US

BÜHLER TECHNOLOGIES

GAS ANALYSIS

COMPONENTS AND SYSTEMS FOR GAS CONDITIONING & PARTICLE MONITORING

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1 General Information

US

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BÜHLER TECHNOLOGIES

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GAS ANALYSIS

INNOVATIVE, DIVERSE AND EFFICIENT

In many areas of manufacturing, energy production and environmental protection, continuously monitoring process data, limits and occupational safety are key for efficient and safe equipment operation.

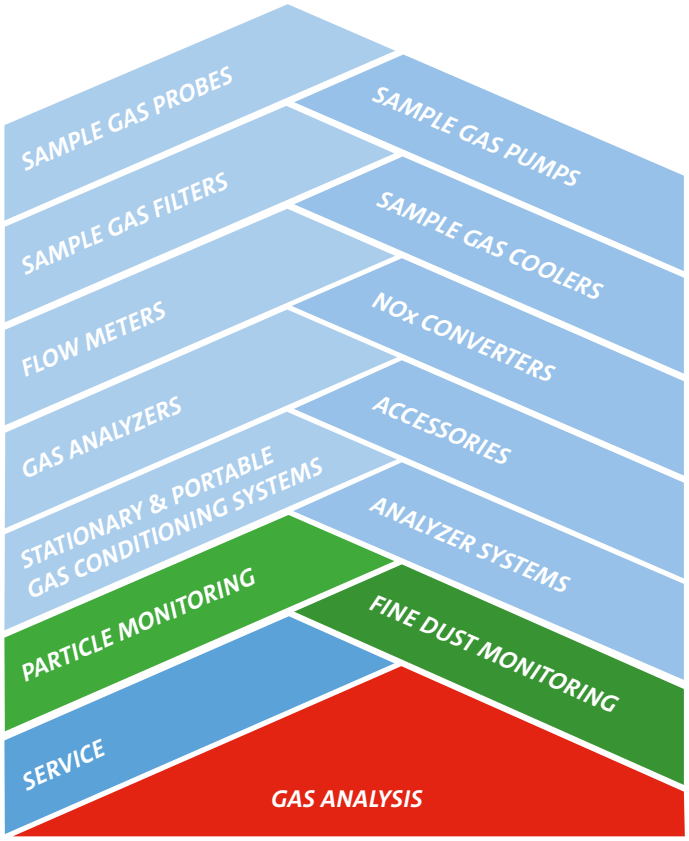
Analyzing the process atmosphere from gas and particle emissions as well as immission affecting the environment are a key task. Many of the analysis methods used in these areas require extracting the sample gas. Process-related contaminants such as particles or moisture are inevitably also extracted. These in turn can impact the readings or damage the measuring cells of the high-quality analyzers. The sample gas therefore needs to be conditioned before it enters the analyzer. Depending on the application, this conditioning uses multiple stages. It starts at the sample gas extraction point and ends with releasing or returning the gas once it has been analyzed. Based on the often toxic and/or corrosive nature of the sample gas, conventional standard components from general measuring and control technology cannot be used.

Reliable analysis systems require devices and components developed specifically for this field of application.

In workplace and environmental monitoring the fine particle concentration is becoming more and more important. Here, network-compatible monitors with a modern digital connection are the first choice.

Filter monitors offer optimal conditions for monitoring particulate emissions in waste gas streams, e.g. of dust filters, to ensure active filter management.

Bühler Technologies has been a world renowned technology driver for this sophisticated equipment for 50 years.



COMPONENTS / ANALYSIS SYSTEMS

SAMPLE GAS PROBES

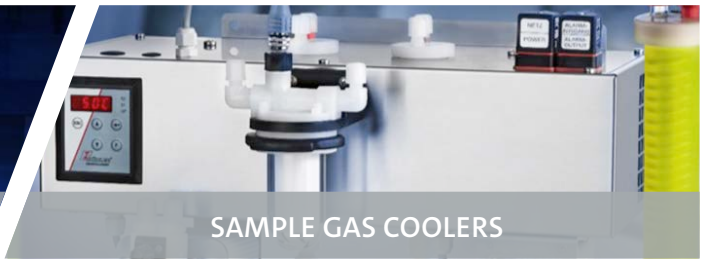
Sample gas probes are a critical point between process and analysis system. They must be able to extract sample gas from the process stream unaltered and supply it for further transport to the analyzer system.

SAMPLE GAS FILTERS

Even if the particulate was already removed at the sampling point using an effective particle filter in the sample gas probe, there's still a risk of fine particles entering the measuring system. Effective analysis filters are therefore required.

SAMPLE GAS PUMPS

If the process pressure is not adequate to safely transport sufficient amounts of the sample gas to the analyzers, reliable and noncorrosive sample gas pumps are needed.

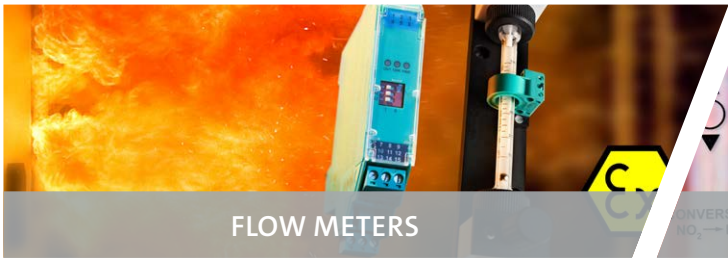


SAMPLE GAS COOLERS

One important element in gas conditioning is removing any moisture from the gas. We offer various gas cooler models for this purpose. Plus the necessary accessories such as condensate removal and moisture detectors. Precoolers and water coolers / gas scrubbers complete the sample gas cooler line.

GAS CONDITIONING

COMPONENTS / ANALYSIS SYSTEMS



FLOW METERS

Reliable analysis results require consistent operating conditions. This also includes setting and monitoring the flow rate precisely. At the same time, flow meters serve as filter monitors.

NOx CONVERTERS

Nitrogen oxide emission need to be reduced and monitored to protect humans and the environment. The BüNOx 2+ converter series converts these to a measurable quantity. Advantages of these devices are high energy efficiency, converter materials with a high conversion rate and optional built-in bypass valves.

ACCESSORIES

A range of useful accessories such as needle valves, ball valves and different screw fittings make it easier for the plant manufacturer to plan and implement systems specifically suited for gas analysis.

GAS ANALYZERS

The selective program based on 50 years of experience includes in situ or “Closed-coupled extractive” analyzers, portable gas analyzers, stationary devices for extractive analyzer systems. Implementable depending on the application: paramagnetic measuring cells, ZrO_2 modules, IR and UV banks, electrochemical cells.

PORTABLE GAS CONDITIONING SYSTEMS

The gas analyzers used to monitor emissions are available as stationary or portable analysis systems.

ANALYZER SYSTEMS

We provide both prefabricated, modular 19” systems for one or multiple gas paths as well as custom analyzer systems.

MONITORING

PARTICLE AND FINE DUST MONITORING

The user-friendly particle monitors in our BDA series are high-quality systems for monitoring fabric filters and other separators.

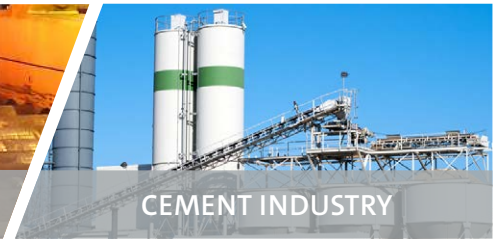
Network-compatible monitors for monitoring the fine dust concentration in buildings and the environment.

SERVICE

HERE FOR YOU AROUND THE CLOCK

Individuality and flexibility are also the focus of our services. Our service team is not only a reliable point of contact for Bühler Technologies products, but also beyond, for products from other manufacturers.

GAS ANALYSIS INDUSTRIES



GAS ANALYSIS

INNOVATIVE, DIVERSE AND EFFICIENT

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For further countries please contact our export department.

2 Sample Probes

Sample Gas Probes - Series GAS 222

Description

The sampling point (measuring point) is the critical interface between the process and the measuring system. Sample gas probes require a special design for the typically rough and challenging process parameters. A tough design and a flexible configuration reduce installation and operating costs.

The GAS 222 series sample gas probes are modular and enable easy alignment with the specific requirements of the respective process.

BASIC CONFIGURATION

- Unheated, heated self-regulating, heated with regulator,
- Probes for use in explosive area ATEX Zone 1, 21 or 2 and AMEX Class I Div 2. Some Atex probes allow sampling from Zone 0 and 20,
- Inlet and/or outlet filter
- Designed for high dust loads

FEATURES

- Easy to use
- Tool-less filter change
- Weather hood opens without tools,
- Special insulation for steady temperatures and protection against contact,
- Highly effective filter cleaning system for greatly reduced maintenance,
- Integrated complete system for fully automated control.

OPTIONS AND ACCESSORIES

- Vast range of inlet and outlet filters in different materials,
- Heated and unheated extensions,
- Different blowback options including blowback control.

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Sample gas probes with outlet filter

This type of gas probes is used for applications with low dust concentrations (up to approx. 2 g/m³).

The filter elements can be changed very quickly without tools.

Sample gas probes with inlet filter

With these sample gas probes, the filter element is located directly inside the process.

Combining this probe with effective blowback yields a very long filter life. This drastically reduces operating and maintenance expenses.

Filter elements are available in different materials and sizes depending on the dust concentration and other application parameters.

The efficient blowback system is based on a compressed air tank directly on the probe. The sequential control of solenoid valves a high, pressurised purging gas volume runs through the filter element in the opposite direction during blowback. If necessary, the purging gas can be heated.

The blowback cycle is either controlled by the system controller or an optional built-in or separate blowback control.

On probe type GAS 222.35, the inlet filter is easy to access for maintenance without tools.

The probe remains installed in the process. This further reduces maintenance costs.

Combination of inlet and outlet filter

Some operators require installing an outlet filter in addition to the inlet filter to serve as “last change filter”. This is also an option. In this case, however, the blowback system will only clean the inlet filter. The outlet filter element is easy to replace without tools.

Heated and unheated sample gas probes

Water or water steam are an inherent part in many processes. Moisture together with dirt particles produce undesirable contamination in the measuring system. The sample gas must therefore remain inside the gas phase during filtration. This is implemented by heating the gas probe and the gas line, however the temperature must remain above the gas dew point.

Depending on the application, the probes can be heated electrically or with steam. The electric heating elements can be self-regulating or regulated by a temperature regulator mounted directly to the probe.

Sample gas probes for Ex zones

For applications in explosive areas we offer ATEX or CSA-C and CSA-US approved sample gas probes. These can be used in zones 1, 21/ category 2 and Zone 2/ category 3 or Class I Div 2, Gps B, C and D. In some cases gas can be sampled from zones 0 and 20. All basic components and the blowback option can be implemented. Furthermore, all unheated and steam heated probes can be used in Ex areas.

Sampling tubes and sampling tube extensions

We offer various heated and unheated sampling tubes and different extensions for these tubes.

A regulator for heated extensions can optionally be integrated in the probe controller.

Options

Vast range of accessories as well as test gas connections, integrated regulator for heated extension, integrated blowback control etc.

Combinations and versions

Please carefully read the specific data sheets to determine the correct probe type.

All properties of the basic types and possible combinations are detailed in the respective data sheets.

Data sheet no. 461099 contains additional important information on accessories.

Please submit your detailed specifications if you are unable to find a product to fit your application.

Data sheets and probe selection

The data sheets describe the specific probe type. In addition to this information, there are charts and drawings. The probe selection chart and the following examples illustrate the possible combinations of gas probes for a custom solution.

Our experts are here to assist you if you have any questions or require support in designing your measuring system.

Probe selection

The chart shows the key selection criteria to determine a gas probe and guide you through our product range. Once you have selected a specific gas probe, please carefully read the data sheet (number specified) to ensure it meets all of your requirements.

Please refer to data sheet no. 461099 for a list of accessories.

	Non-explosive area			Explosive area			
Dust load Filter type	**Heated, self-regulating**	**Heated, with regulator**	**Unheated**	**Heated 1GD/2GD Extraction from zones 0, 20/ use in Zone 1, 21**	**Heated 3G Extraction from / use in zone 2**	**Class I, Div 2**	**Extraction temperature max.**
	max. permissible operating pressure 6 bar (87 psi)/max. permissible probe inlet temperature 200 °C (392 °F)						
up to 2 g/m³ Outlet filter	**GAS 222.15** (461015)	**GAS 222.20** (461020)	**GAS 222.10** (461010)	**GAS 222.20 ATEX *** (461120)	**GAS 222.20 ATEX 2** (461220)	**GAS 222.20 AMEX** (461520)	**1600 °C (2912 °F)**
	GAS 222.15 ANSI/CSA (461415)	**GAS 222.20 ANSI/CSA** (461420)	**GAS 222.10 ANSI** (461410)				
	GAS 222.17 (461017)	**GAS 222.21** (461021)	**GAS 222.11** (461011)	**GAS 222.21 ATEX *** (461121)	**GAS 222.21 ATEX 2** (461221)	**GAS 222.21 AMEX** (461521)	
	GAS 222.17 ANSI/CSA (461417)	**GAS 222.21 ANSI/CSA** (461421)	**GAS 222.11 ANSI/CSA** (461411)				
			Steam heated **GAS 222.20DH** (461320)				
			GAS 222.20DH ANSI/CSA (461620)				
> 2 g/m³ Inlet filter		**GAS 222.31** (461031)	**GAS 222.30** (461030)	**GAS 222.31 ATEX *** (461131)	**GAS 222.31 ATEX 2** (461231)	**GAS 222.31 AMEX** (461531)	**1000 °C (1832 °F)**
		GAS 222.31 ANSI/CSA (461431)	**GAS 222.30 ANSI/CSA** (461430)				
> 2 g/m³ Inlet and outlet filter		**GAS 222.21** (461021)		**GAS 222.21 ATEX *** (461121)	**GAS 222.21 ATEX 2** (461221)	**GAS 222.21 AMEX** (461521)	
		GAS 222.21 ANSI/CSA (461421)					
> 2 g/m³ inlet filter removable without tools		**GAS 222.35** (461035)	**GAS 222.35U** (461335)	**GAS 222.35 ATEX *** (461135)	**GAS 222.35 ATEX 2** (461235)	**GAS 222.35 AMEX** (461535)	**600 °C (1112 °F)**
		GAS 222.35 ANSI/CSA (461435)	**GAS 222.35U ANSI/CSA** (461435)				

*max. gas inlet temperature 135 °C (275 °F)

Ordering instructions

1. Select the base model from the chart.
2. Select the item number of the basic gas probe from the respective data sheet.
3. Select accessories using data sheet no. 461099 to customise the base model to your application and ensure safe operation.

Example 1:

The application has a dust concentration of approx. 89 g/m³ with moisture present, the process temperature is between 500 °C (932 °F) and 600 °C (1112 °F), to be installed in non-Ex area.

The process has no notable aggressive components.

The voltage is 230 VAC and probe blowback is monitored by an existing SPS.

Solution:

Per the probe selection chart, 3 probe models would be suitable, as the process temperature is between 500 °C (932 °F) and 600 °C (1112 °F): GAS 222.31, GAS 222.21 and GAS 222.35

If lower operating costs are more important, probe type GAS 222.35 would be used: The item number for the heated gas probe GAS 222.35 is 4622235.

Use data sheet DE 461099 to complete the gas probe: An inlet filter will be used: Item no.: 46222359.

For effective probe blowback we recommend a blowback vessel, item no.: 46222PAV.

A solenoid valve is required between the blowback vessel and the gas prove to control the probe blowback: Item no.: 46222PAVMV3.

The complete gas probe consists of:

Item no.: 4622235, quantity 1

Item no.: 46222359, quantity 1

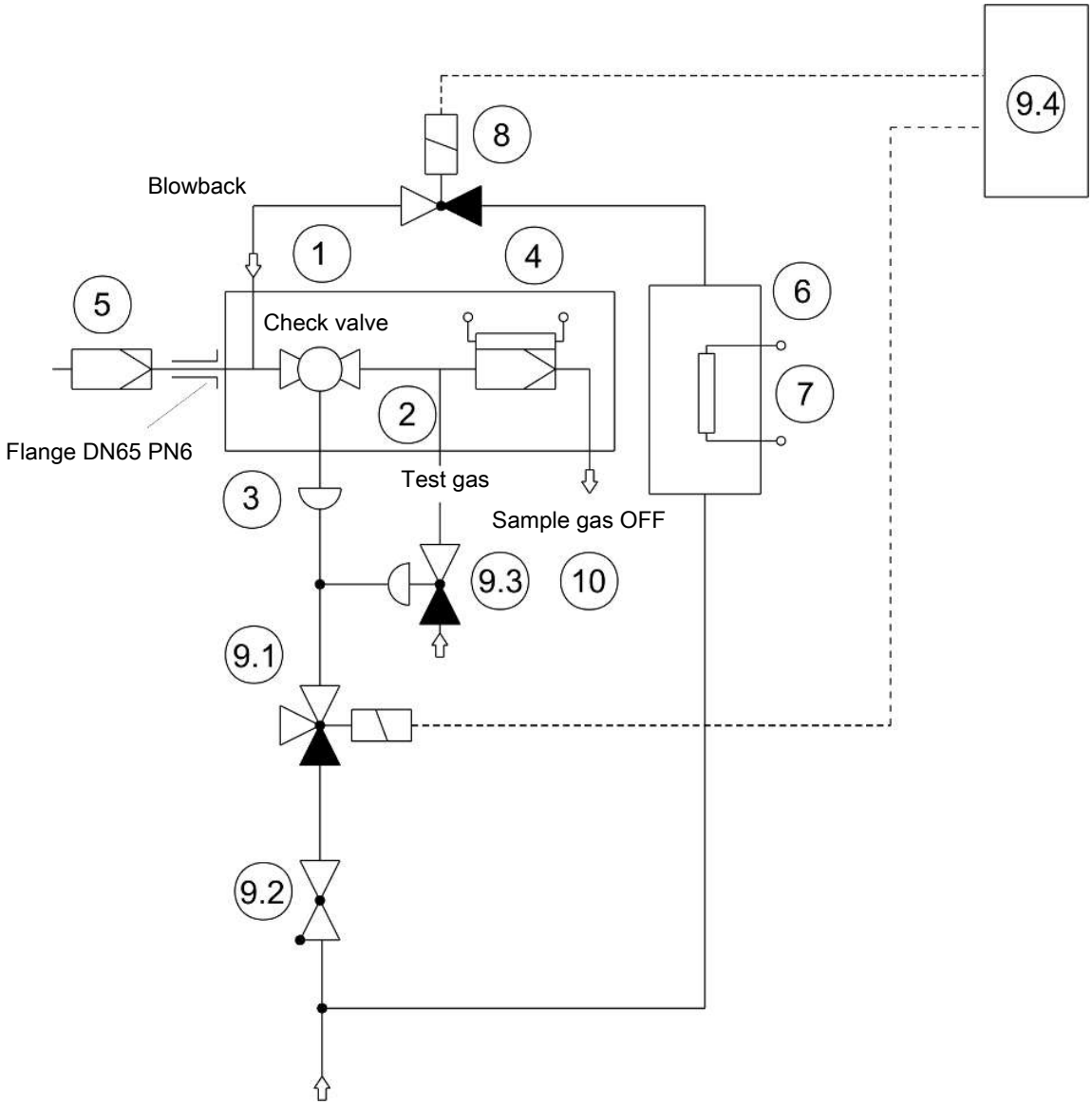
Item no.: 46222PAV, quantity 1

Item no.: 46222PAVMV3, quantity 1*

**Assuming the sample gas path in the measuring system will be shut off during probe blowback.*

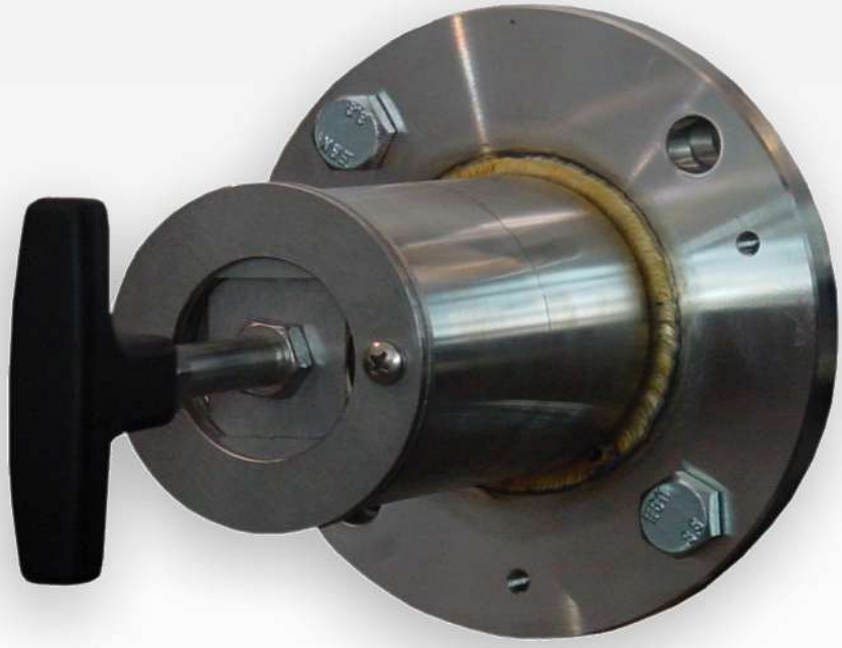
Example 2:

GAS 222.21 with automatic blowback and control unit



Application similar to **Example 1**, extraction temperature approx. 600 °C (1112 °F). The particle concentration is always over 10 g/m³ and inconsistent. Therefore a large filter element should be used and a “Last chance” filter element is recommended. Blowback is controlled by the central SPS.

No.	Description	Data sheet no.	Item no.
1	Probe GAS 222.21	461021	4622221
2	Test gas connection	461099	46222309
3	Pneumatic drive for ball valve	461099	46222008
4	Outlet filter	461099	46222010
5	Inlet filter	461099	46222303
6	Compressed air tank	461099	46222PAV
7	Self-regulating heater	461099	46222PAVHZ1
8	2/2-way solenoid valve for purge air	461099	46222PAVMV3
9	Control unit for blowback-compatible probe consists of: **9.1** 3/2-way solenoid valve for pneumatic drive **9.2** Check valve (upon request) **9.3** Pneumatic valve for test gas **9.4** Terminal box for solenoid valves		upon request
10	Fitting for sample gas connection	461099	9026172



Sample gas probe GAS 222.10

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

Unheated probe with downstream filter for indoor installation.

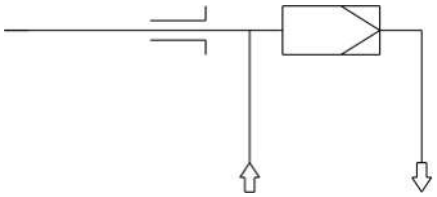
The filter element can easily be removed by turning the handle 90°

For dust loads up to 2 g/m³

The probe is suitable for use in explosive areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data	
Operating temperature:	max. 395 °F
Max. operating pressure:	85 psia
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

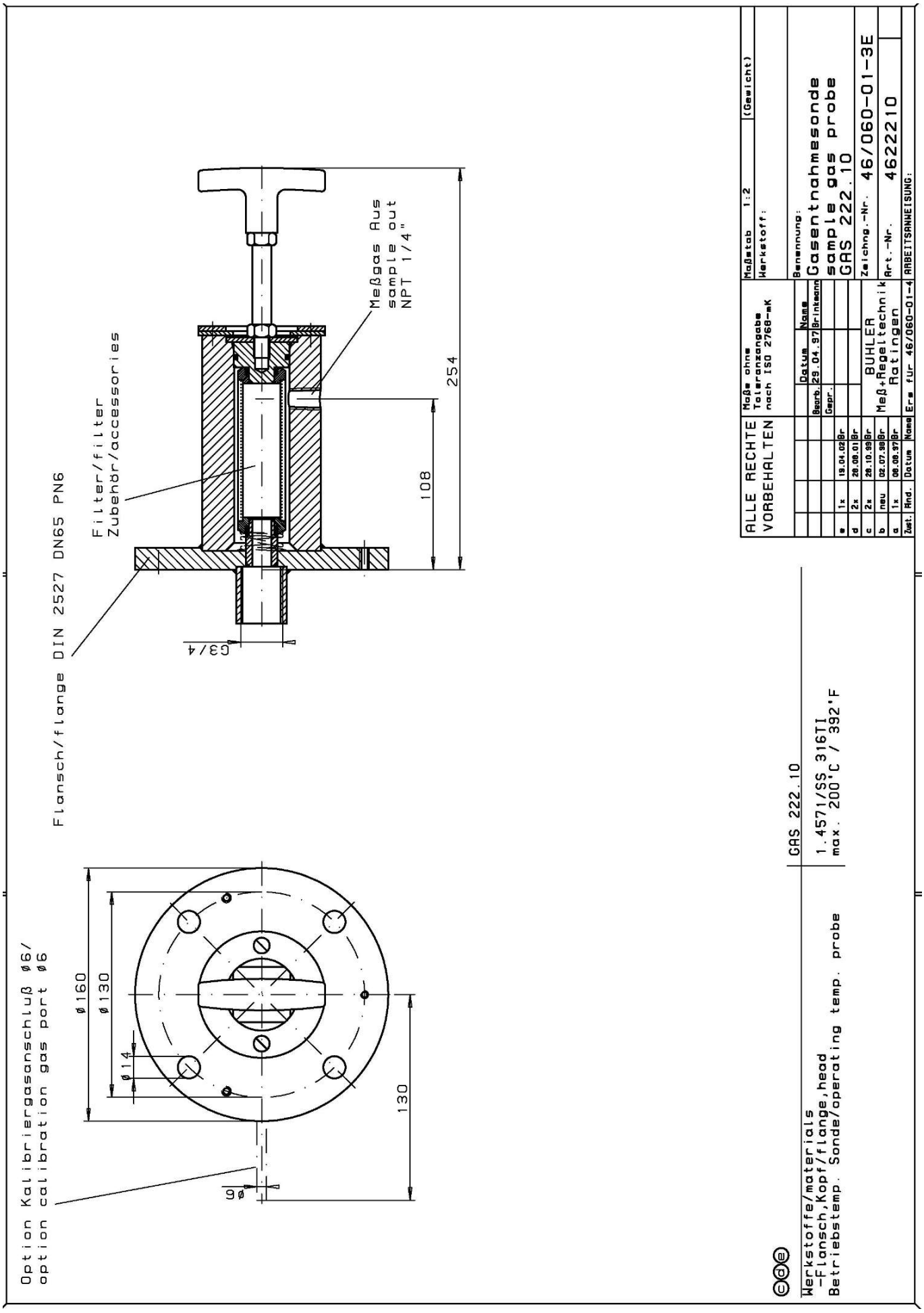
4622210	X	9	9	0	0	X	0	0	9	9	9	9	9	9	Product Characteristics
															Flange
	0														DIN DN65 PN6
	2														ANSI 3"-150 lbs - without CSA C & US approval
															Power supply sample probe
					0										none
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

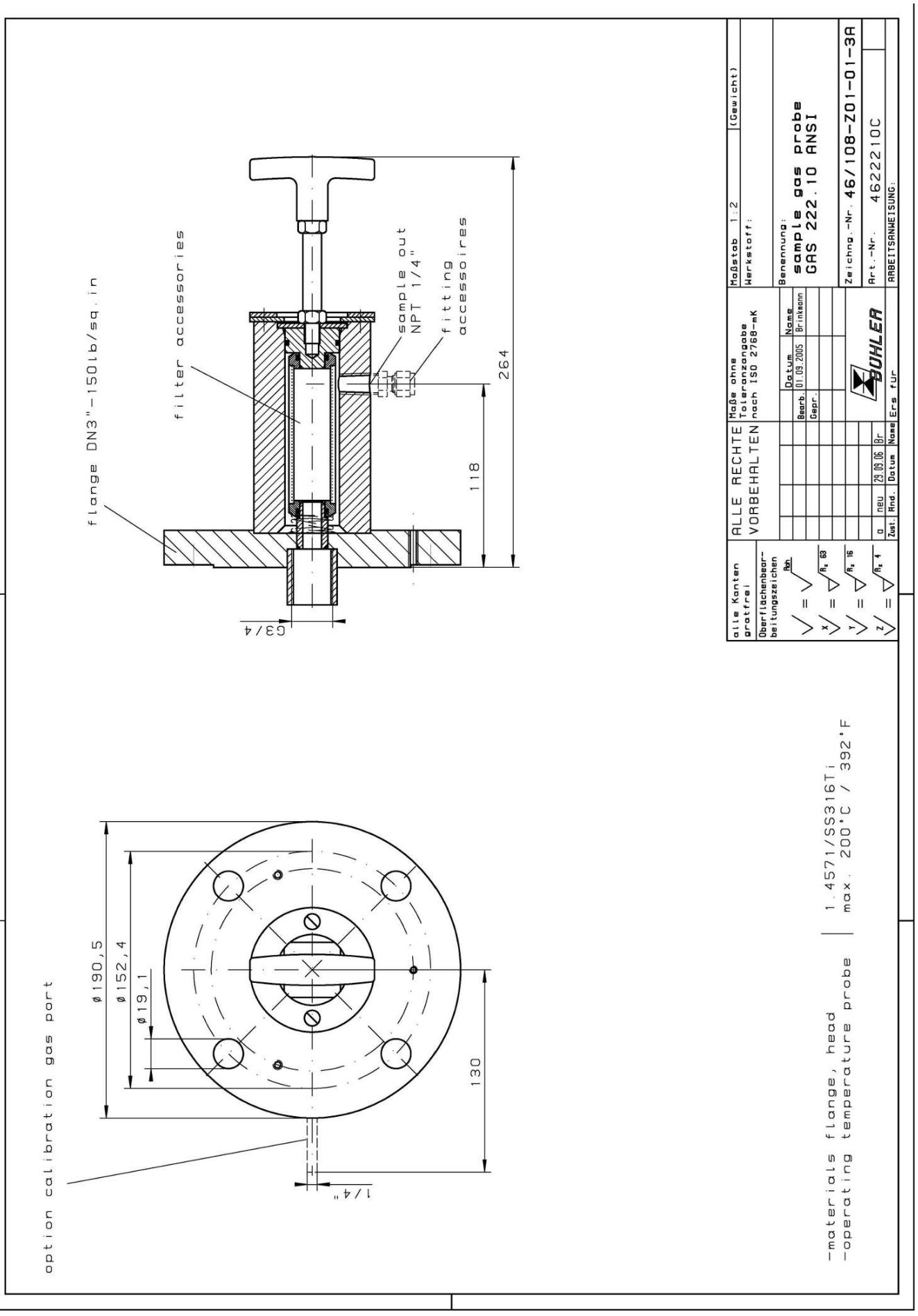
Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Meßgas Aus
sample out
NPT 1/4"
254
108
G3/4
Filter/filter
Zubehör/accessories
Flansch/flange DIN 2527 DN65 PN6
Option Kalibriergasanschluß ø6/
option calibration gas port ø6
ø160
ø130
ø14
130
9ø
ALLE RECHTE VORBEHALTEN
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab 1:2
(Gewicht)
Werkstoff:
Benennung:
Gasentnahmesonde
sample gas probe
GAS 222.10
Datum
Name
Bearb. 29.04.97 Brinkmann
Gepr.
Zeichng.-Nr. 46/060-01-3E
Art.-Nr. 4622210
BUHLER
Meß+Regeltechnik
Ratingen
ARBEITSANWEISUNG:
Ers. für 46/060-01-4
GAS 222.10
1.4571/SS 316TI
max. 200°C / 392°F
Werkstoffe/materials
-Flansch,Kopf/flange,head
Betriebstemp. Sonde/operating temp. probe

Dimensions (ANSI flange)

NOTICE! ANSI flange only available without CSA approval.



Sample gas probe GAS 222.11

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Unheated probe with shut-off valve and/or upstream filter
- The filter element can easily be removed by turning the handle 90°
- For dust loads up to 2 g/m³, non-condensable gases. Combined with upstream filter up to 10 g/m³ and higher
- The probe is suitable for use in explosive areas

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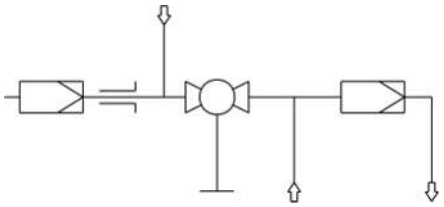
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data

Probe operating temperature:	max. 392 °F	
Ambient temperature without accessories:	-4 to 176 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	14 °F < T_{amb} < 131 °F
	Pneumatic drive:	-4 °F < T_{amb} < 176 °F
	Limit switch:	-4 °F < T_{amb} < 212 °F
	Solenoid valve for pneumatic drive:	14 °F < T_{amb} < 131 °F
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Compressed air valve:	14 °F to 176 °F
	Solenoid valve for pneumatic drive:	14 °F to 212 °F
Max. operating pressure:	85 psia	
Materials in contact with media		
Flange:	Stainless steel 1.4571	
Probe body:	Stainless steel 1.4571	
Ball valve:	Stainless steel 1.4408/1.4462/PTFE	
Seal:	Stainless steel 1.4404/graphite/and see filter	

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622211	X	9	9	0	0	X	0	0	X	X	X	X	X	X	Product Characteristics
															Flange
	0														DIN DN65 PN6
	2														ANSI 3"-150 lbs - without CSA C & US approval
															Power supply sample probe
					0										none
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve
															Connection heated extension
							0								No
															Built-in temperature controller for heated extension
								0							No
															Blowback with air reservoir [1]
															Air reservoir heating
									1						Yes
									9						No
															Built-in blowback control
										9					No
															Compressed air valve / valve voltage information
											0				Manual
											1				115 V
											2				230 V
											3				24 V
											9				None (if no blowback requested)
															Pneumatic drive for ball valve
												0			Manual
												1			Monostable pressure-free open
												2			Monostable pressure-free closed
												3			Bi-stable
															Limit switch for pneumatic drive
													1		Yes
													9		No
															Control valve for pneumatic drive
														3	3/2-way valve
														5	5/2-way valve
														9	No control valve

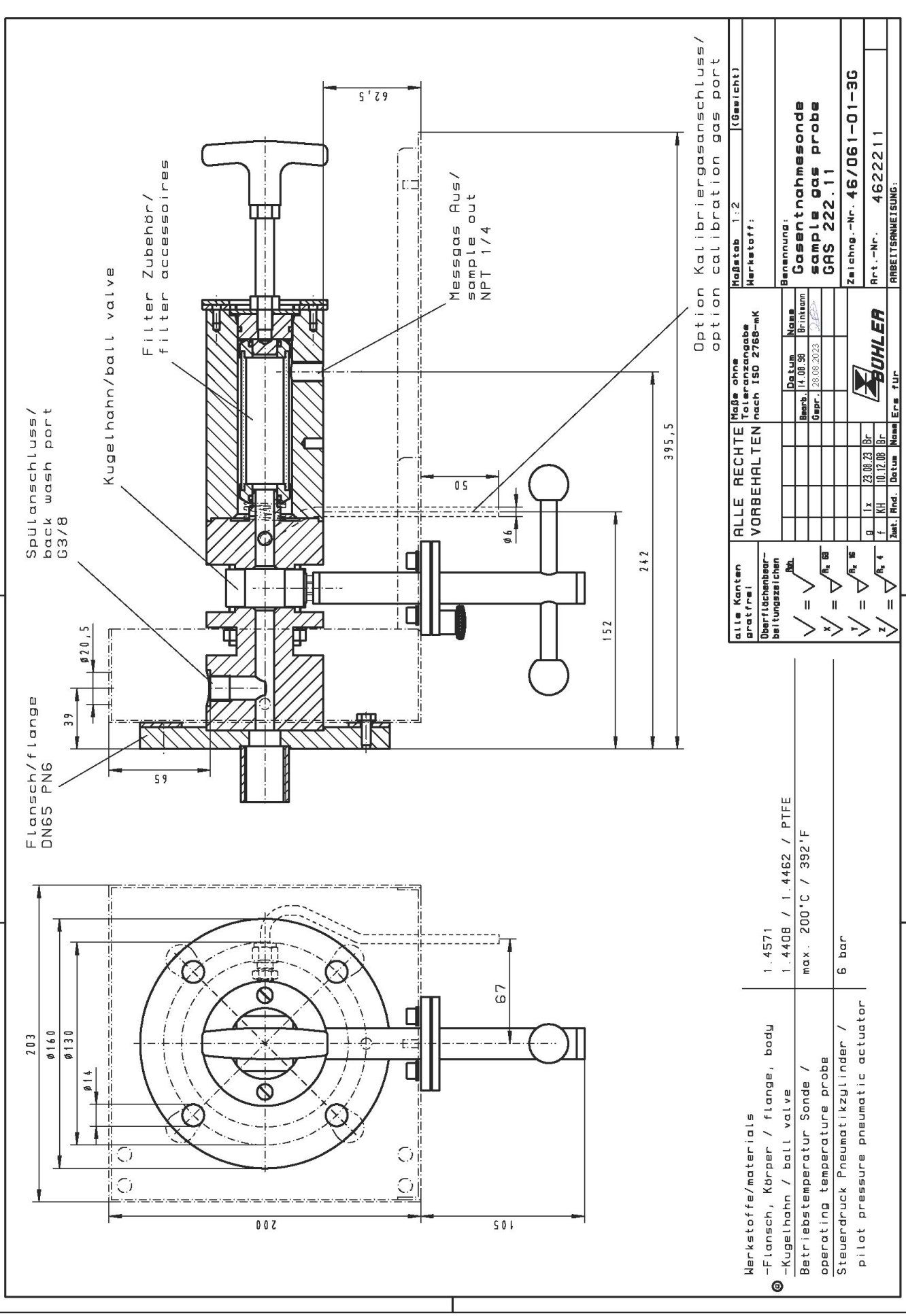
[1] In the case of flammable gases, always use inert gas for blowback. Probe blowback prohibited when using explosive sample gas!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions

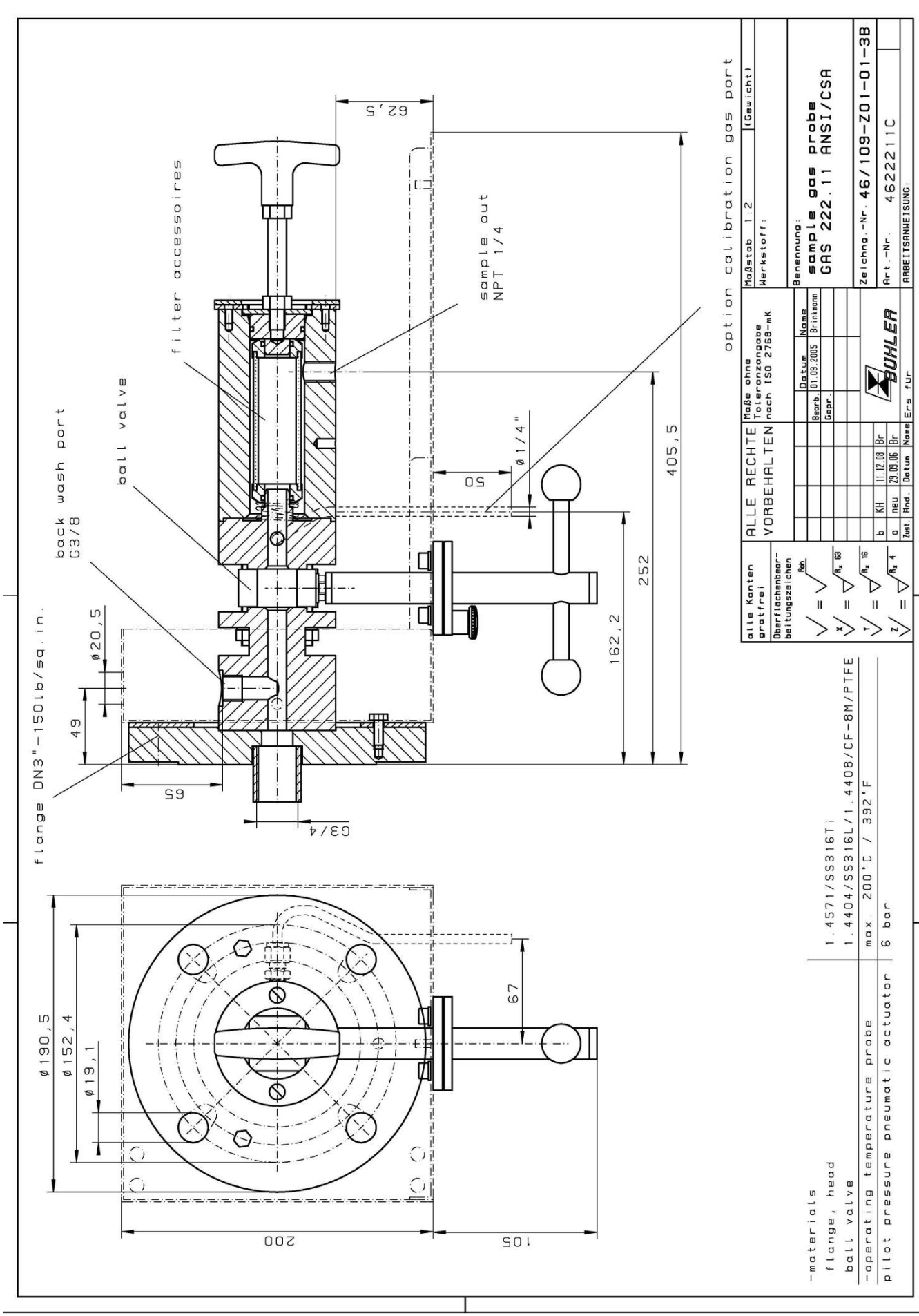


Werkstoffe/materials

-Flansch, Körper / flange, body	1.4571
-Kugelhahn / ball valve	1.4408 / 1.4462 / PTFE
Betriebstemperatur Sonde / operating temperature probe	max. 200°C / 392°F
Steuerdruck Pneumatikzylinder / pilot pressure pneumatic actuator	6 bar

Dimensions (ANSI flange)

NOTICE! ANSI flange only available without CSA approval.



Sample gas probe GAS 222.11 Ex1

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Unheated probe with shut-off valve and/or upstream filter
- The filter element can easily be removed by turning the handle 90°
- For dust loads up to 2 g/m³, non-condensable gases. Combined with upstream filter up to 10 g/m³ and higher
- This probe is designed for use in explosive areas. Use in zone 1 and 21 and sampling from zone 0 and 20.

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Internet: www.buhlertech.com

Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-40 to 131 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	-22 °F < T_{amb} < 131 °F
	Solenoid valve for pneumatic drive:	14 °F < T_{amb} < 131 °F
	Pneumatic drive:	-4 °F < T_{amb} < 131 °F
	Limit switch:	-13 °F < T_{amb} < 131 °F
	Terminal box:	-4 °F < T_{amb} < 131 °F
Permissible gas inlet temperatures:	**Outer zone temperature class**	**Permissible gas inlet temperature**
	T2	275 °F
	T3	275 °F
	T4	266 °F
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Compressed air valve:	14 °F to 176 °F
	Solenoid valve for pneumatic drive:	14 °F to 212 °F
Max. operating pressure:	85 psia	
Max. flow rate:	16.66 lpm	
Materials in contact with media Flange: Probe body: Ball valve: Seal:	 Stainless steel 1.4571 Stainless steel 1.4571 Stainless steel 1.4408/1.4462/PTFE Stainless steel 1.4404/graphite/and see filter	
Probe marking, depending on the selected options and temperature class:	**for zone 0/1:** ATEX: Ⓔx II 1G/2G Ex db[1] eb mb[2] IIC T4 Ga/Gb IECEx: Ex db[1] eb mb[2] IIC T4 Ga/Gb **for zone 1:** ATEX: Ⓔx II 2G Ex db[1] eb mb[2] IIC T4 Gb IECEx: Ex db[1] eb mb[2] IIC T4 Gb **for zone 0/21:** ATEX: Ⓔx II 1G/2D Ex db[1] eb mb[2] IIC T4 Ga Ex tb mb[2] IIIC T130 °C Db IECEx: Ex db[1] eb mb[2] IIC T4 Ga Ex tb mb[2] IIIC T130 °C Db **for zone 20/1:** ATEX: Ⓔx II 1D/2G Ex ta IIIC T130 °C Da Ex db[1] eb mb[2] IIC T4 Gb IECEx: Ex ta IIIC T130 °C Da Ex db[1] eb mb[2] IIC T4 Gb **for zone 20/21:** ATEX: Ⓔx II 1D/2D Ex ta/tb mb[2] IIIC T130°C Da/Db IECEx: Ex ta/tb mb[2] IIIC T130°C Da/Db **for zone 21:** ATEX: Ⓔx II 2D Ex tb mb[2] IIIC T130°C Db IECEx: Ex tb mb[2] IIIC T130°C Db [1] "db" only for GAS 222.11/30 versions with limit switch [2] "mb" only for versions with solenoid valve	
Applied standards:	IEC 60079-0 (Ed. 6.0); IEC 60079-7 (Ed. 5.0); IEC 60079-26 (Ed. 3.0); EN 60079-0:2012+A11:2013; EN 60079-7:2015; EN 60079-26:2015	
IECEx certificate number:	IECEx IBE 17.0024X	
ATEX certificate number:	IBExU17ATEX1088X	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622211	X	X	X	X	X	4	0	0	X	X	X	X	X	X	Product Characteristics			
															Terminal box			
	0														No			
	1														Yes			
															Flange			
		0	1												Flange DN65 PN6			
		0	2												Flange DN3"-150			
		x	x												Other			
															Hazardous area			
															Outside			
				4											Zone 1 (Atex/IECEx)			
				7											Zone 21 (Atex/IECEx)			
				9											none			
															Inside			
					3										Zone 0 (Atex/IECEx)			
					4										Zone 1 (Atex/IECEx)			
					6										Zone 20 (Atex/IECEx)			
					7										Zone 21 (Atex/IECEx)			
					9										none			
															Temperature class (inside/outside)			
															Ga/Gb or Gb/Gb	**Ga/Db or Gb/Db**	**Da/Gb or Db/Gb**	**Da/Db or Db/Db**
						4									T4/T4	T4/T130 °C	T130 °C/T4	T130 °C/T130 °C
															Calibration gas port			
									0						No			
									1						6 mm			
									2						6 mm with check valve			
									3						1/4"			
									4						1/4" with check valve			
															Pressure vessel *			
										0					No			
										1					Yes			
															Purge valve *			
											0				Ball valve			
											1				Solenoid valve 110 V (marked with "mb")			
											2				Solenoid valve 230 V (marked with "mb")			
											3				Solenoid valve 24 V (marked with "mb")			
											9				none			
															Pneumatic actuator for internal ball valve			
												0			No			
												1			Monostable pressure-free opened			
												2			Monostable pressure-free closed			
															Limit switch for pneumatic actuator			
													0		No			
													1		Yes (marked with "db" or "ta" or "tb")			
															Solenoid valve for pneumatic actuator			
														0	No			
														1	110 V (marked with "mb")			
														2	230 V (marked with "mb")			
														3	24 V (marked with "mb")			

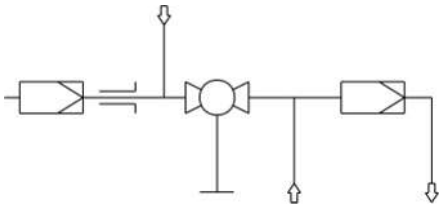
* Blowback of explosive atmosphere prohibited.

Options

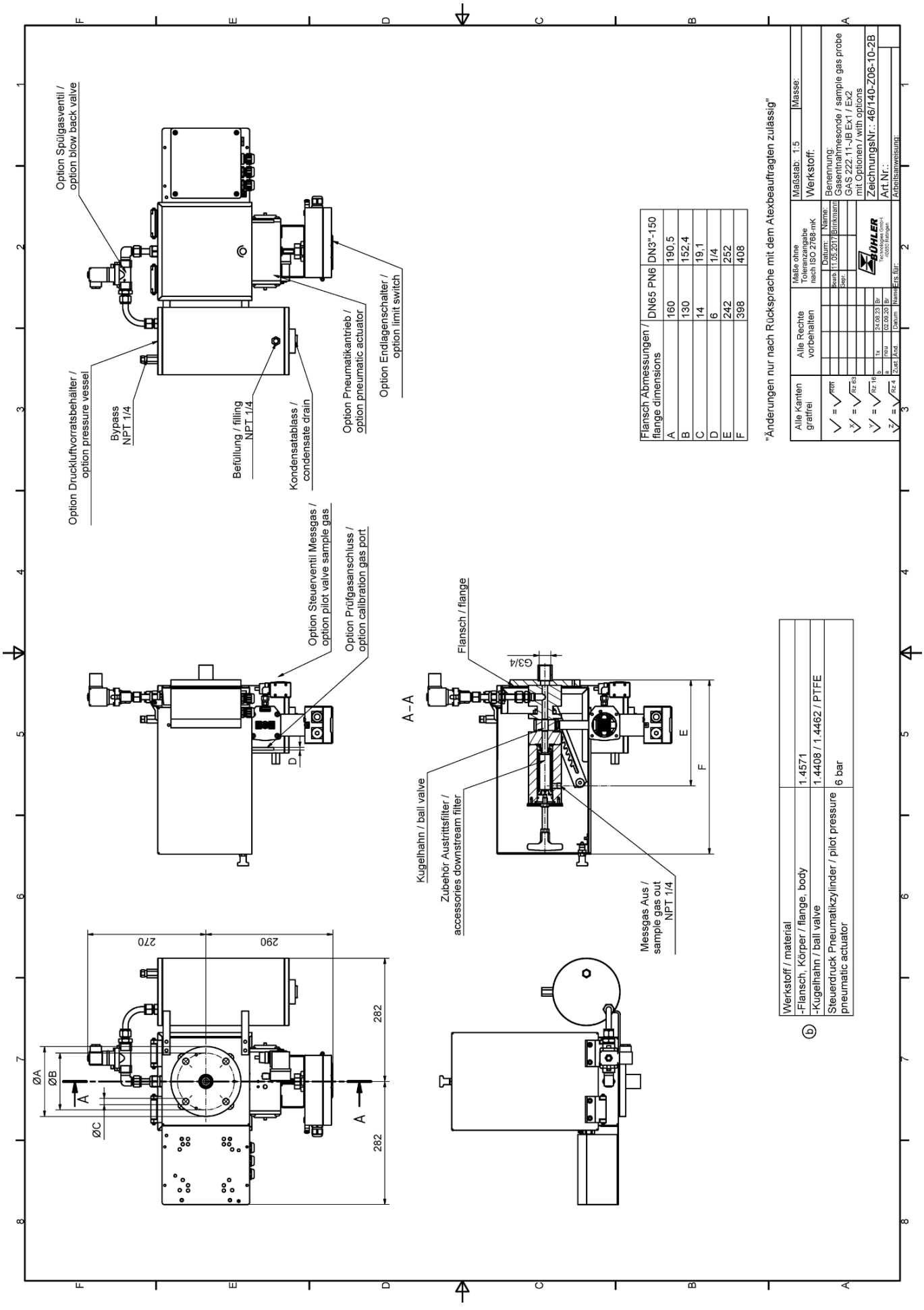
The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Flow chart



Dimensions


Option Spülgasventil / option blow back valve
Option Druckluftvorratsbehälter / option pressure vessel
Bypass NPT 1/4
Befüllung / filling NPT 1/4
Kondensatablass / condensate drain
Option Pneumatikantrieb / option pneumatic actuator
Option Endlagenschalter / option limit switch
Option Steuerventil Messgas / option pilot valve sample gas
Option Prüfgasanschluss / option calibration gas port
D
Flansch / flange
G3/4
A–A
E
F
Kugelhahn / ball valve
Zubehör Austrittsfilter / accessories downstream filter
Messgas Aus / sample gas out NPT 1/4
270
290
282
282
ØA
ØB
ØC
A
A
Flansch Abmessungen / flange dimensions
DN65 PN6
DN3"-150
A 160 190,5
B 130 152,4
C 14 19,1
D 6 1/4
E 242 252
F 398 408
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Alle Rechte vorbehalten
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab: 1:5
Masse:
Werkstoff:
Benennung: Gasentnahmesonde / sample gas probe GAS 222.11-JB Ex1 / Ex2 mit Optionen / with options
ZeichnungsNr.: 46/140-Z06-10-2B
Art.Nr.:
Arbeitsanweisung:
Ers. für:
Name
Datum
Bearb. 11.05.2017 Blinkmann
Gepr.
Zust. Änd.
a nau 02.09.20 Br
b 1:x 24.08.23 Br
Werkstoff / material
-Flansch, Körper / flange, body 1.4571
-Kugelhahn / ball valve 1.4408 / 1.4462 / PTFE
Steuerdruck Pneumatikzylinder / pilot pressure pneumatic actuator 6 bar

Sample gas probe GAS 222.11 Ex2

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Unheated probe with shut-off valve and/or upstream filter
- The filter element can easily be removed by turning the handle 90°
- For dust loads up to 2 g/m³, non-condensable gases. Combined with upstream filter up to 10 g/m³ and higher
- The probe is permitted for use in explosive areas

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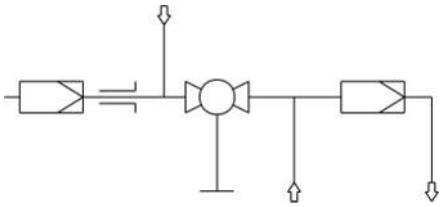
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-4 to 176 °F	
Ambient temperature for accessories:	**Component**	**Ambient temperature range**
	Valve for pressurized air:	-22 °F < T_{amb} < 131 °F
	Solenoid valve for pneumatic actuator:	14 °F < T_{amb} < 131 °F
	Pneumatic actuator:	-4 °F < T_{amb} < 176 °F
	Limit switch:	-13 °F < T_{amb} < 140 °F
	Junction box:	-4 °F < T_{amb} < 158 °F
Max. gas inlet temperature:	383 °F (T3)/266 °F (T4)	
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Valve for pressurized air:	14 °F to 176 °F
	Solenoid valve for pneumatic actuator:	14 °F to 212 °F
Max. operating pressure:	85 psia	
Materials in contact with media Flange: Probe body: Ball valve: Seal:	 Stainless steel 1.4571 Stainless steel 1.4571 Stainless steel 1.4408/1.4462/PTFE Stainless steel 1.4404/graphite/and see filter	
Markings:	ATEX: Ⓔx II 3G Ex ec mb IIC T3/T4 Gc IECEx: Ex ec mb IIC T3/T4 Gc	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622211	X	X	X	X	X	X	0	0	X	X	X	X	X	X	Product characteristics
															Junction box
	0														No
	1														Yes
															Flange
		0	1												Flange DN65 PN6
		0	2												Flange DN3"-150
															Hazardous area Outside and Inside
				2	9										Ex-Zone 2 outside, none inside
				2	2										Ex-Zone 2 outside and inside
															Temperature class
						3									T3
						4									T4
															Power supply sample probe
							0								none
															Calibration gas port
									0						No
									1						6 mm
									2						6 mm with check valve
									3						1/4"
									4						1/4" with check valve
															Capacitive vessel *
										0					No
										1					Yes
															Valve for pressurized air *
											0				Ball valve
											1				Solenoid valve 110 V (marked with "mb")
											2				Solenoid valve 230 V (marked with "mb")
											3				Solenoid valve 24 V (marked with "mb")
											9				none
															Pneumatic actuator for internal ball valve
												0			No
												1			Mono stable depressurized open
												2			Mono stable depressurized closed
															Limit switch for pneumatic actuator
													0		No
													1		Yes
															Solenoid valve for pneumatic actuator
														0	No
														1	110 V (marked with "mb")
														2	230 V (marked with "mb")
														3	24 V (marked with "mb")

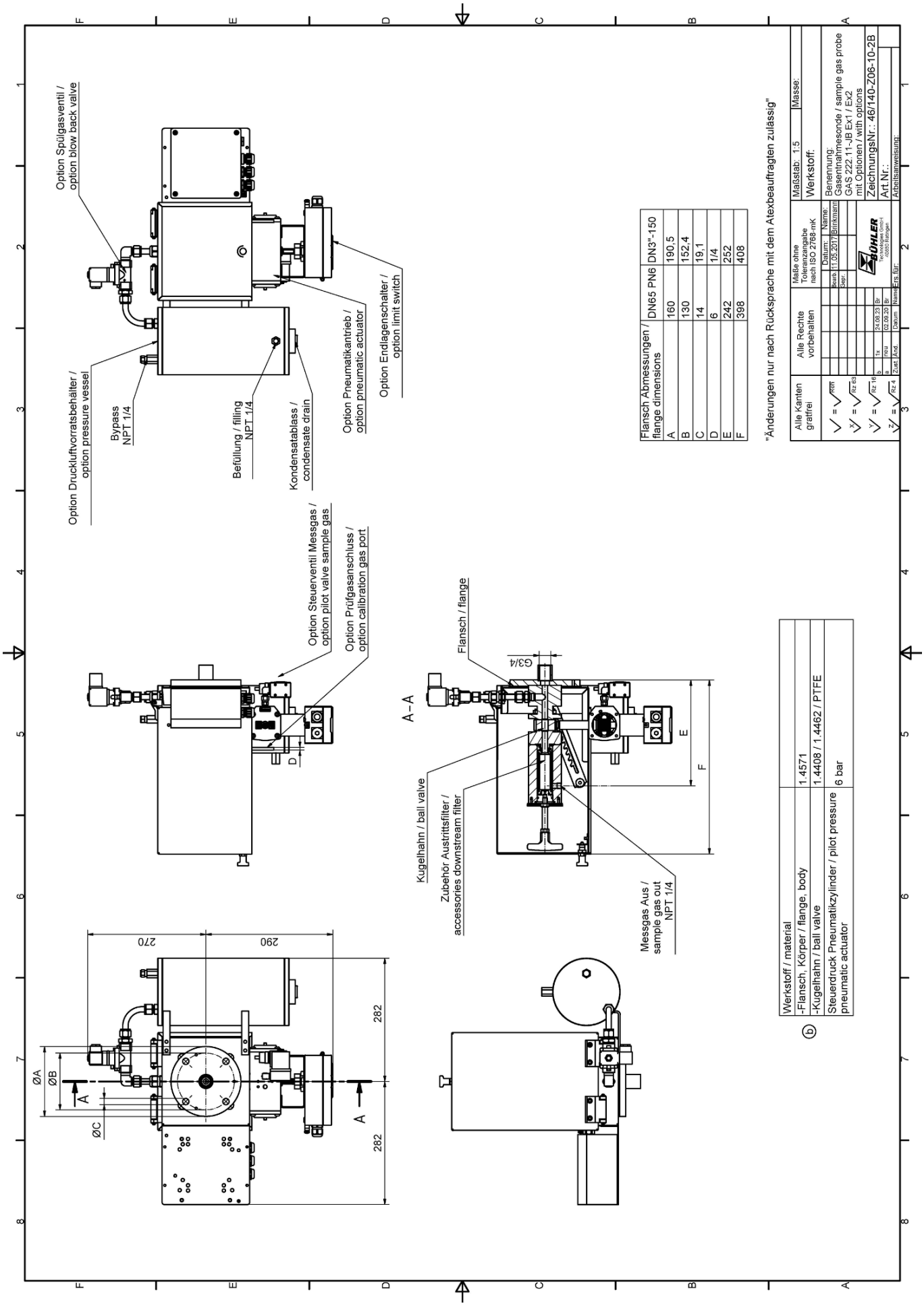
* Blowback of explosive atmosphere prohibited.

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Option Spülgasventil / option blow back valve
Option Druckluftvorratsbehälter / option pressure vessel
Bypass NPT 1/4
Befüllung / filling NPT 1/4
Kondensatablass / condensate drain
Option Pneumatikantrieb / option pneumatic actuator
Option Endlagenschalter / option limit switch
Option Steuerventil Messgas / option pilot valve sample gas
Option Prüfgasanschluss / option calibration gas port
Flansch / flange
G3/4
A–A
Kugelhahn / ball valve
Zubehör Austrittsfilter / accessories downstream filter
Messgas Aus / sample gas out NPT 1/4
270
290
282
282
ØA
ØB
ØC
A
A
D
E
F
Flansch Abmessungen / flange dimensions
DN65 PN6
DN3"-150
A 160 190,5
B 130 152,4
C 14 19,1
D 6 1/4
E 242 252
F 398 408
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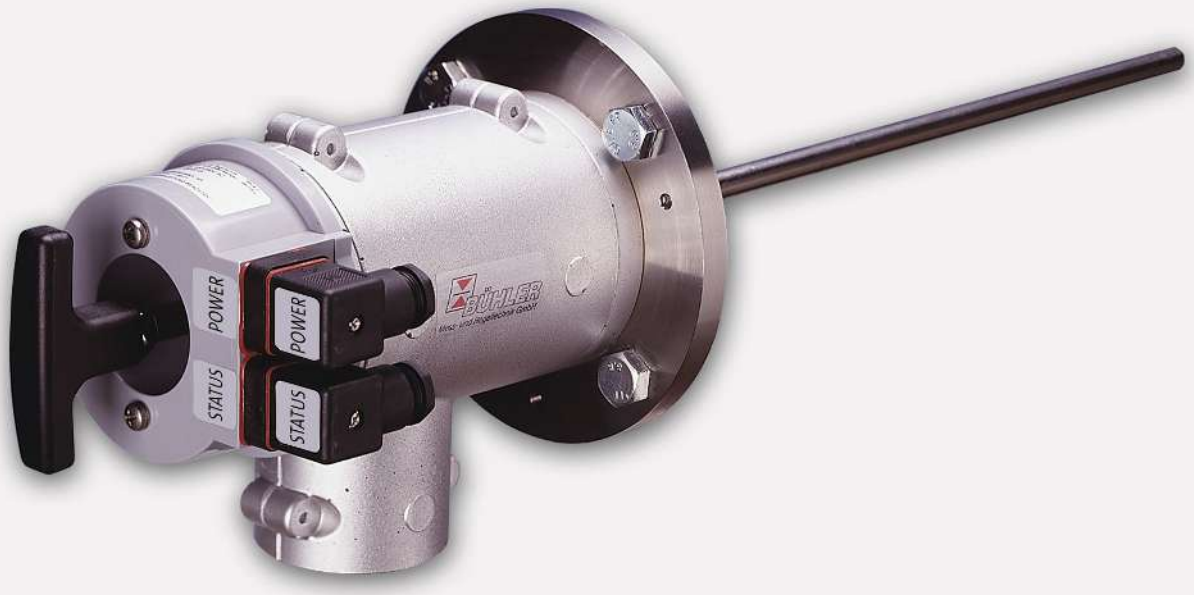
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab: 1:5
Masse:
Werkstoff:
Benennung: Gasentnahmesonde / sample gas probe GAS 222.11-JB Ex1 / Ex2 mit Optionen / with options
ZeichnungsNr.: 46/140-Z06-10-2B
Art.Nr.:
Arbeitsanweisung:
Ers. für:
Name
Datum
Bearb. 11.05.2017 Blinkmann
Gepr.
Zust. Änd.
a neu 02.09.20 Br
b 1:x 24.08.23 Br
Rz 4
Rz 16
Rz 63
Rz 100
Werkstoff / material
-Flansch, Körper / flange, body 1.4571
-Kugelhahn / ball valve 1.4408 / 1.4462 / PTFE
Steuerdruck Pneumatikzylinder / pilot pressure pneumatic actuator 6 bar
b



Sample gas probe GAS 222.15

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with downstream filter
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Self-regulating heater to approx. 356 °F with low temperature alarm
- For dust loads up to 2 g/m³
- This probe is not suitable for use in Ex areas

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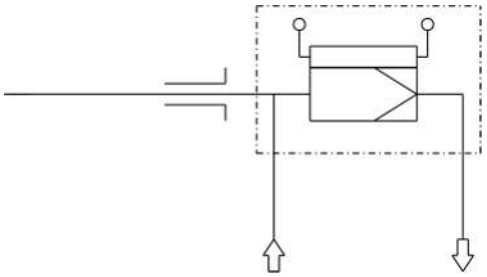
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data	
Probe operating temperature:	max. 395 °F
Ambient temperature:	-4 to 176 °F
Self-regulating heater:	356 °F
Low temperature alarm:	Contact open at operating temperature, closes at < 284 °F, Max. switching current 4 A
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz
Max. operating pressure:	85 psia
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

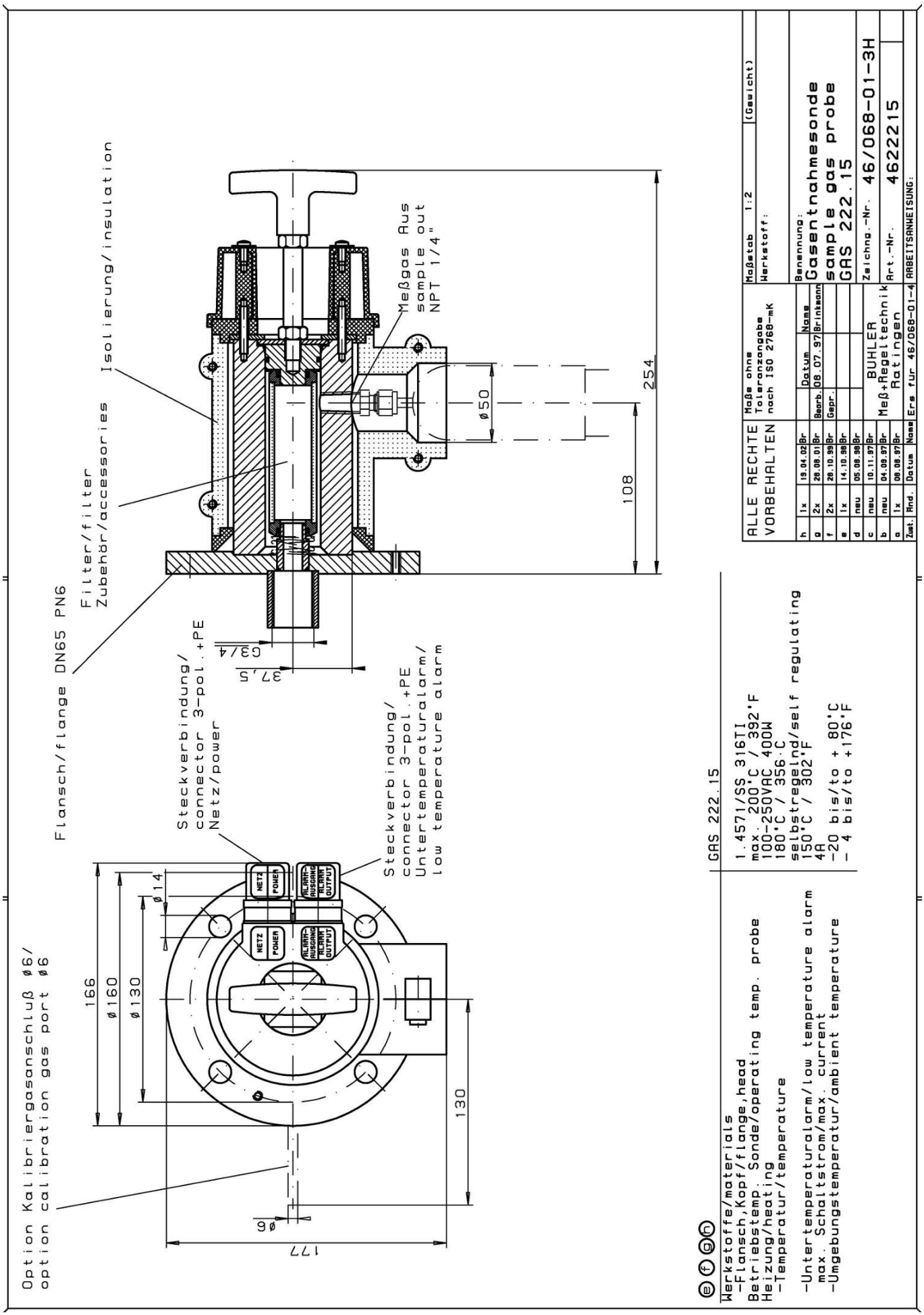
4622215	X	9	9	0	3	X	0	0	9	9	9	9	9	9	Product Characteristics
															Flange
	0														DIN DN65 PN6
	1														ANSI 3"-150 lbs - with CSA C & US approval
	2														ANSI 3"-150 lbs - without CSA C & US approval
															Power supply sample probe
					3										115/230 V
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve

Options

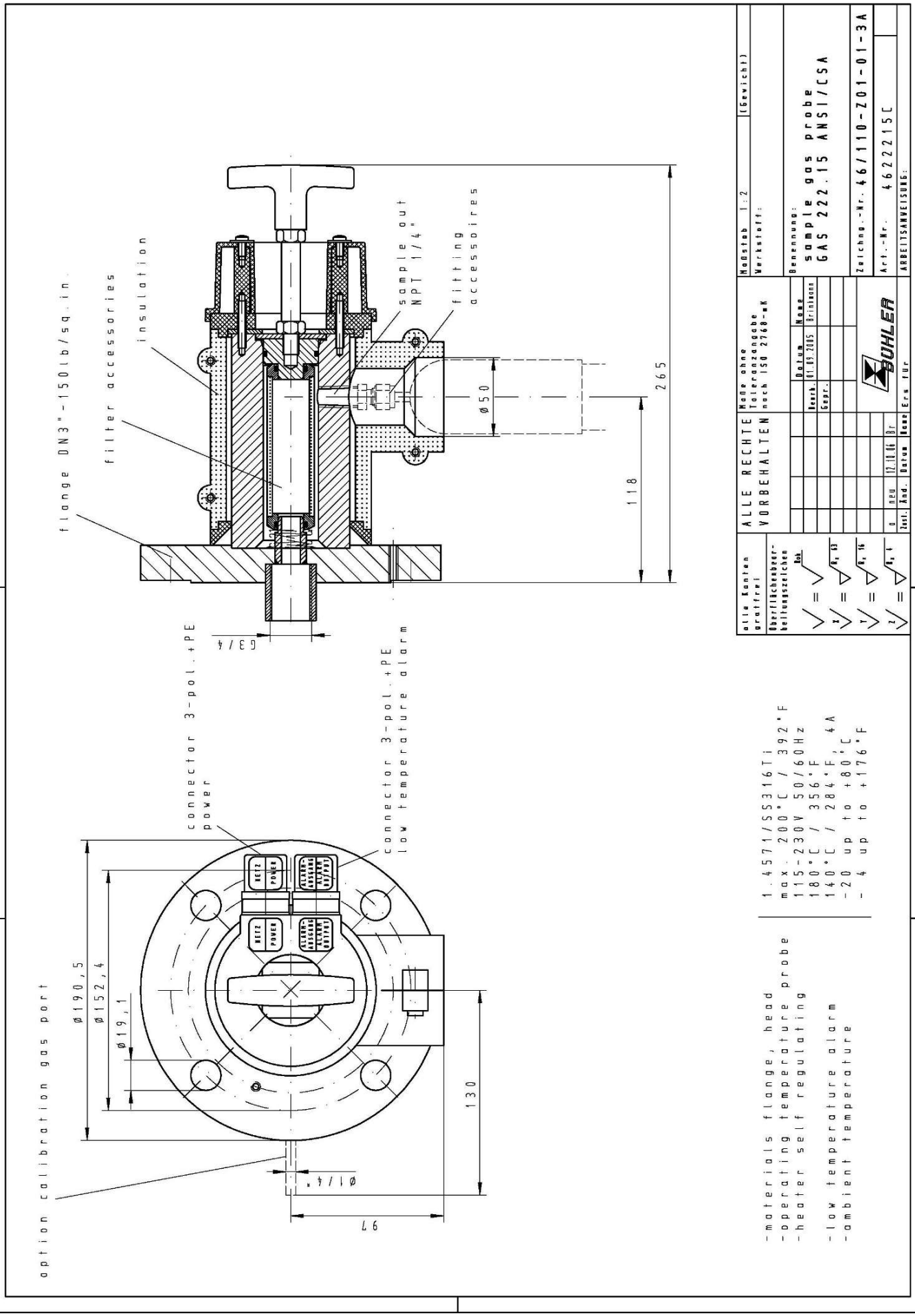
The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Flansch/flange DN65 PN6
Filter/filter
Zubehör/accessories
Isolierung/insulation
Meßgas Aus
sample out
NPT 1/4"
ø50
254
108
G3/4
37,5
Steckverbindung/
connector 3-pol.+PE
Netz/power
Steckverbindung/
connector 3-pol.+PE
Untertemperaturalarm/
low temperature alarm
Option Kalibriergasanschluß ø6/
option calibration gas port ø6
166
ø160
ø130
ø14
130
177
9ø
NETZ
POWER
ALARM
RELAIS
RELAY
OUTPUT
GAS 222.15
1.4571/SS 316TI
max. 200°C / 392°F
100-250VAC 400W
180°C / 356°C
selbstregelnd/self regulating
150°C / 302°F
4A
-20 bis/to + 80°C
- 4 bis/to +176°F
Werkstoffe/materials
-Flansch,Kopf/flange,head
Betriebstemp. Sonde/operating temp. probe
Heizung/heating
-Temperatur/temperature
-Untertemperaturalarm/low temperature alarm
max. Schaltstrom/max. current
-Umgebungstemperatur/ambient temperature
ALLE RECHTE VORBEHALTEN
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab 1:2 (Gewicht)
Werkstoff:
Benennung:
Gasentnahmesonde
sample gas probe
GAS 222.15
Zeichng.-Nr. 46/068-01-3H
Art.-Nr. 4622215
BUHLER
Meß+Regeltechnik
Ratingen
ARBEITSANWEISUNG:
Ers. für 46/068-01-4
h 1x 19.04.02 Br
g 2x 28.08.01 Br
f 2x 28.10.99 Br
e 1x 14.10.98 Br
d neu 05.08.98 Br
c neu 10.11.97 Br
b neu 04.08.97 Br
a 1x 08.08.97 Br
Zust. Änd. Datum Name
Datum Name
Baarb. 08.07.97 Brinkmann
Gepr.

Dimensions (ANSI flange)



Sample gas probe GAS 222.15-MA

The GAS 222.15-MA gas probe was designed specifically for sampling gas in maritime applications. It is certified for operation on ships and offshore units and is type approved by **DNV** and **Lloyd's Register**. The special design features allow the GAS 222.15-MA to also be used in high vibration environments (e.g. on ships) up to an acceleration of 4 g (0.009 lbs).

Similar to large combustion plants, gas analysis in maritime applications also serves monitoring pollutant emissions as well as controlling the combustion process. However, maritime applications pose additional requirements with respect to components compared to stationary applications. The gas probe is therefore protected by a special silicone cover (type of protection IP66).

The GAS 222.15-MA probe is equipped with a self-regulating heater for approx. 356 °F including low temperature alarm (284 °F) and can even be operated in severe ambient conditions of -4 °F and 140 °F. Apart from additional requirements for operation on ships, the GAS 222.15-MA gas probe has the tried and tested advantage of toolless filter changes and a very compact size.

Heated probe with downstream filter
Type tested for use on ships according to **LR and DNV**
Product Design Assessment of the American Bureau of Shipping (ABS)
Certified for high vibration environments up to 4 g (0.009 lbs)
Safe for use in environments between -4 °F and 140 °F
Self-regulating heater to approx. 356 °F with low temperature alarm
Type of protection IP66
The downstream filter can easily be removed by turning the handle 90°
For dust loads up to 2 g/m^3

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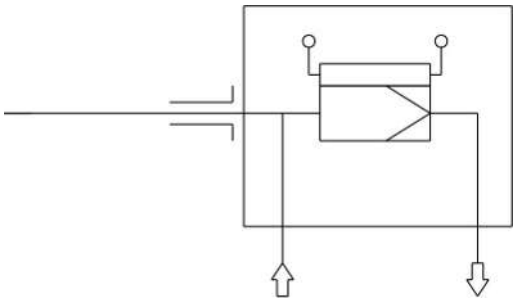
Flow chart



Technical Data

Gas Probe	
Type tested:	**DNV** rules for classification Ships, offshore units, and high speed and light craft Certificate no.: TAA00002FW **Lloyd's Register** Type Approval System, Test Specification Number 1 - March 2019 Certificate no.: LR2008137TA
Product Design Assessment:	ABS
Ambient categories as per DNV-CG-0339:	Temperature: D Humidity B Vibration B EMC B Housing: B (IP66)
Environmental categories as per LR:	ENV1, ENV2
Probe gas inlet temperature:	max. 392 °F
Ambient temperature:	-4 to +140 °F
Self-regulating heater:	+356 °C
Low temperature alarm:	Switching current max. 4 A (switch-back point < 284 °F)
Electrical data:	115 V/230 V, 50/60 Hz, 400 W
Weight:	18.7 lb
IP rating:	IP66
Max. operating pressure:	87 psia
Materials in contact with media:	1.4571, graphite/1.4404 and see filter

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

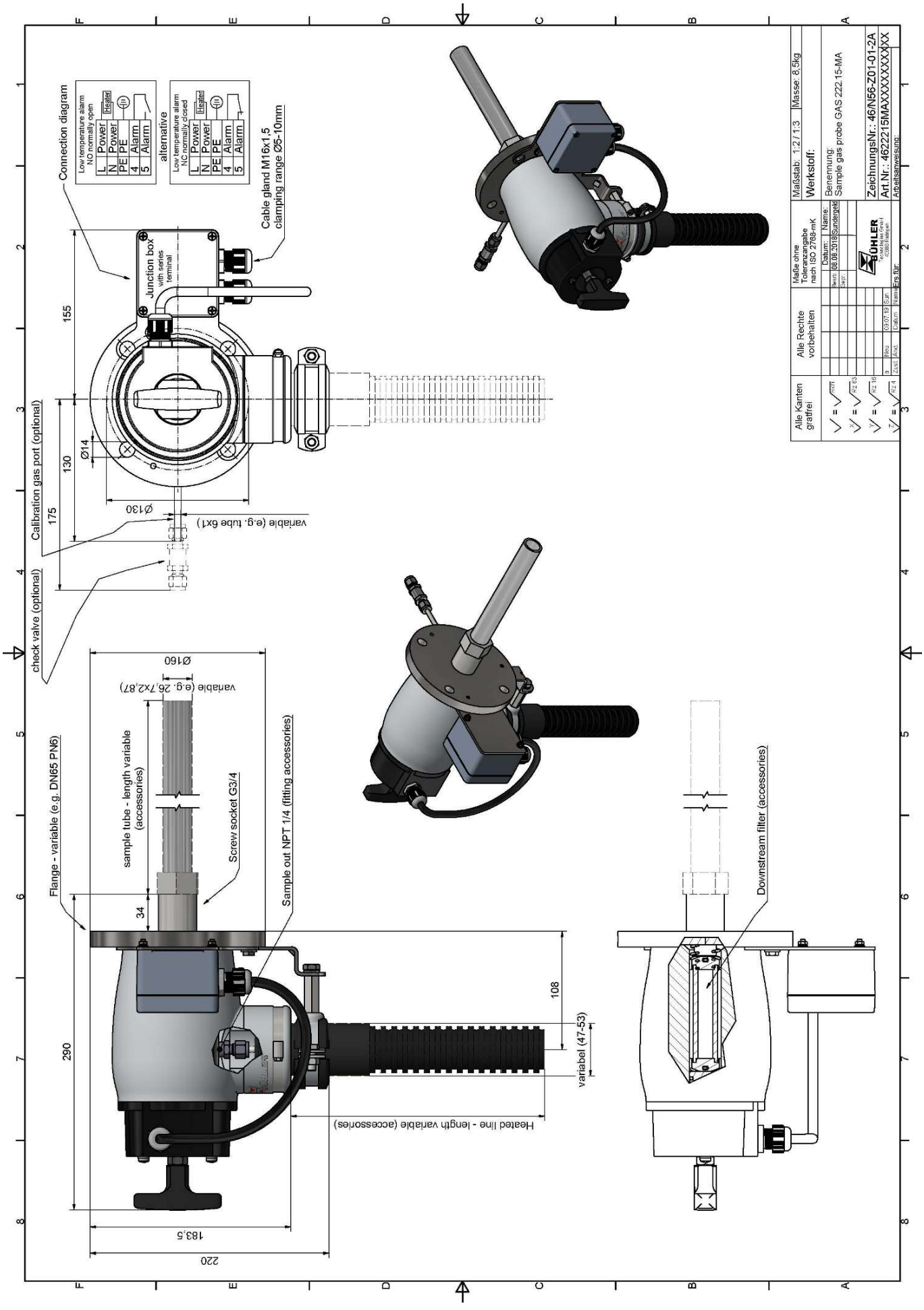
4622215MA	X	9	9	0	3	X	X	0	0	0	Product characteristic
											Flange
	0										DIN DN65 PN6
	1										ANSI 3"- 150 lbs
											Voltage
					3						115/230 V
											Calibration gas connection
						0					without calibration gas connection
						1					6 mm
						2					6 mm with check valve
						3					1/4"
						4					1/4" with check valve
											Low temperature alarm
							1				opening contact (open at operating temperature)
							2				closing contact (closed at operating temperature)

Options

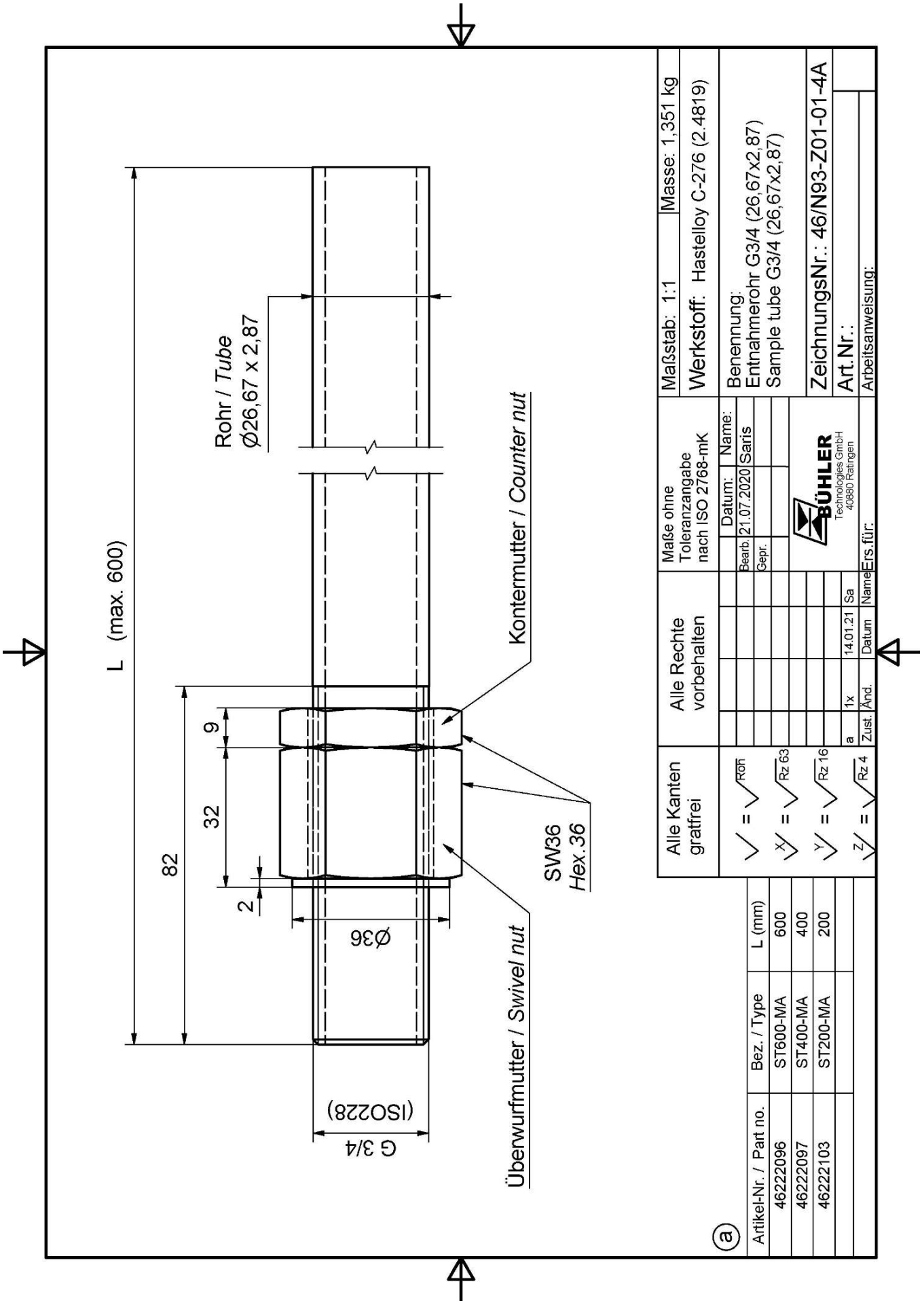
The base unit can optionally be equipped with a sampling tube type ST...-MA. These are type approved by DNV and available in 7.9, 15.7 and 23.6 inch lengths. You will find the dimensions on the last page.

Type designation	ST200-MA	ST400-MA	ST600-MA
Item no.	46222103	46222097	46222096
Length (inch)	7.9	15.7	23.6

Probe dimensions



Sampling tube dimensions



Sample gas probe GAS 222.17

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with downstream filter and weather hood
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Self-regulating heater to approx. 356 °F with low temperature alarm
- For dust loads up to 2 g/m³
- This probe is not suitable for use in Ex areas

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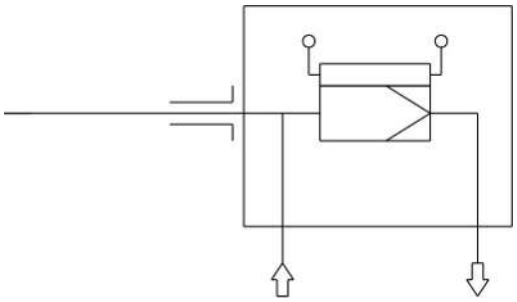
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data	
Probe operating temperature:	max. 395 °F
Ambient temperature:	-4 °F to 176 °F
Self-regulating heater:	356 °F
Low temperature alarm:	Contact open at operating temperature, closes at < 284 °F. Max. switching current 4 A
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz
IP rating:	IP54
Max. operating pressure:	85 psia
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

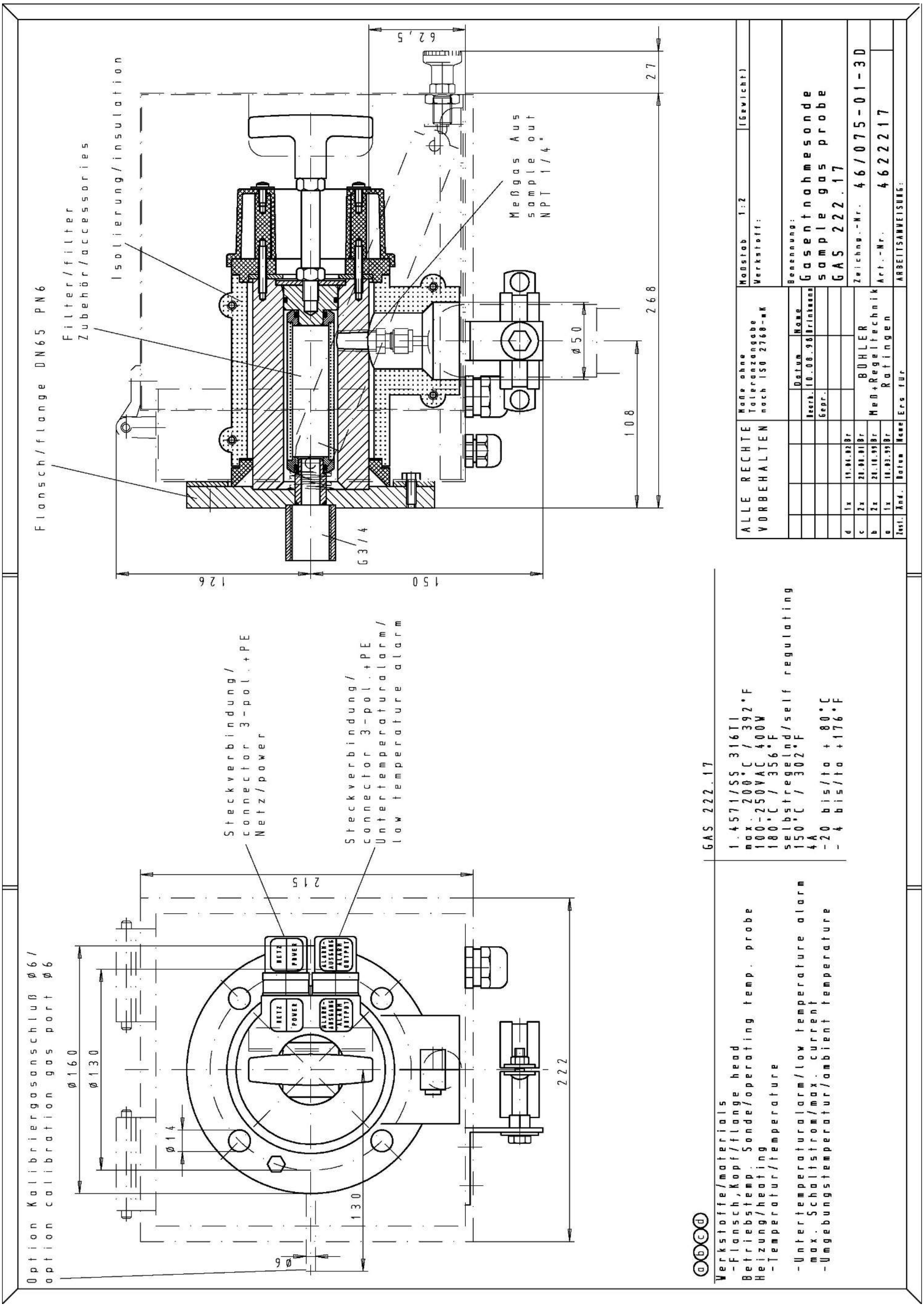
4622217	X	9	9	0	3	X	0	0	9	9	9	9	9	9	Product Characteristics
															Flange
	0														DIN DN65 PN6
	1														ANSI 3"-150 lbs - with CSA C & US approval
	2														ANSI 3"-150 lbs - without CSA C & US approval
															Power supply sample probe
					3										115/230 V
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve

Options

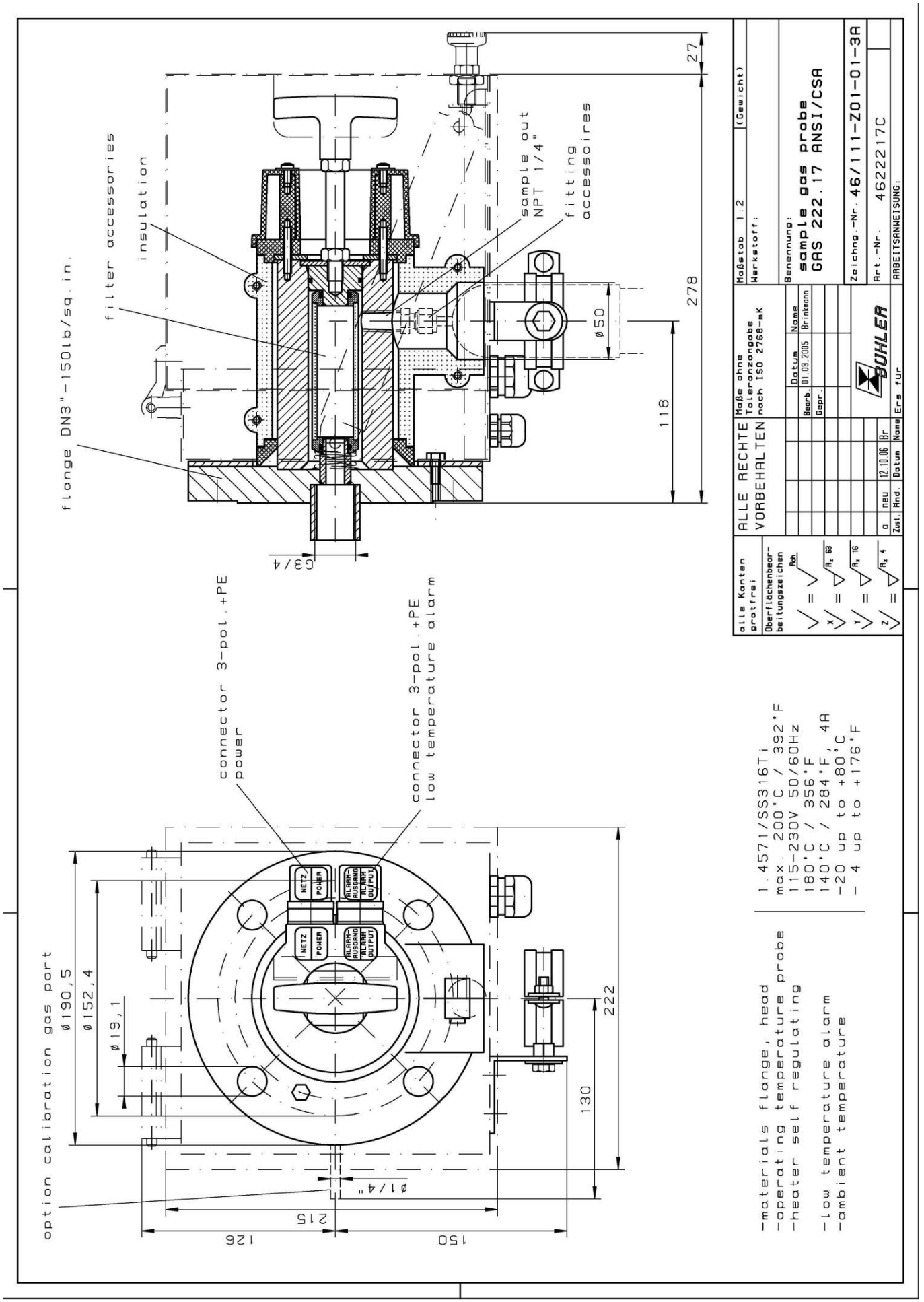
The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


62,5
27
268
108
ø50
126
150
G3/4
Flansch/flange DN65 PN6
Filter/filter
Zubehör/accessories
Isolierung/insulation
Meßgas Aus
sample out
NPT 1/4"
Steckverbindung/
connector 3-pol.+PE
Netz/power
Steckverbindung/
connector 3-pol.+PE
Untertemperaturalarm/
low temperature alarm
Option Kalibriergasanschluß ø6/
option calibration gas port ø6
ø160
ø130
ø14
ø6
130
215
222
GAS 222.17
Werkstoffe/materials
-Flansch,Kopf/flange head 1.4571/SS 316TI
Betriebstemp. Sonde/operating temp. probe max. 200°C / 392°F
Heizung/heating 100-250VAC 400W
-Temperatur/temperature 180°C / 356°F
selbstregelnd/self regulating
-Untertemperaturalarm/low temperature alarm 150°C / 302°F
max. Schaltstrom/max. current 4A
-Umgebungstemperatur/ambient temperature -20 bis/to +80°C
-4 bis/to +176°F
ALLE RECHTE VORBEHALTEN
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab 1:2
Werkstoff:
(Gewicht)
Benennung:
Gasentnahmesonde
sample gas probe
GAS 222.17
Zeichng.-Nr. 46/075-01-3D
Art.-Nr. 4622217
BÜHLER
Meß+Regeltechnik
Ratingen
Bearb. 10.08.98 Brinkmann
Gepr.
ARBEITSANWEISUNG:

Dimensions (ANSI flange)



Sample gas probe GAS 222.20

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with downstream filter and weather hood
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Electronic temperature controller up to 395 °F with low/high temperature alarm and display
- For dust loads up to 2 g/m³
- This probe is not suitable for use in Ex areas

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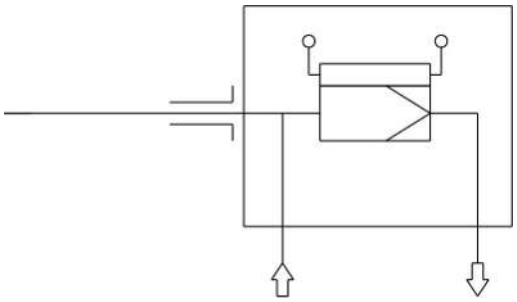
Flow chart



Technical Data

Gas Probe Technical Data	
Probe operating temperature:	max. 395 °F
Ambient temperature:	-4 to 158 °F (can be limited by optional add-ons)
Controller temperature range:	122 to 395 °F
Low/high temperature alarm:	Alarm adjustable ±5.....30 K from setpoint, factory preset 15 K Max. switching current 1 A
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz
IP rating:	IP54
Max. operating pressure:	85 psia
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

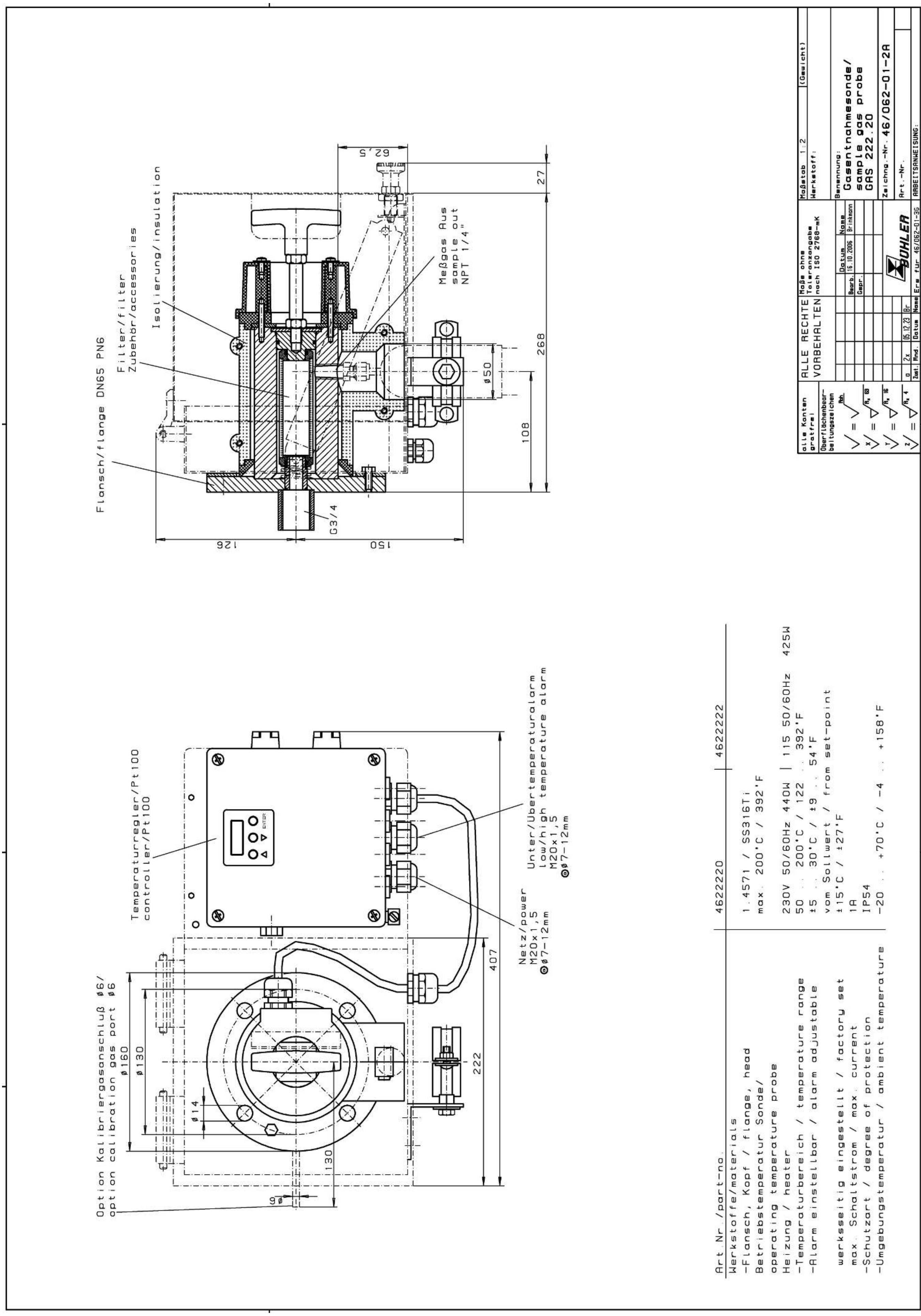
4622220	X	9	9	0	X	X	X	X	9	9	9	9	9	9	Product Characteristics
															Flange
	0														DIN DN65 PN6
	2														ANSI 3"-150 lbs - without CSA C & US approval
															Power supply sample probe
					1										115 V
					2										230 V
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve
															Connection heated extension
							0								No
							1								Yes
															Built-in temperature controller for heated extension
								0							No
								1							Yes

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

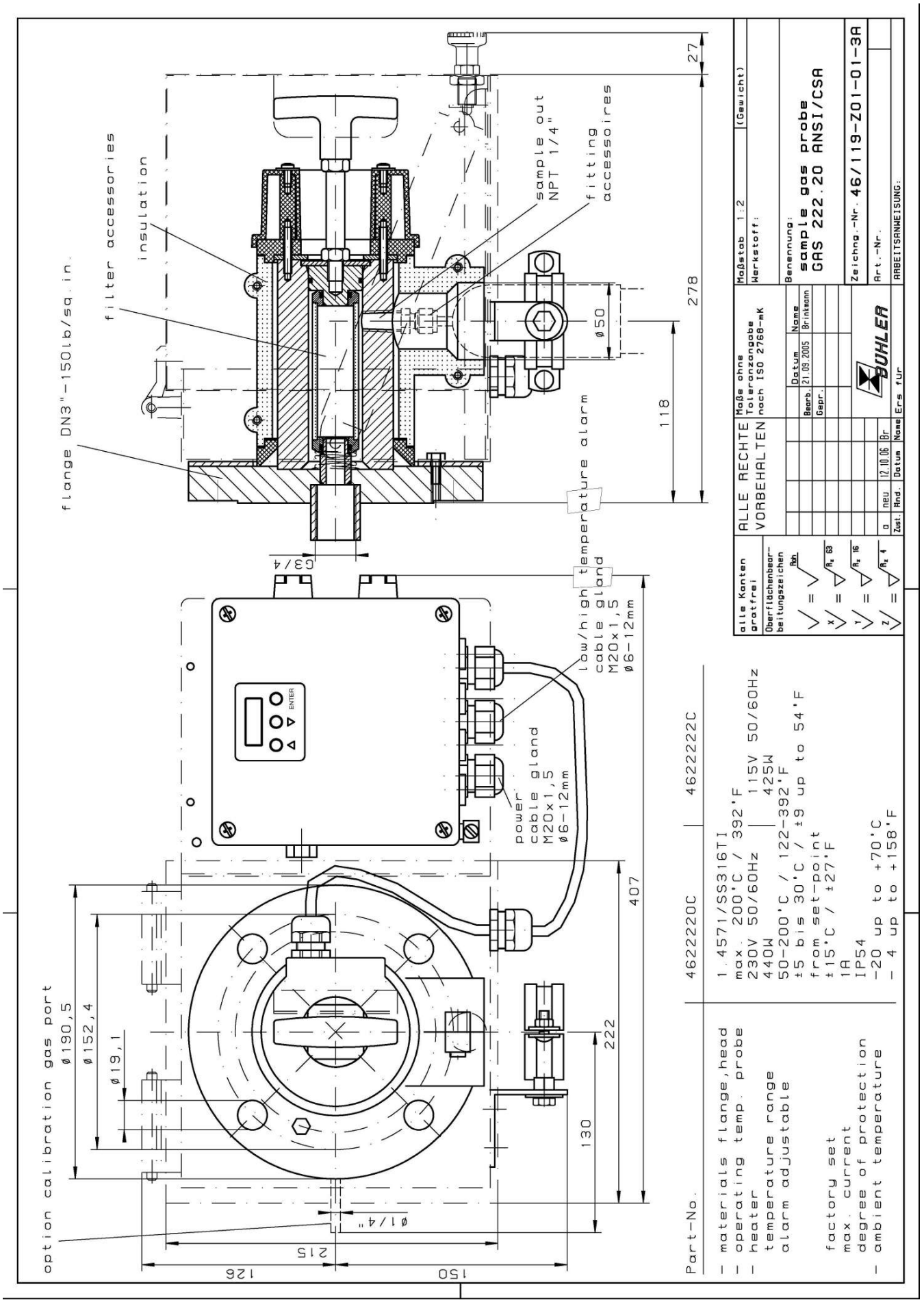
Dimensions

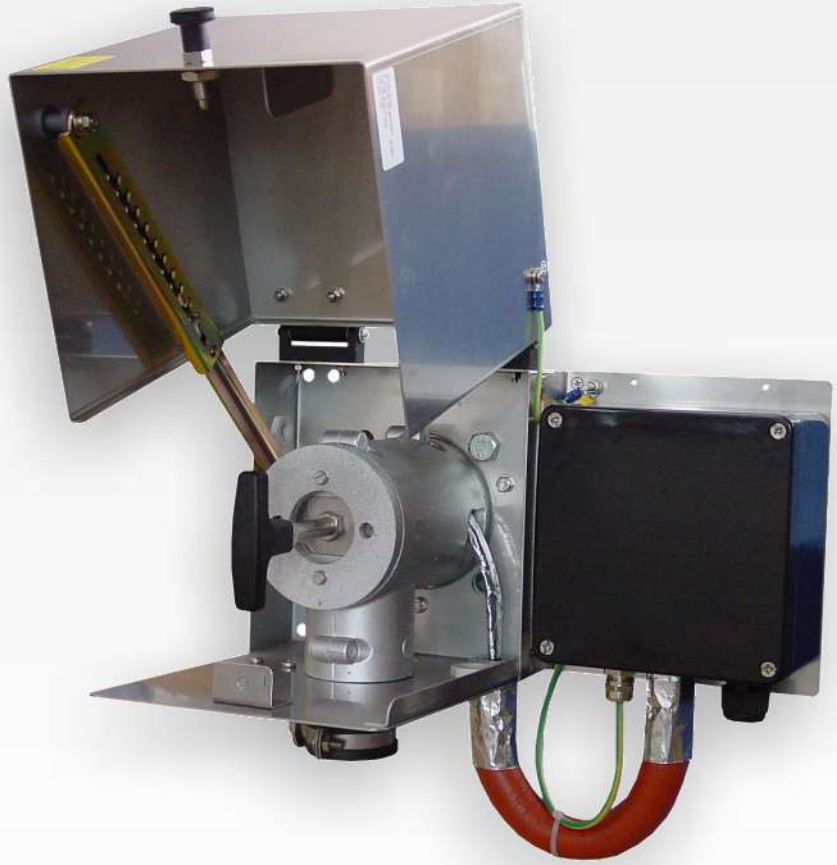


Option Kalibriergasanschluß ø6/
option calibration gas port ø6
ø160
ø130
ø14
ø6
130
222
407
Temperaturregler/Pt100
controller/Pt100
Netz/power
M20x1,5
ø7-12mm
Unter/Übertemperaturalarm
low/high temperature alarm
M20x1,5
ø7-12mm
Flansch/flange DN65 PN6
Filter/filter
Zubehör/accessories
Isolierung/insulation
126
150
G3/4
62,5
Meßgas Aus
sample out
NPT 1/4"
ø50
108
268
27
Art.Nr./part-no. | 4622220 | 4622222
Werkstoffe/materials
-Flansch, Kopf / flange, head | 1.4571 / SS316Ti
Betriebstemperatur Sonde/ operating temperature probe | max. 200°C / 392°F
Heizung / heater | 230V 50/60Hz 440W | 115 50/60Hz 425W
-Temperaturbereich / temperature range | 50 .. 200°C / 122 .. 392°F
-Alarm einstellbar / alarm adjustable | ±5 .. 30°C / ±9 .. 54°F vom Sollwert / from set-point
werksseitig eingestellt / factory set | ±15°C / ±27°F
max. Schaltstrom / max. current | 1A
-Schutzart / degree of protection | IP54
-Umgebungstemperatur / ambient temperature | -20 .. +70°C / -4 .. +158°F
alle Kanten gratfrei
ALLE RECHTE VORBEHALTEN
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab 1:2
(Gewicht)
Werkstoff:
Benennung:
Gasentnahmesonde/
sample gas probe
GAS 222.20
Zeichng.-Nr. 46/062-01-2A
Art.-Nr.
ARBEITSANWEISUNG:
Bearb. 16.10.2006 Brinkmann
Gepr.
a 2x 05.12.23 Br
Zust. Änd. Datum Name
Ers für 46/062-01-3G
BÜHLER

Dimensions (ANSI flange)

NOTICE! ANSI flange only available without CSA approval.





Sample gas probe GAS 222.20 Ex1

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Heated probe with downstream filter and weather hood
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely insulated
- Self-regulating heater
- For dust loads up to 2 g/m³
- This probe is permitted for use in explosive areas.
  Atex: Use in zone 1 and 21 and sampling from zone 0 and 20
  IECEx: Use in zone 1 and sampling from zone 0

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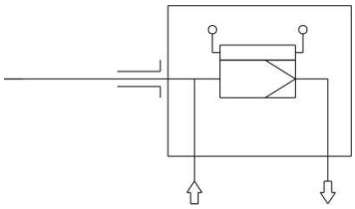
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature:	-40 to 131 °F	
Permissible gas inlet temperatures:	**Outer zone temperature class**	**Permissible gas inlet temperature**
	T2	275 °F
	T3	275 °F
	T4	266 °F
	T6	158 °F
Self-regulating heater:	T4	176 °F
	T6	113 °F
Probe electrical data:	**Power at 32 °F:**	**External circuit breaker type C:**
	T4: 230 V, 100 W, 50/60 Hz 115 V, 100 W, 50/60 Hz	230 V, 2 A, 50/60 Hz 115 V, 3 A, 50/60 Hz
	T6: 230 V, 50 W, 50/60 Hz 115 V, 50 W, 50/60 Hz	
Max. operating pressure:	85 psia	
Max. flow rate:	16.66 lpm	
Material:	1.4571	
Parts in contact with media:	Seals: Graphite/1.4404 and see filter	
Probe marking, depending on the selected options and temperature class:	**for zone 0/1:** ATEX: Ⓔx II 1G/2G Ex db[1] eb mb[2] IIC T5/T6...T1/T2 Ga/Gb IECEx: Ex db[1] eb mb[2] IIC T5/T6...T1/T2 Ga/Gb **for zone 1:** ATEX: Ⓔx II 2G Ex db[1] eb mb[2] IIC T6...T2 Gb IECEx: Ex db[1] eb mb[2] IIC T6...T2 Gb **for zone 0/21:** ATEX: Ⓔx II 1G/2D Ex db[1] eb mb[2] IIC T5 ... T1 Ga Ex tb mb[2] IIIC T80 °C ... T226 °C Db IECEx: - **for zone 20/1:** ATEX: Ⓔx II 1D/2G Ex ta IIIC T120 °C ... T300 °C Da Ex db[1] eb mb[2] IIC T6 ... T2 Gb IECEx: - **for zone 20/21:** ATEX: Ⓔx II 1D/2D Ex ta/tb mb[2] IIIC T120°C/T80°C...T300°C/T226°C Da/Db IECEx: - **for zone 21:** ATEX: Ⓔx II 2D Ex tb mb[2] IIIC T80°C...T226°C Db IECEx: - [1] "db" only for GAS 222.21/31 versions with limit switch [2] "mb" only for versions with solenoid valve	
Applied standards:	IEC 60079-0 (Ed. 6.0); IEC 60079-7 (Ed. 5.0); IEC 60079-26 (Ed. 3.0); EN 60079-0:2012+A11:2013; EN 60079-7:2015; EN 60079-26:2015	
IECEx certificate number:	IECEx IBE 17.0024X	
ATEX certificate number:	IBExU17ATEX1088X	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

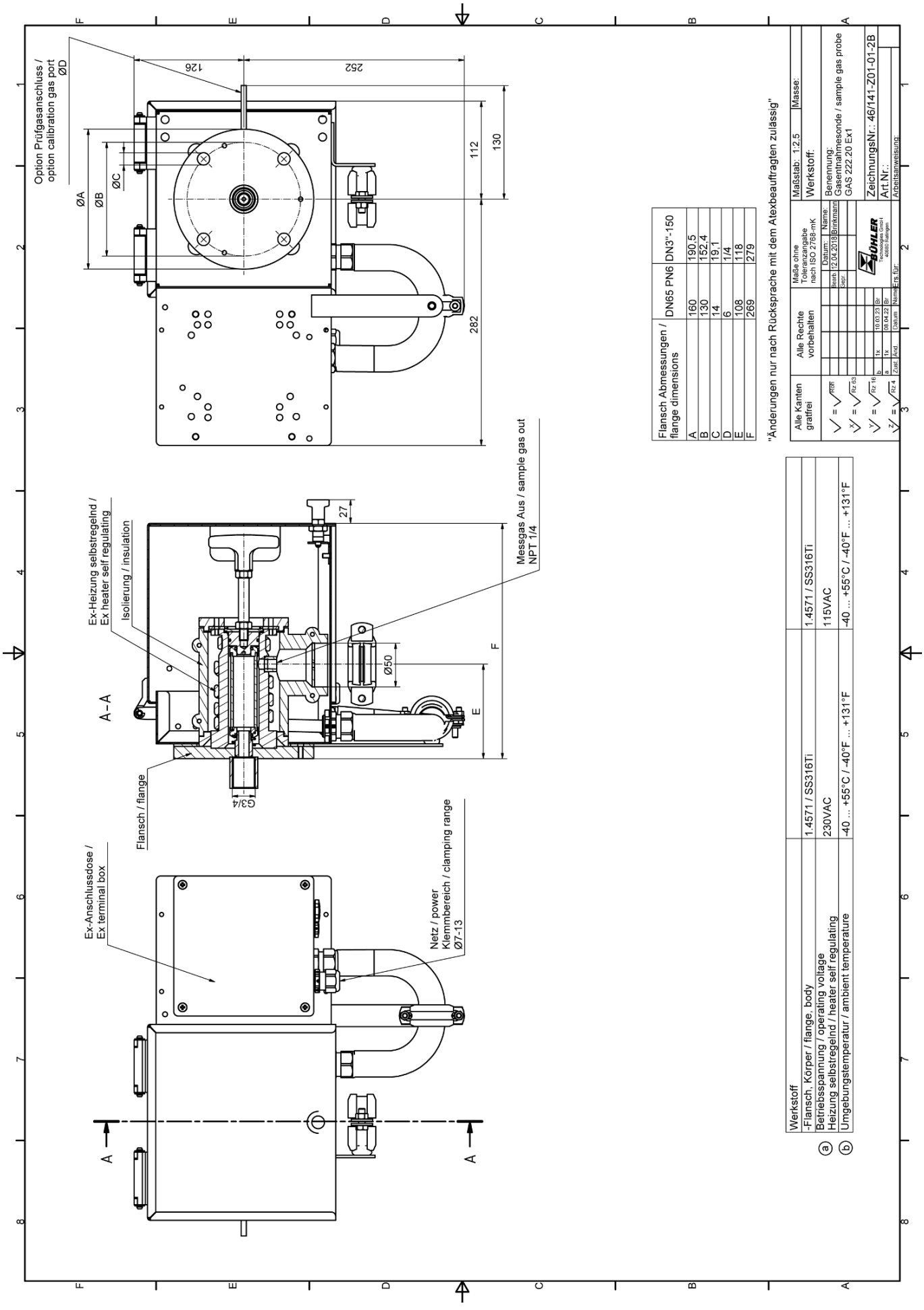
46222201	X	X	X	X	X	X	0	X	0	9	0	0	0	Product Characteristics			
														Flange			
	0	1												Flange DN65 PN6			
	0	2												Flange DN3"-150			
	x	x												Other			
														Hazardous area			
														Outside			
			4											Zone 1 (Atex/IECEx)			
			7											Zone 21 (Atex)			
			9											none			
														Inside			
				3										Zone 0 (Atex/IECEx)			
				4										Zone 1 (Atex/IECEx)			
				6										Zone 20 (Atex)			
				7										Zone 21 (Atex)			
				9										none			
														Temperature class inside/outside (dust only ATEX)			
														Ga/Gb	**Ga/Db**	**Da/Gb**	**Da/Db**
					4									T3/T4	T3/T130°C	T175°C/T4	T175°C/T130°C
					6									T5/T6	T5/T80°C	T120°C/T6	T120°C/T80°C
														Temperature class inside/outside (dust only ATEX)			
														Gb/Gb	**Gb/Db**	**Db/Gb**	**Db/Db**
					4									T4/T4	T4/T130°C	T130°C/T4	T130°C/T130°C
					6									T6/T6	T6/T80°C	T80°C/T6	T80°C/T80°C
														Power supply sample probe			
						1								115 V			
						2								230 V			
														Calibration gas port			
								0						No			
								1						6 mm			
								2						6 mm with check valve			
								3						1/4"			
								4						1/4" with check valve			

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Option Prüfgasanschluss / option calibration gas port ØD
ØA
ØB
ØC
126
252
112
130
282
Ex-Heizung selbstregelnd / Ex heater self regulating
Isolierung / insulation
A–A
27
Messgas Aus / sample gas out NPT 1/4
Ø50
F
E
G3/4
Flansch / flange
Ex-Anschlussdose / Ex terminal box
Netz / power Klemmbereich / clamping range Ø7-13
A
A
Flansch Abmessungen / flange dimensions
DN65 PN6
DN3"-150
A 160 190,5
B 130 152,4
C 14 19,1
D 6 1/4
E 108 118
F 269 279
"Änderungen nur nach Rücksprache mit dem Atexbeauftragten zulässig"
Alle Kanten gratfrei
Alle Rechte vorbehalten
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab: 1:2,5
Masse:
Werkstoff:
Benennung: Gasentnahmesonde / sample gas probe GAS 222.20 Ex1
ZeichnungsNr.: 46/141-Z01-01-2B
Art.Nr.:
Arbeitsanweisung
Werkstoff
-Flansch, Körper / flange, body 1.4571 / SS316Ti 1.4571 / SS316Ti
Betriebsspannung / operating voltage 230VAC 115VAC
ⓐ Heizung selbstregelnd / heater self regulating
ⓑ Umgebungstemperatur / ambient temperature -40 ... +55°C / -40°F ... +131°F -40 ... +55°C / -40°F ... +131°F

Sample gas probe GAS 222.20 Ex2

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

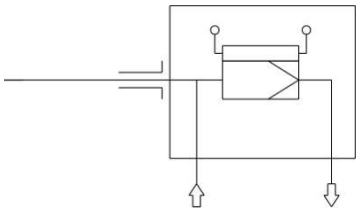
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Heated probe with downstream filter and weather hood
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely insulated
- Heater self-regulating to approx. 266 °F (T3)/158 °F (T4) with low temperature alarm
- For dust loads up to 2 g/m³
- This probe is permitted for use in explosive areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-4 to 176 °F	
Ambient temperature for accessories:	**Component**	**Ambient temperature range**
	Junction box:	-4 °F < T_{amb} < 158 °F
Max. gas inlet temperature:	383 °F (T3)/266 °F (T4)	
Self-regulating heater:	266 °F (T3)/158 °F (T4)	
Low temperature alarm:	Contact switches at < 203 °F (T3) or < 122 °F (T4); Simple electrical equipment according to EN 60079-11; U_i 30 V, I_i = 100 mA; C_i/L_i~0	
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	
Max. operating pressure:	85 psia	
Material:	1.4571	
Parts in contact with media:	Seals: Graphite/1.4404 and see filter	
Markings:	ATEX: Ⓔx II 3G Ex ec ic mb IIC T3/T4 Gc IECEx: Ex ec ic mb IIC T3/T4 Gc	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

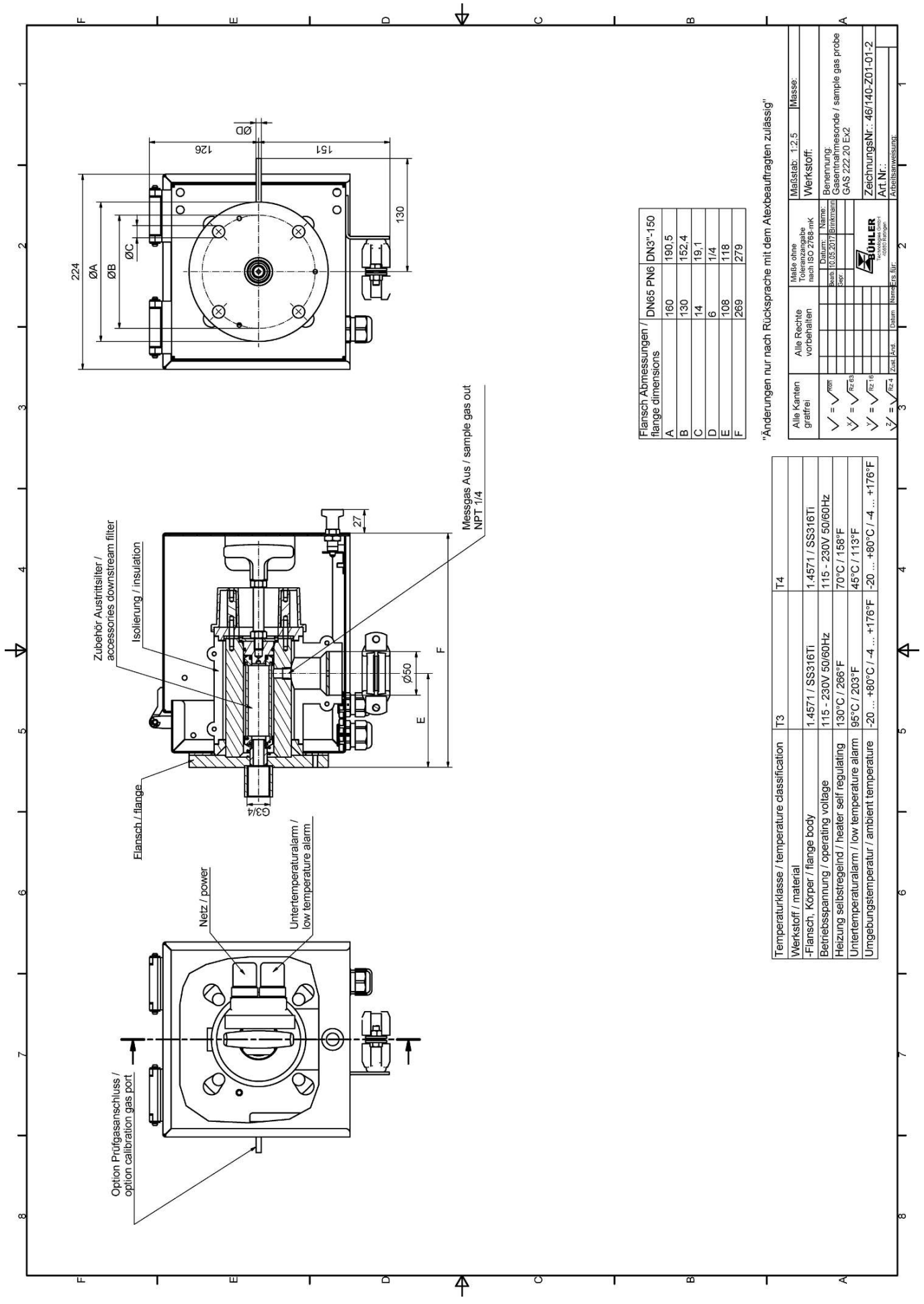
4622220	X	0	X	X	X	X	3	X	X	0	9	0	0	0	Product Characteristics
															Junction box
	0														No
	1														Yes
															Flange
		0	1												Flange DN65 PN6
		0	2												Flange DN3"-150
															Hazardous area Outside and Inside
				2	9										Ex-Zone 2 outside, none inside
				2	2										Ex-Zone 2 outside and inside
															Temperature class
						3									T3
						4									T4
															Power supply sample probe
							3								115/230 V
															Low temperature alarm
								1							Opener (open at operating temperature) (marked with "ic")
								2							Closer (closed at operating temperature) (marked with "ic")
															Calibrating gas port
									0						No
									1						6 mm
									2						6 mm with check valve
									3						1/4"
									4						1/4" with check valve

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions



Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	108	118
F	269	279

"Änderungen nur nach Rücksprache mit dem Atexbeauftragten zulässig"

Temperaturklasse / temperature classification	T3	T4
Werkstoff / material		
-Flansch, Körper / flange body	1.4571 / SS316Ti	1.4571 / SS316Ti
Betriebsspannung / operating voltage	115 - 230V 50/60Hz	115 - 230V 50/60Hz
Heizung selbstregelnd / heater self regulating	130°C / 266°F	70°C / 158°F
Untertemperaturalarm / low temperature alarm	95°C / 203°F	45°C / 113°F
Umgebungstemperatur / ambient temperature	-20 ... +80°C / -4 ... +176°F	-20 ... +80°C / -4 ... +176°F

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Maße ohne Toleranzangabe nach ISO 2768-mK

Maßstab: 1:2,5 | Masse:

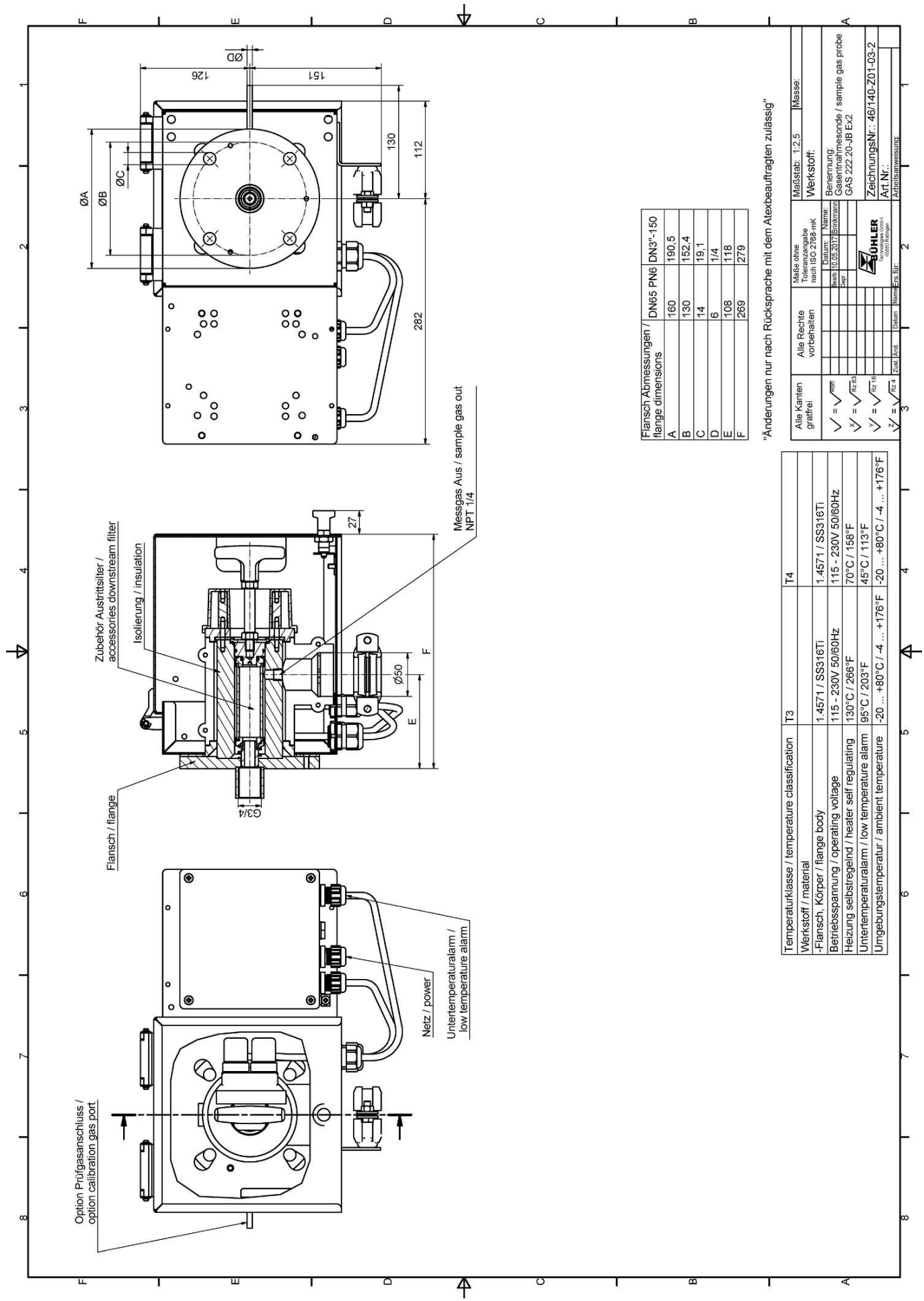
Werkstoff:

Benennung: Gasentnahmesonde / sample gas probe GAS 222.20 Ex2

ZeichnungsNr.: 46/140-Z01-01-2

Art.Nr.:

Arbeitsanweisung:



Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	108	118
F	269	279

"Änderungen nur nach Rücksprache mit dem Atexbeauftragten zulässig"

Temperaturklasse / temperature classification	T3	T4
Werkstoff / material		
-Flansch. Körper / flange body	1.4571 / SS316Ti	1.4571 / SS316Ti
Betriebsspannung / operating voltage	115 - 230V 50/60Hz	115 - 230V 50/60Hz
Heizung selbstregelnd / heater self regulating	130°C / 266°F	70°C / 158°F
Untertemperaturalarm / low temperature alarm	95°C / 203°F	45°C / 113°F
Umgebungstemperatur / ambient temperature	-20 ... +80°C / -4 ... +176°F	-20 ... +80°C / -4 ... +176°F

Alle Kanten gratfrei

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Maße ohne Toleranzangabe nach ISO 2768-mK

Maßstab: 1:2,5 Masse:

Werkstoff:

Benennung: Gasentnahmesonde / sample gas probe GAS 222.20-JB Ex2

ZeichnungsNr.: 46/140-Z01-03-2

Art.Nr.:

Arbeitsanweisung:

Sample gas probe GAS 222.20 Amex

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

Heated prove with downstream filter, weather hood and terminal box
The downstream filter can easily be removed by turning the handle 90°
The probe body and the area around the screw connection for the heated sample gas line are completely isolated
Heater self-regulating to approx. 266 °F (T3)/158 °F (T4)
For dust loads up to 2 g/m³
This probe is suitable for use in explosive areas
C-US and CSA approval

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
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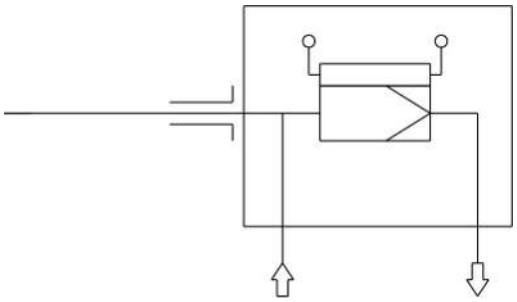
Internet: www.buhlertech.com

Flow diagram



Technical Data

Gas Probe Technical Data	
Self-regulating temperature:	266 °F (T3)/158 °F (T4)
Ambient temperature:	-4 to +176 °F
Low temperature alarm:	Contact open at operating temperature, closes at < 203 °F (T3) resp. < 122 °F (T4); U_{max}=30 VDC, I_{max}=100 mA, Ci/Li~0
Electrical data:	115 V-230 V, 50/60 Hz
Max. operating pressure:	85 psia
Parts in contact with media:	1.4571 Seals: Graphite/1.4404 and see filter
Explosion protection:	Class 1, Div 2, Gps B, C, D, T3 and T4

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

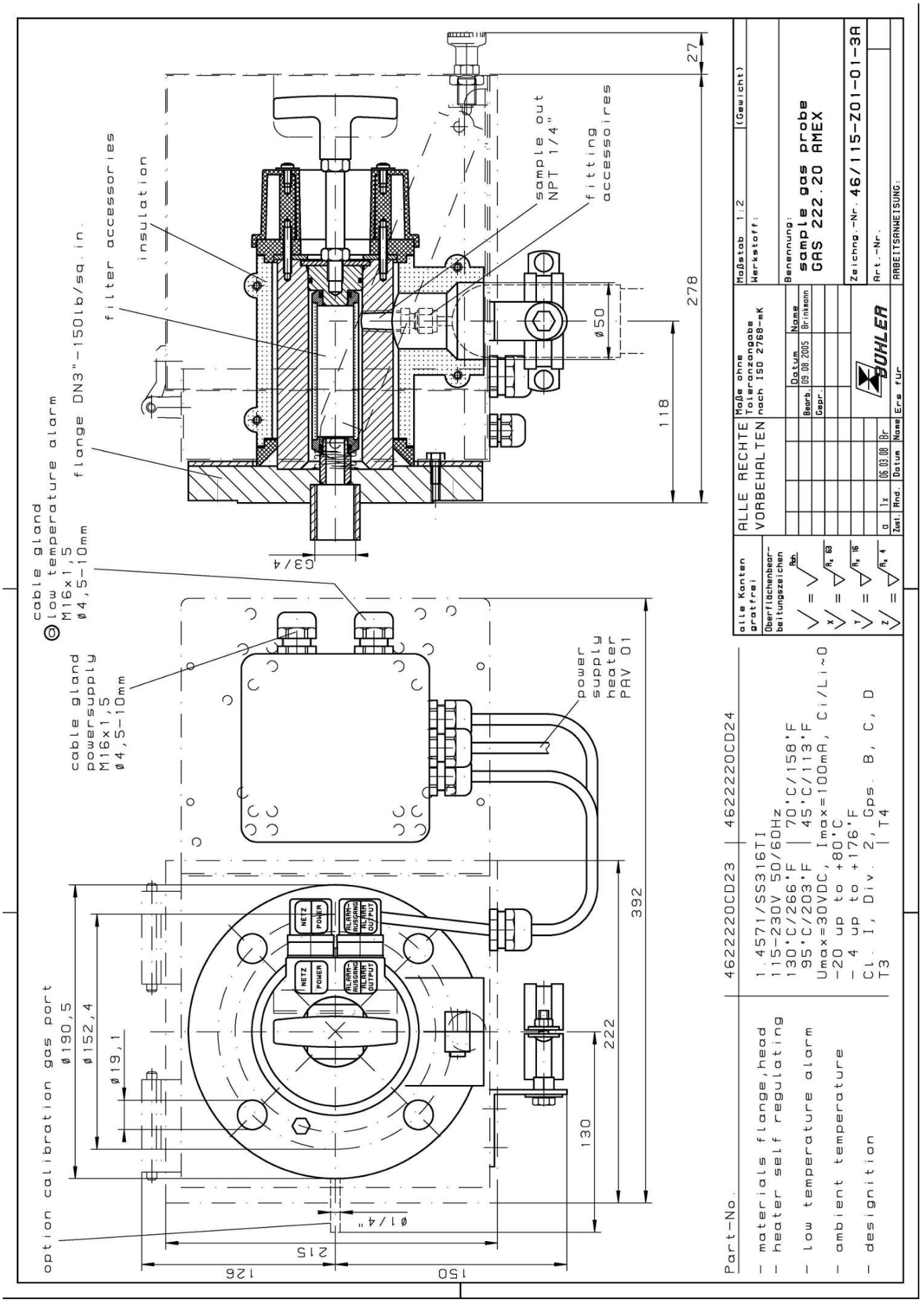
4622220	1	6	6	X	3	X	0	0	9	9	9	9	9	9	Product Characteristics
															Ex temperature classes
				3											T3
				4											T4
															Sample probe power supply
					3										115 / 230 V
															Calibration gas connection
						0									No calibration gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


cable gland
low temperature alarm
M16x1,5
ø4,5–10mm
flange DN3"–150lb/sq.in.
filter accessories
insulation
sample out
NPT 1/4"
fitting
accessoires
27
278
118
ø50
G3/4
cable gland
powersupply
M16x1,5
ø4,5–10mm
power
supply
heater
PAV 01
option calibration gas port
ø190,5
ø152,4
ø19,1
392
222
130
ø1/4"
215
126
150
NETZ
POWER
ALARM-
AUSGANG
ALARM
OUTPUT
ALLE RECHTE VORBEHALTEN
Maße ohne Toleranzangabe nach ISO 2768-mK
alle Kanten gratfrei
Oberflächenbearbeitungszeichen
Maßstab 1:2
(Gewicht)
Werkstoff:
Benennung:
sample gas probe
GAS 222.20 AMEX
Zeichng.-Nr. 46/115-Z01-01-3A
Art.-Nr.
ARBEITSANWEISUNG:
BÜHLER
Part-No. 4622220CD23 | 4622220CD24
- materials flange,head 1.4571/SS316TI
- heater self regulating 115–230V 50/60Hz
130°C/266°F | 70°C/158°F
95°C/203°F | 45°C/113°F
- low temperature alarm Umax=30VDC, Imax=100mA, Ci/Li~0
- ambient temperature –20 up to +80°C
– 4 up to +176°F
- designition Cl. I, Div. 2, Gps. B, C, D
T3 | T4

Sample gas probe GAS 222.20-HT

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

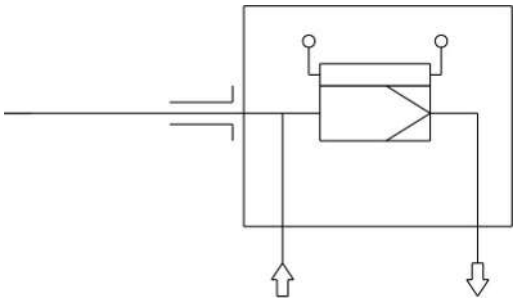
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with downstream filter and weather hood
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Electronic temperature controller up to 536 °F with Pt100, high/low temperature alarm and display
- For dust loads up to 2 g/m³
- This probe is not suitable for use in Ex areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data	
Probe operating temperature:	max. 536 °F
Controller temperature range:	122 to 536 °F
Ambient temperature:	-4 to 158 °F (can be limited by optional add-ons)
Low/high temperature alarm:	Alarm adjustable ±5.....30 K from setpoint, factory preset 15 K Switching current max. 1 A
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz
IP rating:	IP54
Max. operating pressure:	87 psia
Material:	1.4571
Parts in contact with media:	Seals: Graphit/1.4404 and see filter

Ordering instructions

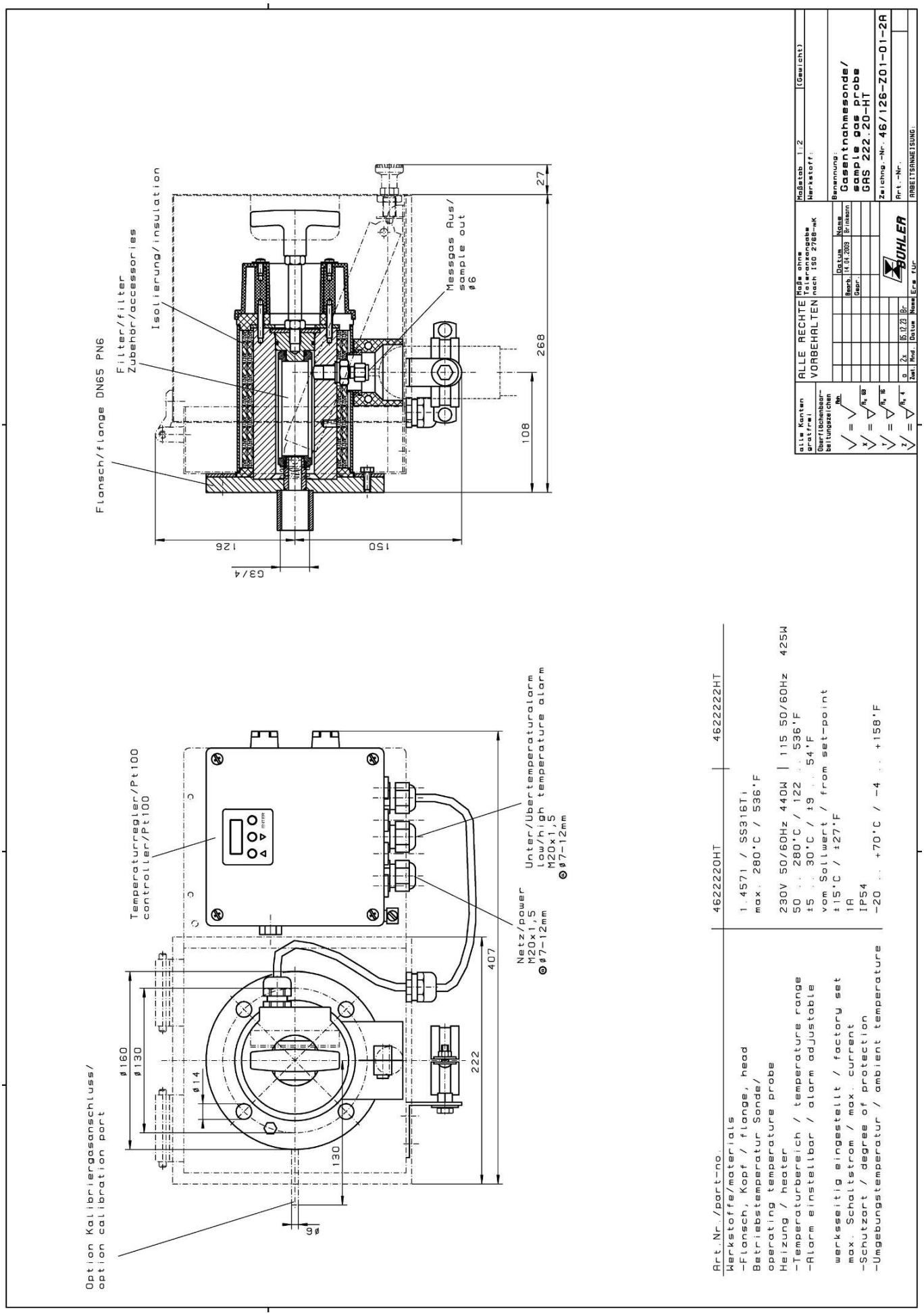
Item no.	Base unit
46 222 20HT	GAS 222.20-HT, 230 V
46 222 22HT	GAS 222.20-HT, 115 V

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Flansch/flange DN65 PN6
Filter/filter
Zubehör/accessories
Isolierung/insulation
Messgas Aus/
sample out
ø6
27
268
108
126
150
G3/4
Temperaturregler/Pt100
controller/Pt100
Unter/übertemperaturalarm
Low/high temperature alarm
M20x1,5
ø7–12mm
Netz/power
M20x1,5
ø7–12mm
ø160
ø130
ø14
407
222
130
9ø
Option Kalibriergasanschluss/
option calibration port
Art.Nr./part-no. 462222OHT 462222HT
Werkstoffe/materials 1.4571 / SS316Ti
-Flansch, Kopf / flange, head max. 280°C / 536°F
Betriebstemperatur Sonde/
operating temperature probe
Heizung / heater 230V 50/60Hz 440W | 115 50/60Hz 425W
-Temperaturbereich / temperature range 50 .. 280°C / 122 .. 536°F
-Alarm einstellbar / alarm adjustable ±5 .. 30°C / ±9 .. 54°F
vom Sollwert / from set-point
werksseitig eingestellt / factory set ±15°C / ±27°F
max. Schaltstrom / max. current 1A
-Schutzart / degree of protection IP54
-Umgebungstemperatur / ambient temperature -20 .. +70°C / -4 .. +158°F
ALLE RECHTE VORBEHALTEN
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab 1:2 (Gewicht)
Werkstoff:
Bearb. 14.04.2003 Brinkmann
Gepr.
Benennung:
Gasentnahmesonde/
sample gas probe
GAS 222.20-HT
Zeichng.-Nr. 46/126-Z01-01-2A
Art.-Nr.
ARBEITSANWEISUNG:
alle Kanten gratfrei
Oberflächenbearbeitungszeichen Rth
0 2x 15.12.23 Br
Zust. Rnd. Datum Name Ers. für

Sample gas probe GAS 222.20 Denox

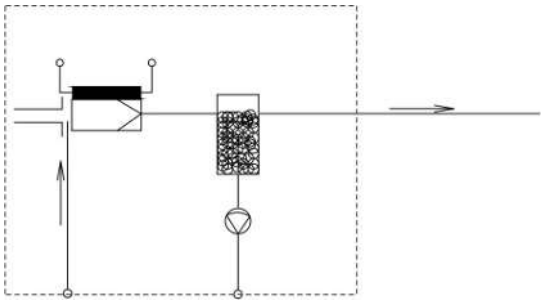
In many applications gas analysis is key for safe and efficient control of process flows, environmental protection, and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

- Heated probe with downstream filter and weather hood
- The downstream filter can easily be removed by turning the handle 90°
- Electronic temperature controller up to 536 °F with Pt100
- For dust loads up to 2 g/m³
- This probe is not suitable for use in Ex areas
- Built-in glass bead receptacle
- Anti-freeze heater optional

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow diagram



Technical Data

Gas Probe Technical Data	
Operating temperature:	max. 536 °F
Operating pressure:	90 kPa...100 kPa
Controller temperature range:	122 °F to 536 °F
Ambient temperature:	41 °F to 122 °F* without anti-freeze heater -4 °F to 122 °F* with optional anti-freeze heater
Electrical data:	230 V 50 Hz 650 W 3 A / 115 V 60 Hz 650 W 6 A
IP rating:	IP44
Parts in contact with media:	1.4571, glass, PVDF, Norprene, Viton, PTFE

* the ambient temperature upper limit varies by inlet dew point and gas composition.

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

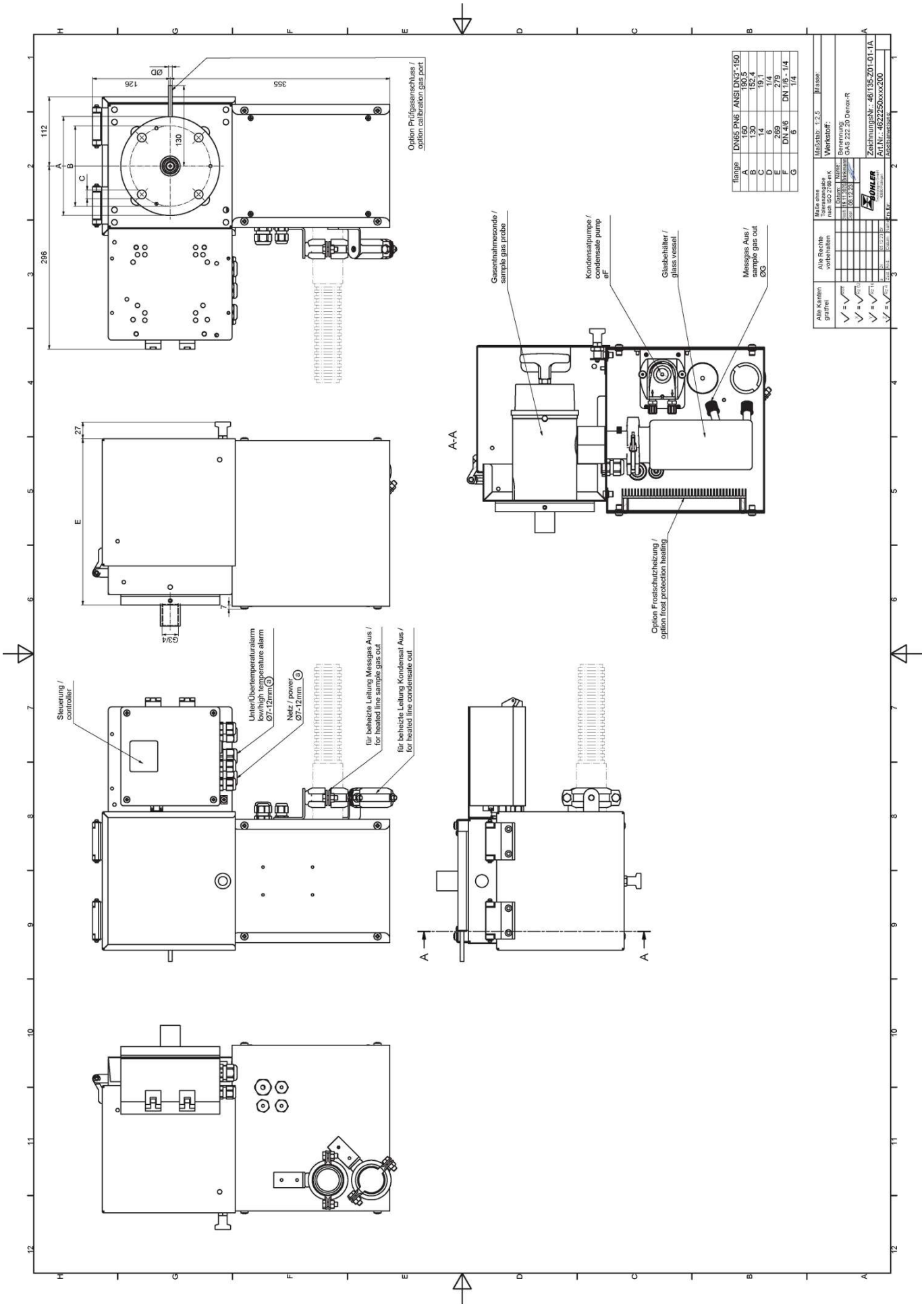
Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Ordering Instructions

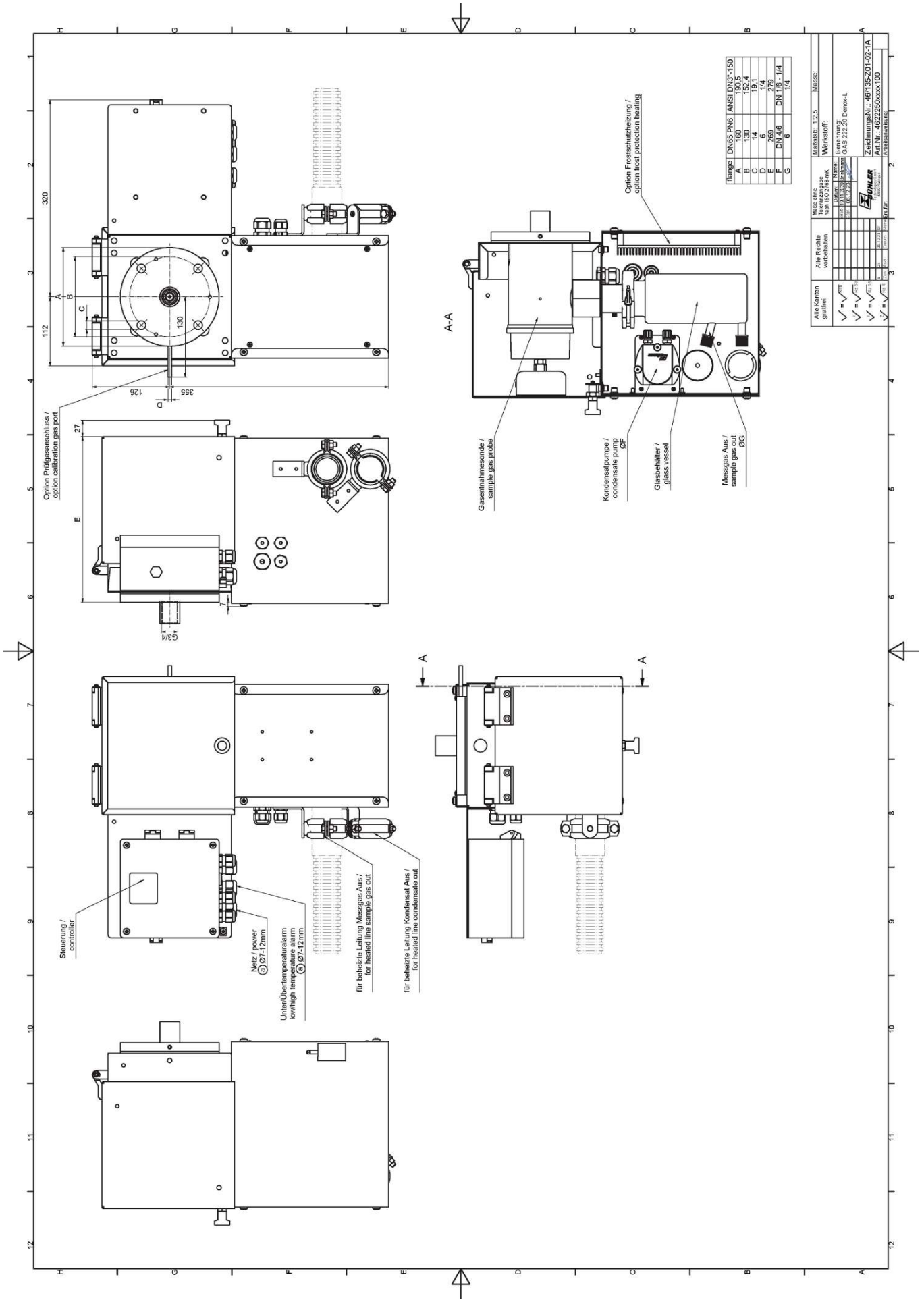
The item number is a code for the configuration of your unit. Please use the following model code:

4622250	X	X	X	X	X	0	0	Product Characteristics
								Flange
	1							DIN DN65 PN6
	2							ASME DN3"-150
								Voltage
		1						115 V
		2						230 V
								Calibrating gas connection
			0					no calibrating gas connection
			1					6 mm
			2					6 mm + check valve
			3					1/4"
			4					1/4" + check valve
								Anti-free heater
				0				without anti-freeze heater
				1				with anti-freeze heater
								Connections
					1			Left
					2			Right

Dimensions



Range	DN65 PN6	ANSI DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	269	279
F	DN 4/6	DN 1/6 1/4
G	6	1/4


Option Frostschutzheizung / option frost protection heating
A-A
Option Prüfgasanschluss / option calibration gas port
Gasentnahmesonde / sample gas probe
Kondensatpumpe / condensate pump
Glasbehälter / glass vessel
Messgas Aus / sample gas out ØG
Steuerung / controller
Netz / power ⓐ Ø7-12mm
Unter/Überlemperaturalarm low/high temperature alarm ⓐ Ø7-12mm
für beheizte Leitung Messgas Aus / for heated line sample gas out
für beheizte Leitung Kondensat Aus / for heated line condensate out
Flange DN6E PN6 ANSI DN3"-150
A 160 190.5
B 130 152.4
C 14 19.1
D 6 1/4
E 269 279
F DN 4/6 DN 1/6 - 1/4
G 6 1/4
Maßstab: 1:2,5
Werkstoff:
Masse
Benennung
GAS 222.20 Denox-L
Zeichnungsnr.: 46/135-Z01-02-1A
Art.Nr.: 4622250xxxx100
Anpassvariante
Alle Kanten gratfrei
Alle Rechte vorbehalten
Maße ohne Toleranzangabe nach ISO 2768-mK

Sample gas probe Denox-MB

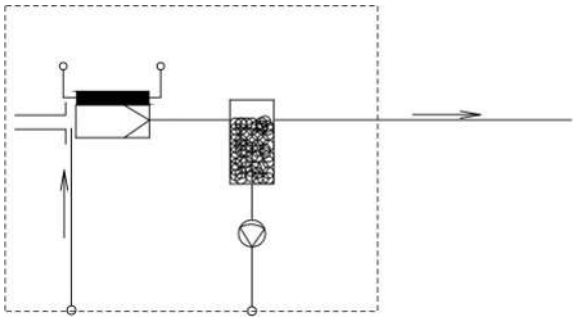
In many applications gas analysis is key for safe and efficient control of process flows, environmental protection, and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

- Heated probe with downstream filter inside GfP housing
- The downstream filter can easily be removed by turning the handle 90°
- Adjustable up to 536 °F with Pt100
- For dust loads up to 2 g/m³
- This probe is not suitable for use in Ex areas
- Built-in glass bead receptacle

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow diagram



Technical Data

Gas Probe Technical Data	
Operating temperature:	max. 536 °F
Operating pressure:	90 kPa...100 kPa
Controller temperature range:	122 °F to 536 °F
Ambient temperature:	-4 °F to 122 °F
Electrical data:	230 V 50 Hz 650 W / 115 V 60 Hz 650 W
IP rating:	IP34
Parts in contact with media:	1.4571, glass, PVDF, Norprene, Viton, PTFE

* the ambient temperature upper limit varies by inlet dew point and gas composition.

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

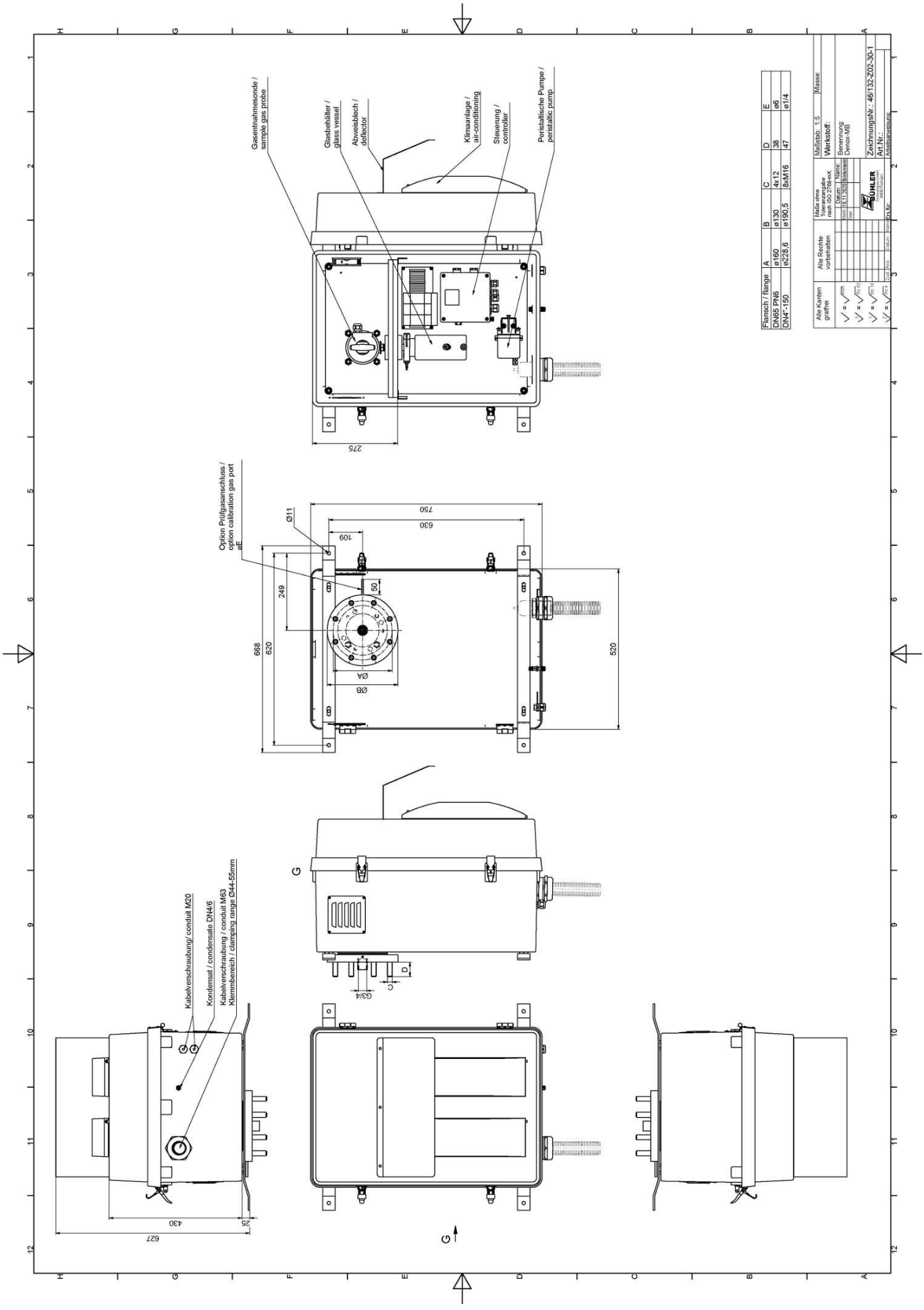
Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model code:

4622251	X	X	X	0	0	0	0	Product Characteristics
								Flange
	1							DIN DN65 PN6
	3							ASME DN4"-150
								Voltage
		1						115 V
		2						230 V
								Calibrating gas connection
			0					no calibrating gas connection
			1					6 mm
			2					6 mm + check valve
			3					1/4"
			4					1/4" + check valve

Dimensions


Gasentnahmesonde / sample gas probe
Glasbehälter / glass vessel
Abweisblech / deflector
Klimaanlage / air-conditioning
Steuerung / controller
Peristaltische Pumpe / peristaltic pump
Option Prüfgasanschluss / option calibration gas port
Kabelverschraubung/ conduit M20
Kondensat / condensate DN4/6
Kabelverschraubung / conduit M63
Klemmbereich / clamping range Ø44-55mm
Flansch / flange
DN65 PN6
DN4"-150
Maßstab: 1:5
Masse:
Werkstoff:
Benennung
Denox-MB
Zeichnungsnr.: 46132-Z02-30-1
Art.Nr.:
Alle Rechte vorbehalten
Alle Kanten gratfrei
Maße ohne Toleranzangabe nach ISO 2768-mK

Sample gas probe GAS 222.20-DH

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with downstream filter and weather hood
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Steam-heated
- For dust loads up to 2 g/m³
- The probe has no innate ignition source and is therefore suitable for use in Ex areas.

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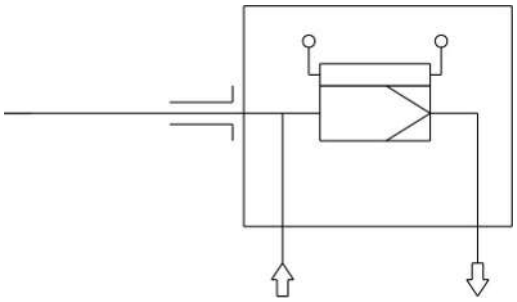
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data	
Probe operating temperature:	max. 395 °F
Ambient temperature:	-4 to 212 °F
Max. operating pressure:	85 psia
Max. steam pressure:	73 psia
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

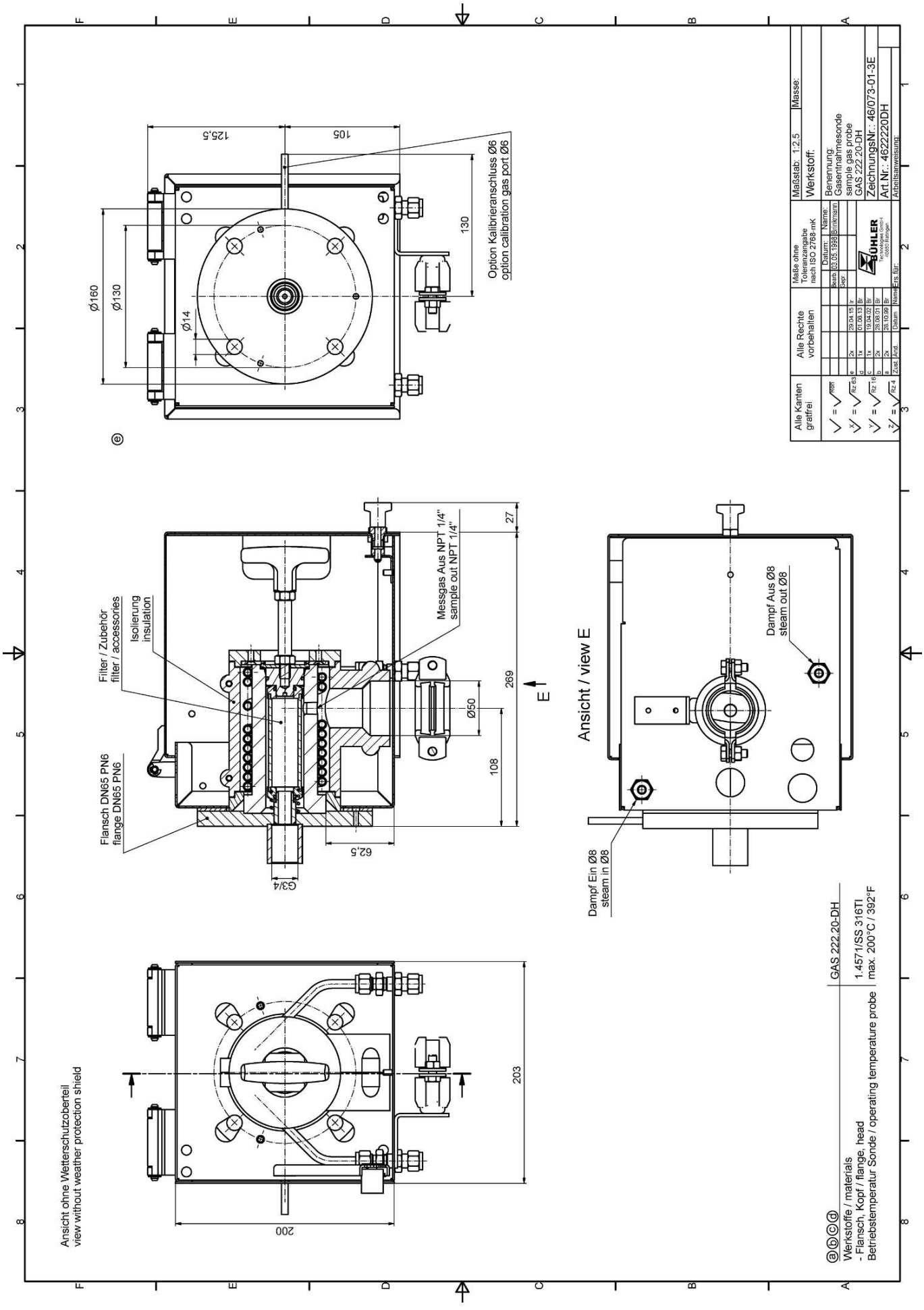
4622220	X	9	9	0	9	X	0	0	9	9	9	9	9	Product Characteristics
														Flange
	0													DIN DN65 PN6
	2													ANSI 3"-150 lbs - without CSA C & US approval
														Power supply sample probe
					9									Steam
														Calibrating gas connection
						0								No calibrating gas connection
						1								6 mm
						2								6 mm + check valve
						3								1/4"
						4								1/4" + check valve

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

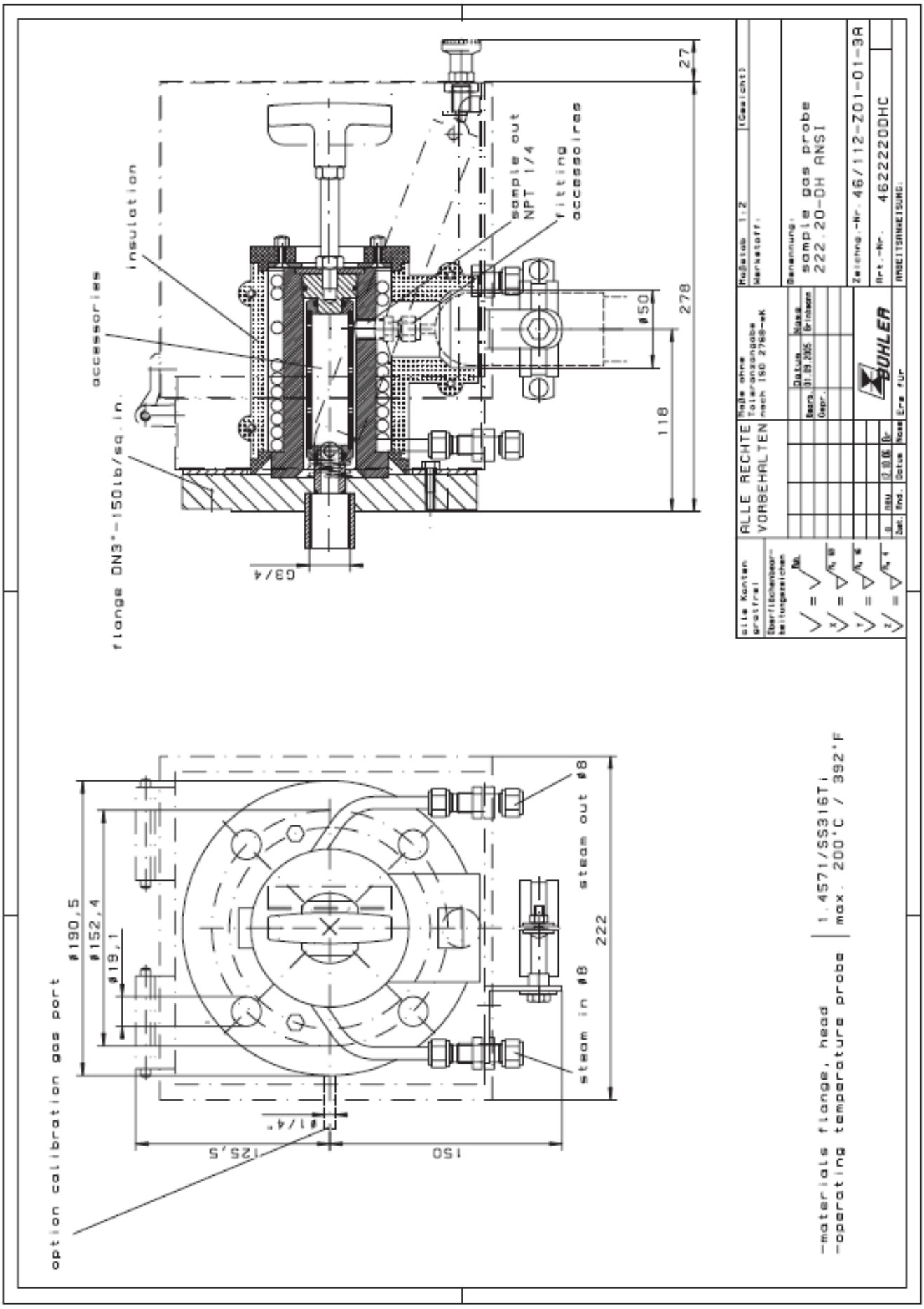
Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Option Kalibrieranschluss Ø6
option calibration gas port Ø6
Messgas Aus NPT 1/4"
sample out NPT 1/4"
Filter / Zubehör
filter / accessories
Isolierung
insulation
Flansch DN65 PN6
flange DN65 PN6
Ansicht / view E
Dampf Aus Ø8
steam out Ø8
Dampf Ein Ø8
steam in Ø8
Ansicht ohne Wetterschutzoberteil
view without weather protection shield
Werkstoffe / materials
- Flansch, Kopf / flange, head
Betriebstemperatur Sonde / operating temperature probe
1.4571/SS 316TI
max. 200°C / 392°F
GAS 222.20-DH
Maßstab: 1:2,5
Masse:
Werkstoff:
Benennung:
Gasentnahmesonde
sample gas probe
GAS 222.20-DH
ZeichnungsNr.: 46/073-01-3E
Art.Nr.: 4622220DH
Arbeitsanweisung:
Alle Kanten gratfrei
Alle Rechte vorbehalten
Maße ohne Toleranzangabe nach ISO 2768-mK
BÜHLER

Dimensions (ANSI flange)

NOTICE! ANSI flange only available without CSA approval.



Sample gas probe GAS 222.21

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

Heated probe with shut-off valve, inlet and/or downstream filter and weather hood

The downstream filter can easily be removed by turning the handle 90°

The probe body and the area around the screw connection for the heated sample gas line are completely isolated

Electronic temperature controller up to 395 °F with low/high temperature alarm and display

For dust loads up to 2 g/m³
With upstream filter 10 g/m³ and up

This probe is not suitable for use in Ex areas

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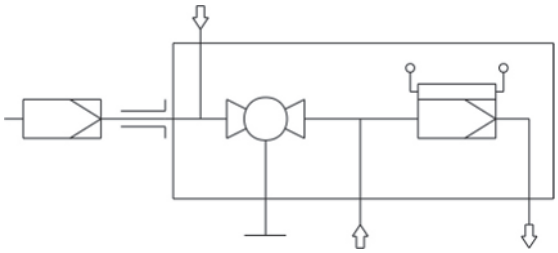
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data		
Probe operating temperature:	max. 392 °F	
Ambient temperature without accessories:	-4 to 158 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	14 °F < T_{amb} < 131 °F
	Pneumatic drive:	-4 °F < T_{amb} < 176 °F
	Limit switch:	-4 °F < T_{amb} < 212 °F
	Solenoid valve for pneumatic drive:	14 °F < T_{amb} < 131 °F
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Compressed air valve:	14 °F to 176 °F
	Solenoid valve for pneumatic drive:	14 °F to 212 °F
Regulator setting range:	50 to 392 °F	
Low/high temperature alarm:	Alarm adjustable ±5.....30 K from setpoint, factory preset to 15 K, max. switching current 1 A	
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	
IP rating:	IP54	
Max. operating pressure:	85 psia	
Materials in contact with media		
Flange:	Stainless steel 1.4571	
Probe body:	Stainless steel 1.4571	
Ball valve:	Stainless steel 1.4408/1.4462/PTFE	
Seal:	Stainless steel 1.4404/graphite/and see filter	

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622221	X	9	9	0	X	X	X	X	X	X	X	X	X	Product Characteristics
														Flange
	0													DIN DN65 PN6
	2													ANSI 3"-150 lbs - without CSA C & US approval
														Power supply sample probe
					1									115 V
					2									230 V
														Calibrating gas connection
						0								No calibrating gas connection
						1								6 mm
						2								6 mm + check valve
						3								1/4"
						4								1/4" + check valve
														Connection heated extension
							0							No
							1							Yes
														Built-in temperature controller for heated extension [1]
								0						No
								1						Yes
														Blowback with air reservoir [2]
														Air reservoir heating
									1					Yes
									9					No
														Built-in blowback control [1]
										1				Internal controller
										9				No
														Compressed air valve / valve voltage information
											0			Manual
											1			115 V
											2			230 V
											3			24 V
											9			None (if no blowback requested)
														Pneumatic drive for ball valve
												0		Manual
												1		Monostable pressure-free open
												2		Monostable pressure-free closed
												3		Bi-stable
														Limit switch for pneumatic drive
													1	Yes
													9	No
														Control valve for pneumatic drive
													3	3/2-way valve
													5	5/2-way valve
													9	No control valve

[1] The electronics can either be equipped with temperature controller for heated extension or blowback control.

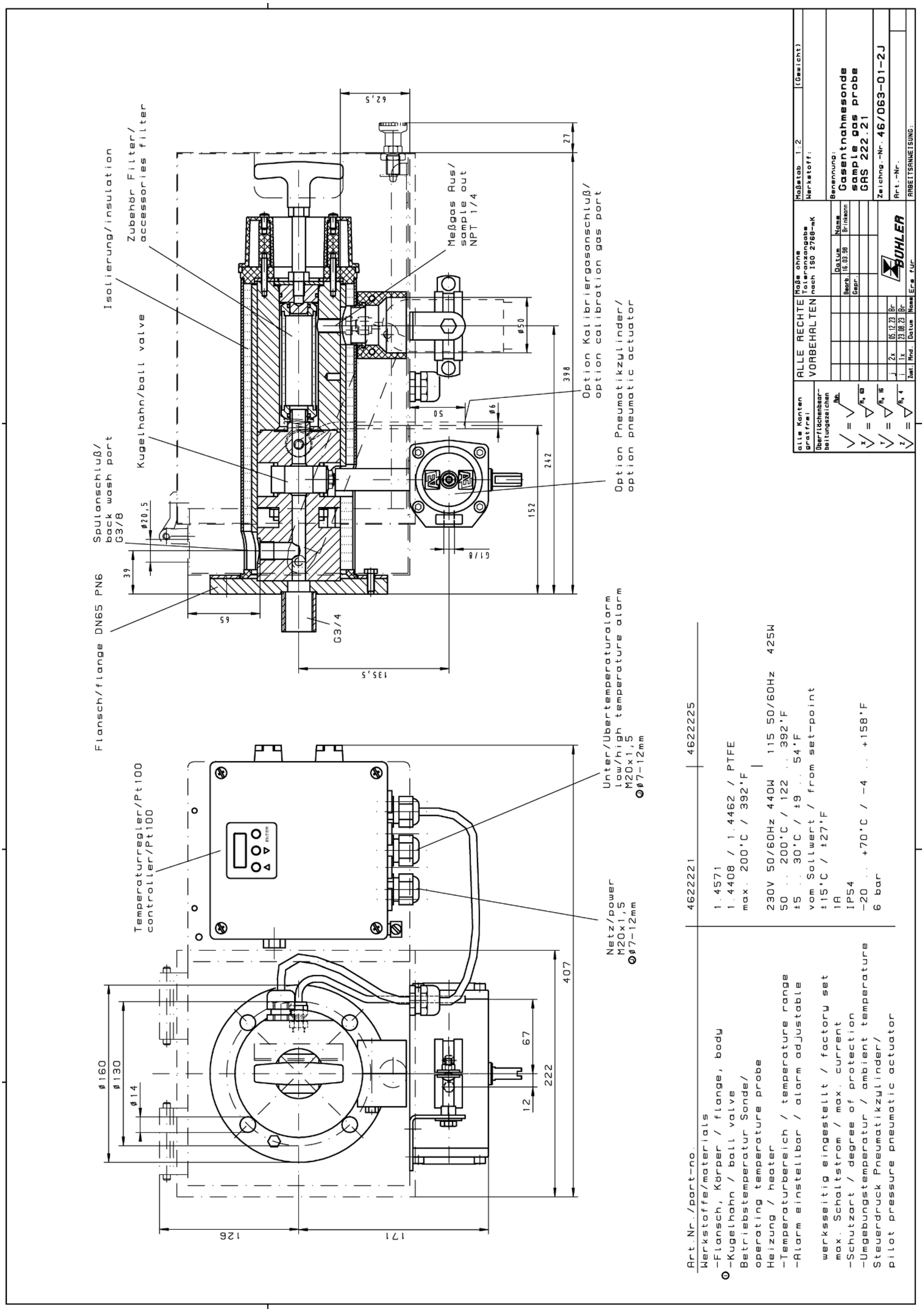
[2] For flammable sample gas, always use inert gas for blowback. Probe blowback prohibited when using explosive gases!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

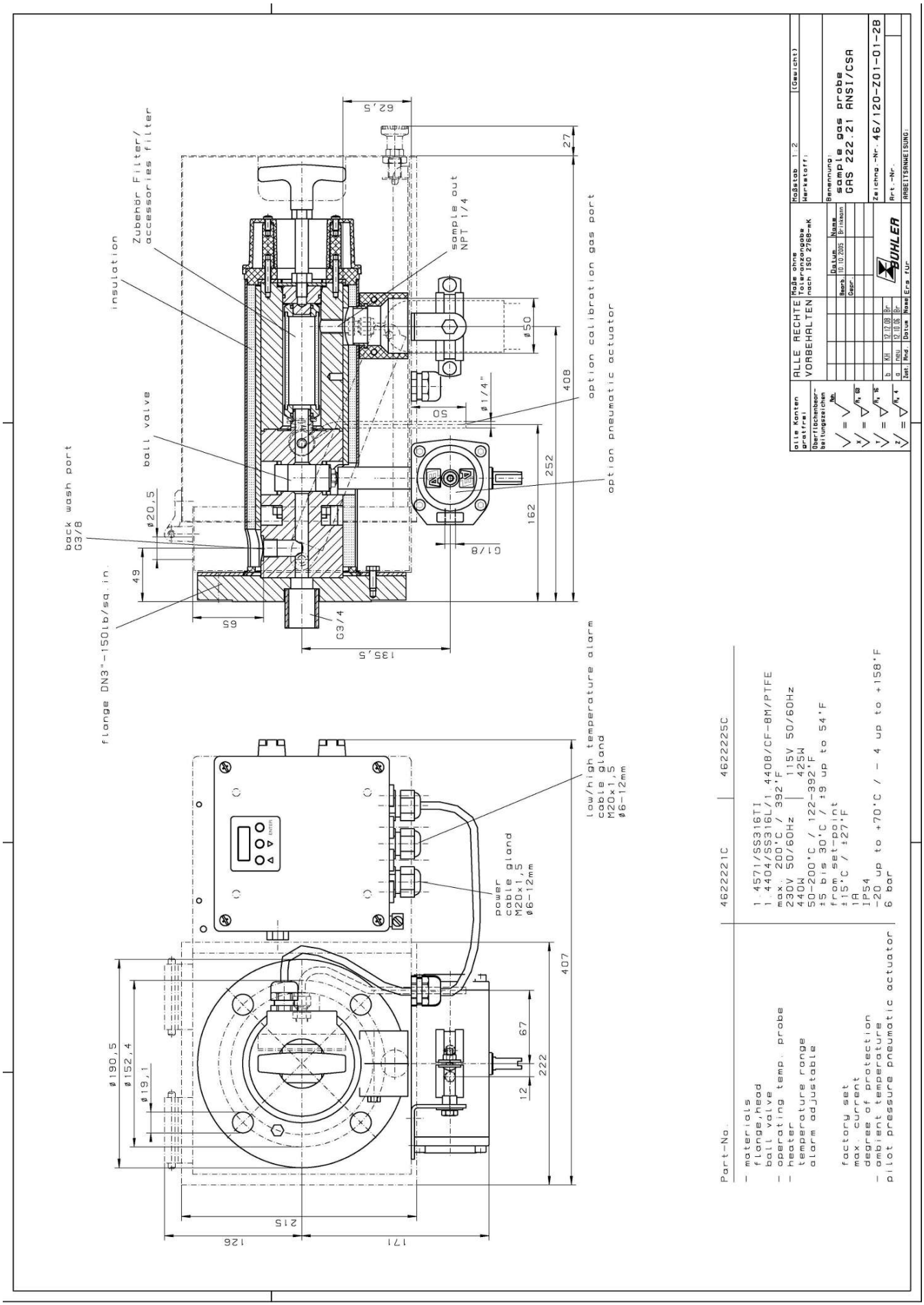
Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Flansch/flange DN65 PN6
Spülanschluß/ back wash port G3/8
Kugelhahn/ball valve
Isolierung/insulation
Zubehör Filter/ accessories filter
Meßgas Aus/ sample out NPT 1/4
Option Kalibriergasanschluß/ option calibration gas port
Option Pneumatikzylinder/ option pneumatic actuator
G3/4
G1/8
Temperaturregler/Pt100 controller/Pt100
Netz/power M20x1,5 Ø7–12mm
Unter/Übertemperaturalarm low/high temperature alarm M20x1,5 Ø7–12mm
Art.Nr./part-no. 4622221 4622225
Werkstoffe/materials
-Flansch, Körper / flange, body 1.4571
-Kugelhahn / ball valve 1.4408 / 1.4462 / PTFE
Betriebstemperatur Sonde/ operating temperature probe max. 200°C / 392°F
Heizung / heater 230V 50/60Hz 440W 115 50/60Hz 425W
-Temperaturbereich / temperature range 50 .. 200°C / 122 .. 392°F
-Alarm einstellbar / alarm adjustable ±5 .. 30°C / ±9 .. 54°F vom Sollwert / from set-point
werksseitig eingestellt / factory set ±15°C / ±27°F
max. Schaltstrom / max. current 1A
-Schutzart / degree of protection IP54
-Umgebungstemperatur / ambient temperature -20 .. +70°C / -4 .. +158°F
Steuerdruck Pneumatikzylinder/ pilot pressure pneumatic actuator 6 bar
ALLE RECHTE VORBEHALTEN
Maßstab 1:2
Benennung: Gasentnahmesonde sample gas probe GAS 222.21
Zeichng.-Nr. 46/063-01-2J
BÜHLER

Dimensions (ANSI flange)

NOTICE! ANSI flange only available without CSA approval.



Sample gas probe GAS 222.21 Ex1

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

Versions with Atex and IECEx approval
Heated probe with shut-off valve, upstream and/or downstream filter and weather hood
The downstream filter can easily be removed by turning the handle 90°
The probe body and the area around the screw connection for the heated sample gas line are completely isolated
Heater self-regulating to approx. 194 °F
For dust loads up to 2 g/m³ with downstream filter or > 10 g/m³ with upstream filter
This probe is suitable for use in explosive areas. Atex: use in zone 1 and 21 and sampling from zone 0 and 20 IECEx: Use in zone 1 and sampling from zone 0

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Phone: 248.652.1546, Fax: 248.652.1598
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Internet: www.buhlertech.com

Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-40 to 131 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	-22 °F < T_{amb} < 131 °F
	Solenoid valve for pneumatic drive:	14 °F < T_{amb} < 131 °F
	Pneumatic drive:	-4 °F < T_{amb} < 131 °F
	Limit switch:	-13 °F < T_{amb} < 131 °F
Permissible gas inlet temperatures:	**Outer zone temperature class**	**Permissible gas inlet temperature**
	T2	275 °F
	T3	275 °F
	T4	266 °F
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Compressed air valve:	14 °F to 176 °F
	Solenoid valve for pneumatic drive:	14 °F to 212 °F
Self-regulating heater:	194 °F	
Electrical data:	Probe: 230 V, 200 W, 50/60 Hz 115 V, 200 W, 50/60 Hz	External circuit breaker type C: 230 V, 3 A, 50/60 Hz 115 V, 4 A, 50/60 Hz
Max. operating pressure:	85 psia	
Max. flow rate:	16.66 lpm	
Materials in contact with media Flange: Probe body: Ball valve: Seal:	 Stainless steel 1.4571 Stainless steel 1.4571 Stainless steel 1.4408/1.4462/PTFE Stainless steel 1.4404/graphite/and see filter	
Probe marking, depending on the selected options and temperature class:	**for zone 0/1:** ATEX: Ⓔx II 1G/2G Ex db[1] eb mb[2] IIC T5/T6...T1/T2 Ga/Gb IECEx: Ex db[1] eb mb[2] IIC T5/T6...T1/T2 Ga/Gb **for zone 1:** ATEX: Ⓔx II 2G Ex db[1] eb mb[2] IIC T6...T2 Gb IECEx: Ex db[1] eb mb[2] IIC T6...T2 Gb **for zone 0/21:** ATEX: Ⓔx II 1G/2D Ex db[1] eb mb[2] IIC T5 ... T1 Ga Ex tb mb[2] IIIC T80 °C ... T226 °C Db IECEx: - **for zone 20/1:** ATEX: Ⓔx II 1D/2G Ex ta IIIC T120 °C ... T300 °C Da Ex db[1] eb mb[2] IIC T6 ... T2 Gb IECEx: - **for zone 20/21:** ATEX: Ⓔx II 1D/2D Ex ta/tb mb[2] IIIC T120°C/T80°C...T300°C/T226°C Da/Db IECEx: - **for zone 21:** ATEX: Ⓔx II 2D Ex tb mb[2] IIIC T80°C...T226°C Db IECEx: - [1] "db" only for GAS 222.21/31 versions with limit switch [2] "mb" only for versions with solenoid valve	
Applied standards:	IEC 60079-0 (Ed. 6.0); IEC 60079-7 (Ed. 5.0); IEC 60079-26 (Ed. 3.0); EN 60079-0:2012+A11:2013; EN 60079-7:2015; EN 60079-26:2015	
IECEx certificate number:	IECEx IBE 17.0024X	
ATEX certificate number:	IBExU17ATEX1088X	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

46222211	X	X	X	X	4	X	0	X	X	X	X	X	X	Product Characteristics			
														Flange			
	0	1												Flange DN65 PN6			
	0	2												Flange DN3"-150			
	x	x												Other			
														Hazardous area			
														Outside			
			4											Zone 1 (Atex/IECEx)			
			7											Zone 21 (Atex)			
			9											none			
														Inside			
				3										Zone 0 (Atex/IECEx)			
				4										Zone 1 (Atex/IECEx)			
				6										Zone 20 (Atex)			
				7										Zone 21 (Atex)			
				9										none			
														Temperature class inside/outside (dust only ATEX)			
														Ga/Gb	**Ga/Db**	**Da/Gb**	**Da/Db**
					4									T3/T4	T3/T130°C	T175°C/T4	T175°C/T130°C
														Temperature class inside/outside (dust only ATEX)			
														Gb/Gb	**Gb/Db**	**Db/Gb**	**Db/Db**
					4									T4/T4	T4/T130°C	T130°C/T4	T130°C/T130°C
														Power supply sample probe			
						1								115 V			
						2								230 V			
														Calibration gas port			
								0						No			
								1						6 mm			
								2						6 mm with check valve			
								3						1/4"			
								4						1/4" with check valve			
														Pressure vessel *			
									0					No			
									1					Yes			
														Purge valve *			
										0				Ball valve			
										1				Solenoid valve 110 V (marked with "mb")			
										2				Solenoid valve 230 V (marked with "mb")			
										3				Solenoid valve 24 V (marked with "mb")			
										9				none			
														Pneumatic actuator for internal ball valve			
											0			No			
											1			Monostable pressure-free opened			
											2			Monostable pressure-free closed			
														Limit switch for pneumatic actuator			
												0		No			
												1		Yes (marked with "db" or "ta" or "tb")			
														Solenoid valve for pneumatic actuator			
													0	No			
													1	110 V (marked with "mb")			

2	230 V (marked with "mb")
3	24 V (marked with "mb")

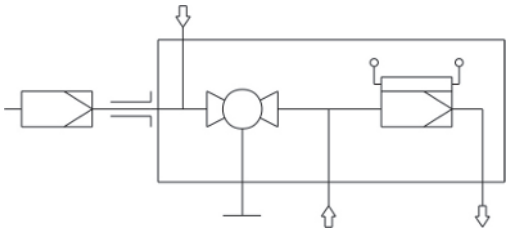
* Blowback of explosive atmosphere prohibited.

Options

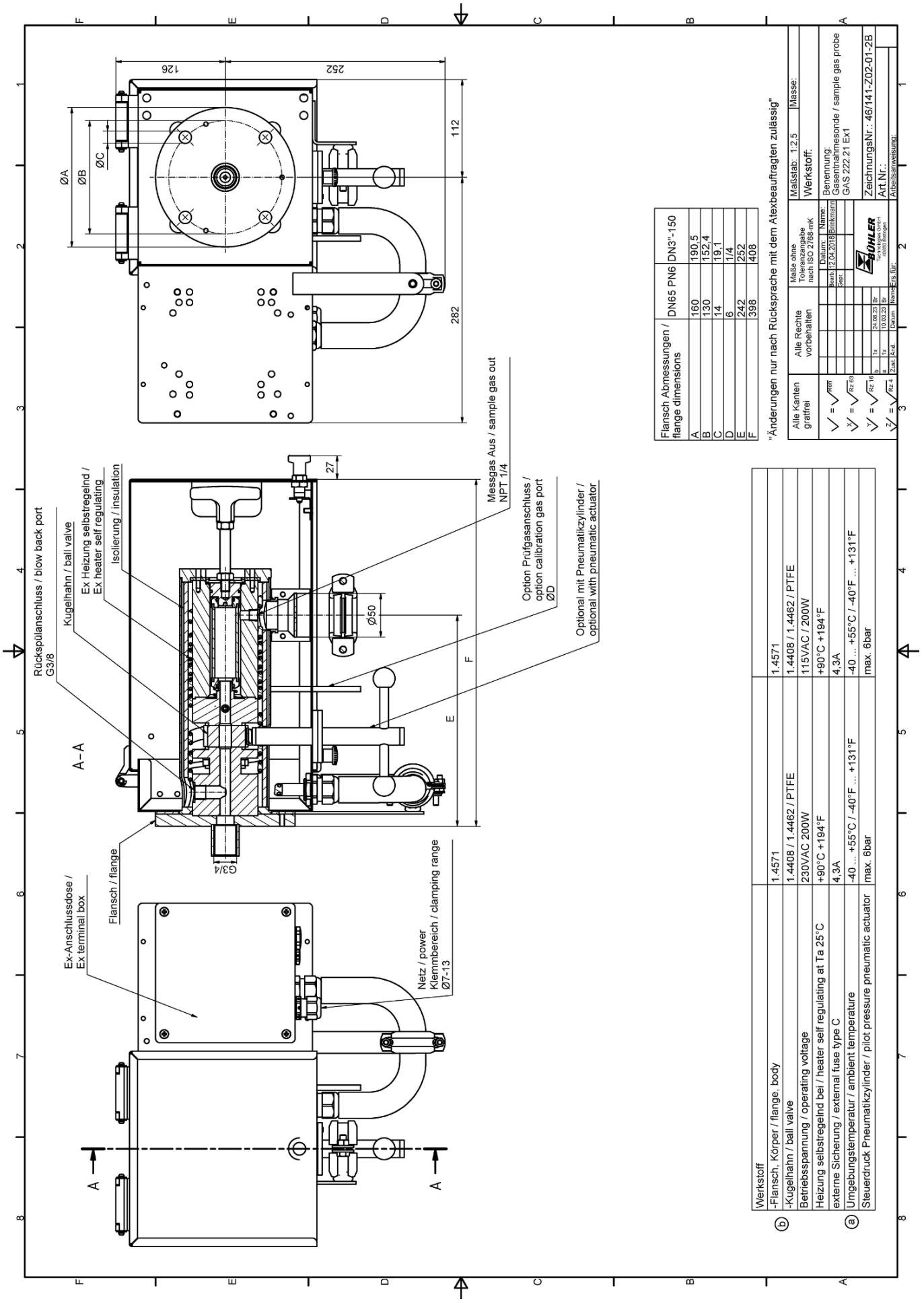
The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Flow chart



Dimensions


Rückspülanschluss / blow back port G3/8
Kugelhahn / ball valve
Ex Heizung selbstregelnd / Ex heater self regulating
Isolierung / insulation
Messgas Aus / sample gas out NPT 1/4
Option Prüfgasanschluss / option calibration gas port ØD
Optional mit Pneumatikzylinder / optional with pneumatic actuator
Ex-Anschlussdose / Ex terminal box
Flansch / flange
Netz / power Klemmbereich / clamping range Ø7-13
A–A
ØA
ØB
ØC
126
252
112
282
27
Ø50
G3/4
E
F
Flansch Abmessungen / flange dimensions
DN65 PN6
DN3"-150
A 160 190,5
B 130 152,4
C 14 19,1
D 6 1/4
E 242 252
F 398 408
"Änderungen nur nach Rücksprache mit dem Atexbeauftragten zulässig"
Alle Kanten gratfrei
Alle Rechte vorbehalten
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab: 1:2,5
Masse:
Werkstoff:
Benennung: Gasentnahmesonde / sample gas probe GAS 222.21 Ex1
ZeichnungsNr.: 46/141-Z02-01-2B
Art.Nr.:
Arbeitsanweisung:
Werkstoff
-Flansch, Körper / flange, body 1.4571 1.4571
-Kugelhahn / ball valve 1.4408 / 1.4462 / PTFE 1.4408 / 1.4462 / PTFE
Betriebsspannung / operating voltage 230VAC 200W 115VAC / 200W
Heizung selbstregelnd bei / heater self regulating at Ta 25°C +90°C +194°F +90°C +194°F
externe Sicherung / external fuse type C 4,3A 4,3A
Umgebungstemperatur / ambient temperature -40 ... +55°C / -40°F ... +131°F -40 ... +55°C / -40°F ... +131°F
Steuerdruck Pneumatikzylinder / pilot pressure pneumatic actuator max. 6bar max. 6bar

Sample gas probe GAS 222.21 Ex2

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

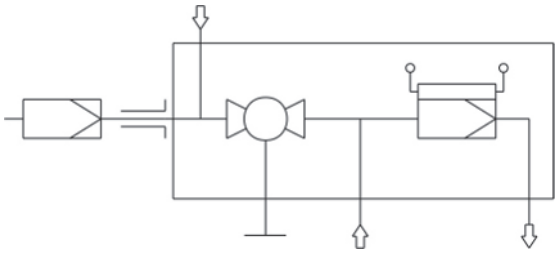
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Heated probe with shut-off valve, upstream and/or downstream filter and weather hood
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely insulated
- Heater self-regulating to approx. 248 °F (T3)/158 °F (T4) with low temperature alarm
- For dust loads up to 2 g/m³ with downstream filter or > 10 g/m³ with upstream filter
- This probe is permitted for use in explosive areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-4 to 176 °F	
Ambient temperature for accessories:	**Component**	**Ambient temperature range**
	Valve for pressurized air:	-22 °F < T_{amb} < 131 °F
	Solenoid valve for pneumatic actuator:	14 °F < T_{amb} < 131 °F
	Pneumatic actuator:	-4 °F < T_{amb} < 176 °F
	Limit switch:	-13 °F < T_{amb} < 140 °F
	Junction box:	-4 °F < T_{amb} < 158 °F
Max. gas inlet temperature:	383 °F (T3)/266 °F (T4)	
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Valve for pressurized air:	14 °F to 176 °F
	Solenoid valve for pneumatic actuator:	14 °F to 212 °F
Self-regulating heater:	248 °F (T3)/158 °F (T4)	
Low temperature alarm:	Contact switches at < 203 °F (T3) or < 122 °F (T4); Simple electrical equipment according to EN 60079-11; U_i 30 V, I_i = 100 mA; C_i/L_i~0	
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	
Max. operating pressure:	85 psia	
Materials in contact with media		
Flange:	Stainless steel 1.4571	
Probe body:	Stainless steel 1.4571	
Ball valve:	Stainless steel 1.4408/1.4462/PTFE	
Seal:	Stainless steel 1.4404/graphite/and see filter	
Markings:	ATEX: Ex II 3G Ex ec ic mb IIC T3/T4 Gc IECEx: Ex ec ic mb IIC T3/T4 Gc	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622221	X	0	X	X	X	X	3	X	X	X	X	X	X	Product characteristics
														Junction box
	0													No
	1													Yes
														Flange
		0	1											Flange DN65 PN6
		0	2											Flange DN3"-150
														Hazardous area Outside and Inside
				2	9									Ex-Zone 2 outside, none inside
				2	2									Ex-Zone 2 outside and inside
														Temperature class
						3								T3
						4								T4
														Power supply sample probe
							3							115/230 V
														Low temperature alarm
								1						Opener (open at operating temperature) (marked with "ic")
								2						Closer (closed at operating temperature) (marked with "ic")
														Calibration gas port
									0					No
									1					6 mm
									2					6 mm with check valve
									3					1/4"
									4					1/4" with check valve
														Capacitive vessel *
										0				No
										1				Yes
														Valve for pressurized air *
											0			Ball valve
											1			Solenoid valve 110 V (marked with "mb")
											2			Solenoid valve 230 V (marked with "mb")
											3			Solenoid valve 24 V (marked with "mb")
											9			none
														Pneumatic actuator for internal ball valve
												0		No
												1		Mono stable depressurized open
												2		Mono stable depressurized closed
														Limit switch for pneumatic actuator
													0	No
													1	Yes
														Solenoid valve for pneumatic actuator
													0	No
													1	110 V (marked with "mb")
													2	230 V (marked with "mb")
													3	24 V (marked with "mb")

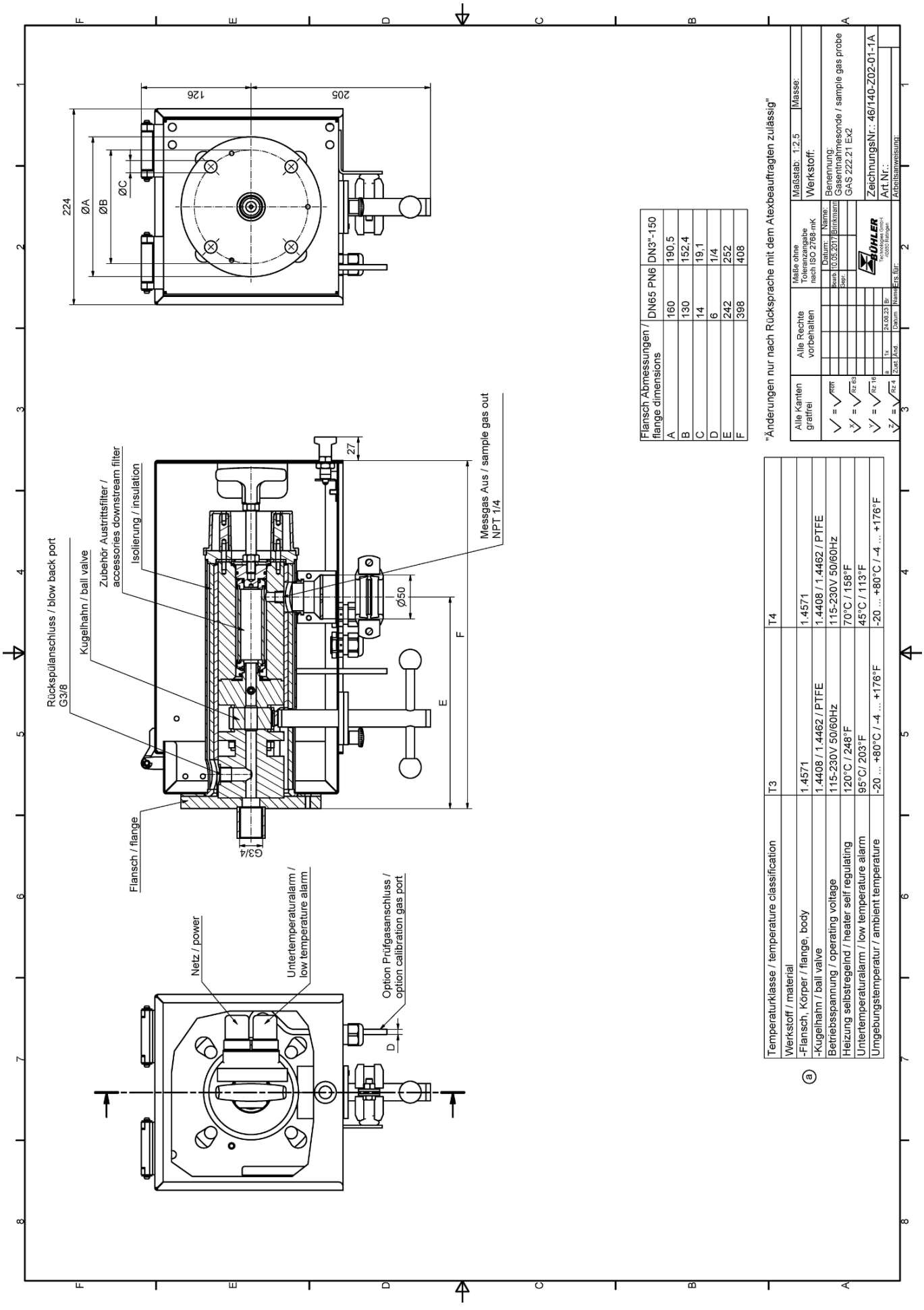
* Blowback of explosive atmosphere prohibited.

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions



Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	242	252
F	398	408

"Änderungen nur nach Rücksprache mit dem Atexbeauftragten zulässig"

Temperaturklasse / temperature classification	T3	T4
Werkstoff / material		
-Flansch, Körper / flange, body	1.4571	1.4571
-Kugelhahn / ball valve	1.4408 / 1.4462 / PTFE	1.4408 / 1.4462 / PTFE
Betriebsspannung / operating voltage	115-230V 50/60Hz	115-230V 50/60Hz
Heizung selbstregelnd / heater self regulating	120°C / 248°F	70°C / 158°F
Untertemperaturalarm / low temperature alarm	95°C/ 203°F	45°C / 113°F
Umgebungstemperatur / ambient temperature	-20 ... +80°C / -4 ... +176°F	-20 ... +80°C / -4 ... +176°F

ⓐ

Alle Kanten gratfrei

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Maße ohne Toleranzangabe nach ISO 2768-mK

Maßstab: 1:2,5

Masse:

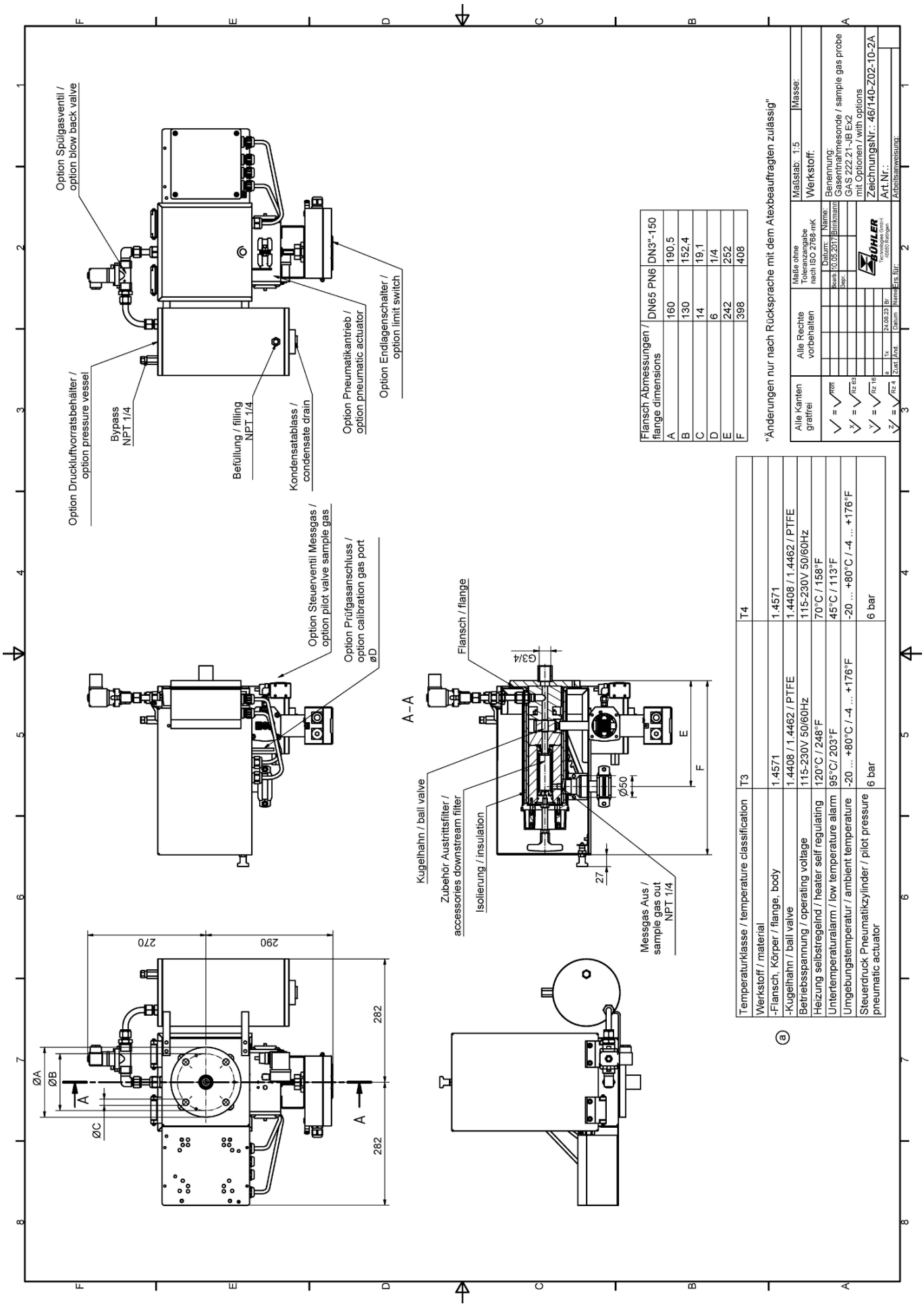
Werkstoff:

Benennung: Gasentnahmesonde / sample gas probe GAS 222.21 Ex2

ZeichnungsNr.: 46/140-Z02-01-1A

Art.Nr.:

Arbeitsanweisung:


Option Spülgasventil / option blow back valve
Option Druckluftvorratsbehälter / option pressure vessel
Bypass NPT 1/4
Befüllung / filling NPT 1/4
Kondensatablass / condensate drain
Option Pneumatikantrieb / option pneumatic actuator
Option Endlagenschalter / option limit switch
Option Steuerventil Messgas / option pilot valve sample gas
Option Prüfgasanschluss / option calibration gas port øD
A–A
Flansch / flange
G3/4
Kugelhahn / ball valve
Zubehör Austrittsfilter / accessories downstream filter
Isolierung / insulation
Messgas Aus / sample gas out NPT 1/4
ØA
ØB
ØC
270
290
282
282
27
Ø50
E
F
Flansch Abmessungen / flange dimensions
DN65 PN6
DN3"-150
A 160 190,5
B 130 152,4
C 14 19,1
D 6 1/4
E 242 252
F 398 408
"Änderungen nur nach Rücksprache mit dem Atexbeauftragten zulässig"
Alle Kanten gratfrei
Alle Rechte vorbehalten
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab: 1:5
Masse:
Werkstoff:
Benennung:
Gasentnahmesonde / sample gas probe
GAS 222.21-JB Ex2
mit Optionen / with options
ZeichnungsNr.: 46/140-Z02-10-2A
Art.Nr.:
Arbeitsanweisung:
Name
Datum
Bearb. 10.05.2017 Brinkmann
Gep.
Ers. für:
Zust. Änd.
Temperaturklasse / temperature classification | T3 | T4
Werkstoff / material
-Flansch, Körper / flange, body | 1.4571 | 1.4571
-Kugelhahn / ball valve | 1.4408 / 1.4462 / PTFE | 1.4408 / 1.4462 / PTFE
Betriebsspannung / operating voltage | 115-230V 50/60Hz | 115-230V 50/60Hz
Heizung selbstregelnd / heater self regulating | 120°C / 248°F | 70°C / 158°F
Untertemperaturalarm / low temperature alarm | 95°C/ 203°F | 45°C / 113°F
Umgebungstemperatur / ambient temperature | -20 ... +80°C / -4 ... +176°F | -20 ... +80°C / -4 ... +176°F
Steuerdruck Pneumatikzylinder / pilot pressure pneumatic actuator | 6 bar | 6 bar

Sample gas probe GAS 222.30

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Unheated probe with Shut-off valve and upstream filter
- For dust loads up to 200 g/m³, non-condensable gases
- The probe is suitable for use in explosive areas

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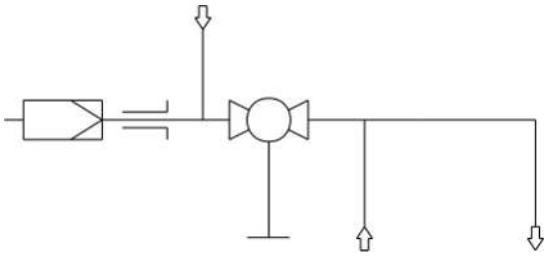
Flow chart



Technical Data

Gas Probe Technical Data		
Probe operating temperature:	max. 392 °F	
Ambient temperature without accessories:	-4 to 176 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	14 °F < T_{amb} < 131 °F
	Pneumatic drive:	-4 °F < T_{amb} < 176 °F
	Limit switch:	-4 °F < T_{amb} < 212 °F
	Solenoid valve for pneumatic drive:	14 °F < T_{amb} < 131 °F
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Compressed air valve:	14 °F to 176 °F
	Solenoid valve for pneumatic drive:	14 °F to 212 °F
Max. operating pressure:	85 psia	
Materials in contact with media		
Flange:	Stainless steel 1.4571	
Probe body:	Stainless steel 1.4571	
Ball valve:	Stainless steel 1.4408/1.4462/PTFE	
Seal:	Stainless steel 1.4404/graphite/and see filter	

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622230	X	9	9	0	0	X	0	0	X	9	X	X	X	X	Product Characteristics
															Flange
	0														DIN DN65 PN6
	2														ANSI 3"-150 lbs - without CSA C & US approval
															Power supply sample probe
					0										none
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve
															Connection heated extension
							0								No
															Built-in temperature controller for heated extension
								0							No
															Blowback with air reservoir [1]
															Air reservoir heating
									1						Yes
									9						No
															Built-in blowback control
										9					No
															Compressed air valve / valve voltage information
											0				Manual
											1				115 V
											2				230 V
											3				24 V
											9				None (if no blowback requested)
															Pneumatic drive for ball valve
												0			Manual
												1			Monostable pressure-free open
												2			Monostable pressure-free closed
												3			Bi-stable
															Limit switch for pneumatic drive
													1		Yes
													9		No
															Control valve for pneumatic drive
														3	3/2-way valve
														5	5/2-way valve
														9	No control valve

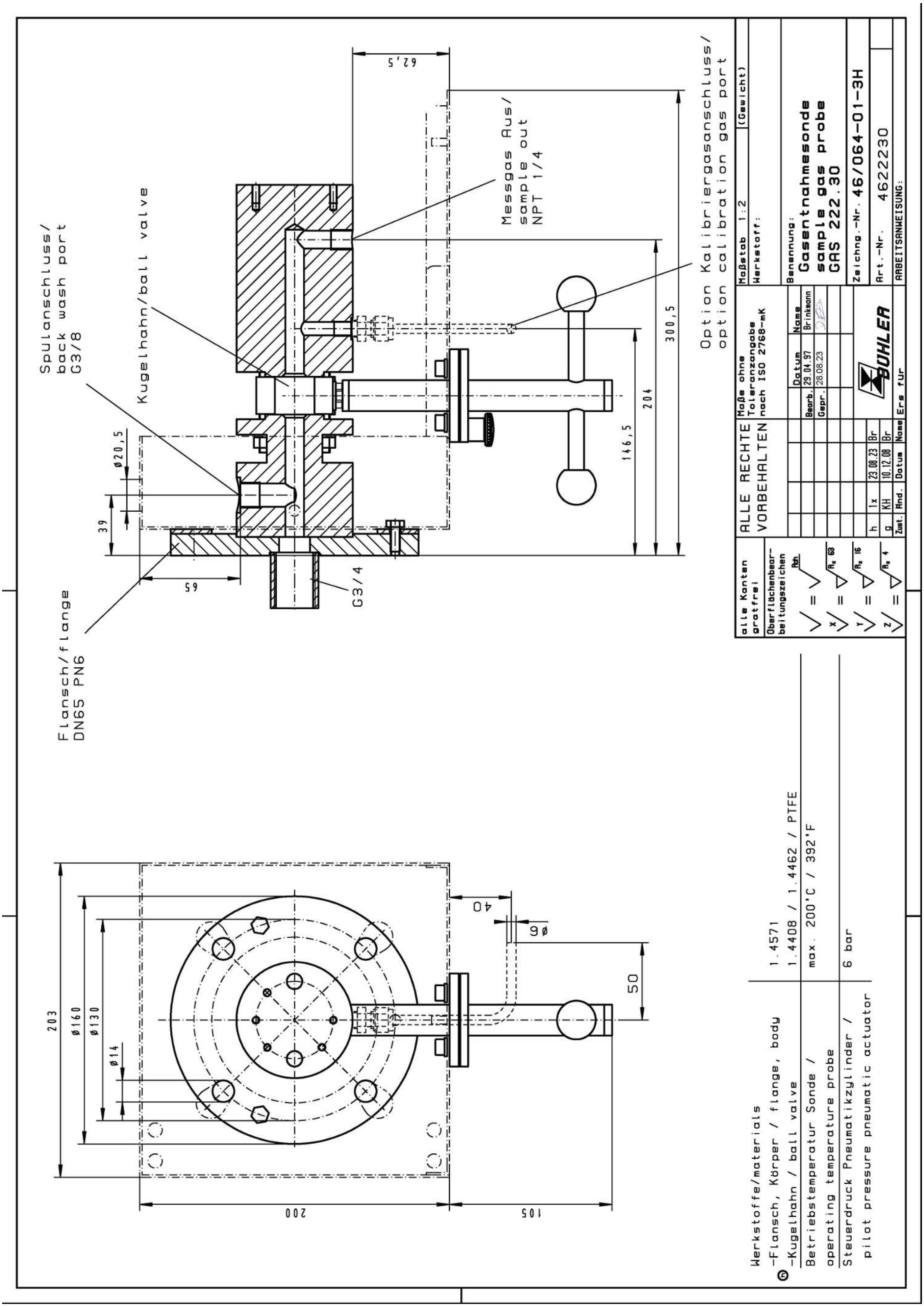
[1] For flammable sample gas, always use inert gas for blowback. Probe blowback prohibited when using explosive gases!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

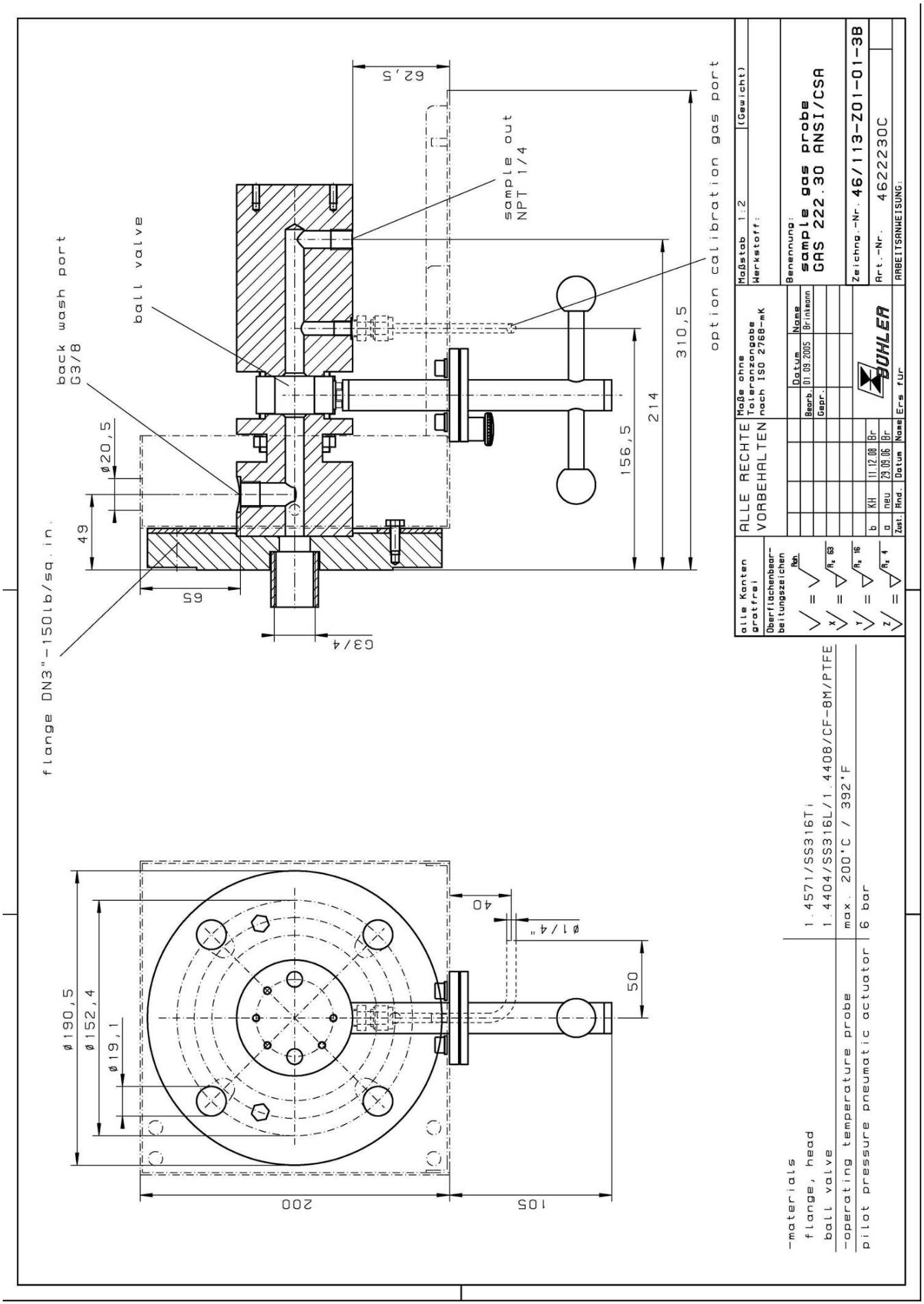
Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Spulanschluss/
back wash port
G3/8
Kugelhahn/ball valve
Messgas Aus/
sample out
NPT 1/4
Option Kalibriergasanschluss/
option calibration gas port
Flansch/flange
DN65 PN6
G3/4
Werkstoffe/materials
-Flansch, Körper / flange, body 1.4571
-Kugelhahn / ball valve 1.4408 / 1.4462 / PTFE
Betriebstemperatur Sonde / operating temperature probe max. 200°C / 392°F
Steuerdruck Pneumatikzylinder / pilot pressure pneumatic actuator 6 bar
ALLE RECHTE VORBEHALTEN
Gasentnahmesonde
sample gas probe
GAS 222.30
Zeichng.-Nr. 46/064-01-3H
Art.-Nr. 4622230
Maßstab 1:2

Dimensions (ANSI flange)

NOTICE! ANSI flange only available without CSA approval.



Sample gas probe GAS 222.30 Ex1

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Unheated probe with shut-off valve and upstream filter
- For dust loads up to 200 g/m³, non-condensable gases
- This probe is designed for use in explosive areas.
  Use in zone 1 and 21 and sampling from zone 0 and 20.

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
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e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-40 to 131 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	-22 °F < T_{amb} < 131 °F
	Solenoid valve for pneumatic drive:	14 °F < T_{amb} < 131 °F
	Pneumatic drive:	-4 °F < T_{amb} < 131 °F
	Limit switch:	-13 °F < T_{amb} < 131 °F
	Terminal box:	-4 °F < T_{amb} < 131 °F
Permissible gas inlet temperatures:	**Outer zone temperature class**	**Permissible gas inlet temperature**
	T2	275 °F
	T3	275 °F
	T4	266 °F
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Compressed air valve:	14 °F to 176 °F
	Solenoid valve for pneumatic drive:	14 °F to 212 °F
Max. operating pressure:	85 psia	
Max. flow rate:	16.66 lpm	
Materials in contact with media Flange: Probe body: Ball valve: Seal:	 Stainless steel 1.4571 Stainless steel 1.4571 Stainless steel 1.4408/1.4462/PTFE Stainless steel 1.4404/graphite/and see filter	
Probe marking, depending on the selected options and temperature class:	**for zone 0/1:** ATEX: Ⓔx II 1G/2G Ex db[1] eb mb[2] IIC T4 Ga/Gb IECEx: Ex db[1] eb mb[2] IIC T4 Ga/Gb **for zone 1:** ATEX: Ⓔx II 2G Ex db[1] eb mb[2] IIC T4 Gb IECEx: Ex db[1] eb mb[2] IIC T4 Gb **for zone 0/21:** ATEX: Ⓔx II 1G/2D Ex db[1] eb mb[2] IIC T4 Ga Ex tb mb[2] IIIC T130 °C Db IECEx: Ex db[1] eb mb[2] IIC T4 Ga Ex tb mb[2] IIIC T130 °C Db **for zone 20/1:** ATEX: Ⓔx II 1D/2G Ex ta IIIC T130 °C Da Ex db[1] eb mb[2] IIC T4 Gb IECEx: Ex ta IIIC T130 °C Da Ex db[1] eb mb[2] IIC T4 Gb **for zone 20/21:** ATEX: Ⓔx II 1D/2D Ex ta/tb mb[2] IIIC T130°C Da/Db IECEx: Ex ta/tb mb[2] IIIC T130°C Da/Db **for zone 21:** ATEX: Ⓔx II 2D Ex tb mb[2] IIIC T130°C Db IECEx: Ex tb mb[2] IIIC T130°C Db [1] "db" only for GAS 222.11/30 versions with limit switch [2] "mb" only for versions with solenoid valve	
Applied standards:	IEC 60079-0 (Ed. 6.0); IEC 60079-7 (Ed. 5.0); IEC 60079-26 (Ed. 3.0); EN 60079-0:2012+A11:2013; EN 60079-7:2015; EN 60079-26:2015	
IECEx certificate number:	IECEx IBE 17.0024X	
ATEX certificate number:	IBExU17ATEX1088X	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622230	X	X	X	X	X	4	0	0	X	X	X	X	X	X	Product Characteristics			
															Terminal box			
	0														No			
	1														Yes			
															Flange			
		0	1												Flange DN65 PN6			
		0	2												Flange DN3"-150			
		x	x												Other			
															Hazardous area			
															Outside			
				4											Zone 1 (Atex/IECEx)			
				7											Zone 21 (Atex/IECEx)			
				9											none			
															Inside			
					3										Zone 0 (Atex/IECEx)			
					4										Zone 1 (Atex/IECEx)			
					6										Zone 20 (Atex/IECEx)			
					7										Zone 21 (Atex/IECEx)			
					9										none			
															Temperature class (inside/outside)			
															Ga/Gb or Gb/Gb	**Ga/Db or Gb/Db**	**Da/Gb or Db/Gb**	**Da/Db or Db/Db**
						4									T4/T4	T4/T130 °C	T130 °C/T4	T130 °C/T130 °C
															Calibration gas port			
									0						No			
									1						6 mm			
									2						6 mm with check valve			
									3						1/4"			
									4						1/4" with check valve			
															Pressure vessel *			
										0					No			
										1					Yes			
															Purge valve *			
											0				Ball valve			
											1				Solenoid valve 110 V (marked with "mb")			
											2				Solenoid valve 230 V (marked with "mb")			
											3				Solenoid valve 24 V (marked with "mb")			
											9				none			
															Pneumatic actuator for internal ball valve			
												0			No			
												1			Monostable pressure-free opened			
												2			Monostable pressure-free closed			
															Limit switch for pneumatic actuator			
													0		No			
													1		Yes (marked with "db" or "ta" or "tb")			
															Solenoid valve for pneumatic actuator			
														0	No			
														1	110 V (marked with "mb")			
														2	230 V (marked with "mb")			
														3	24 V (marked with "mb")			

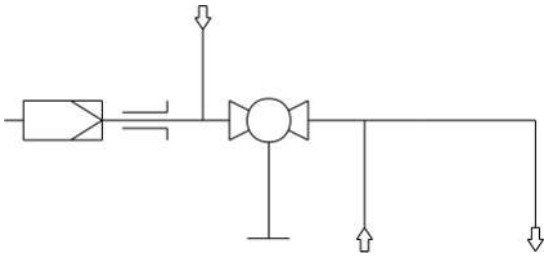
* Blowback of explosive atmosphere prohibited.

Options

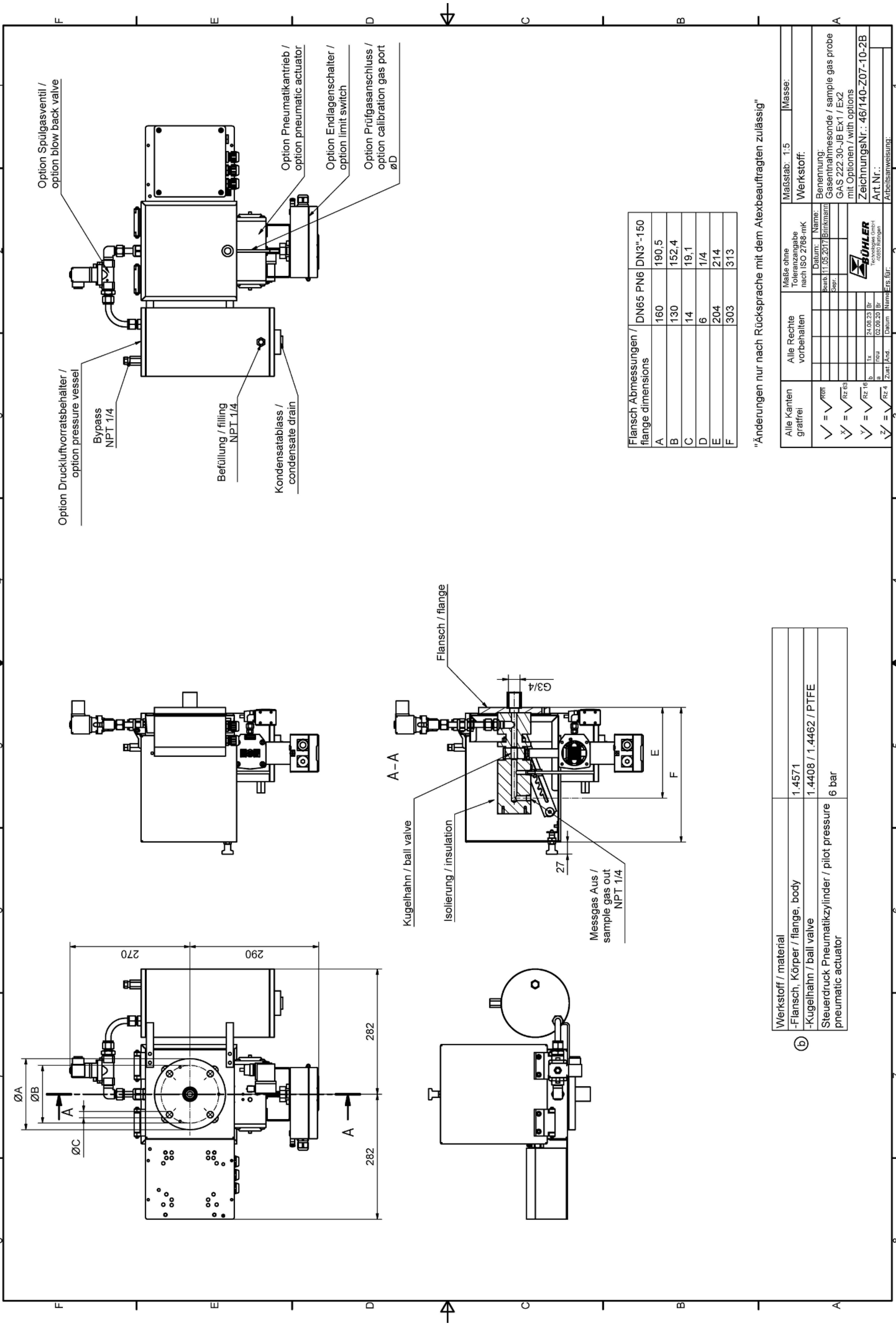
The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Flow chart



Dimensions


Option Spülgasventil /
option blow back valve
Option Pneumatikantrieb /
option pneumatic actuator
Option Endlagenschalter /
option limit switch
Option Prüfgasanschluss /
option calibration gas port
øD
Option Druckluftvorratsbehälter /
option pressure vessel
Bypass
NPT 1/4
Befüllung / filling
NPT 1/4
Kondensatablass /
condensate drain
Flansch Abmessungen / flange dimensions
DN65 PN6
DN3"-150
A 160 190,5
B 130 152,4
C 14 19,1
D 6 1/4
E 204 214
F 303 313
"Änderungen nur nach Rücksprache mit dem Atexbeauftragten zulässig"
Maßstab: 1:5
Masse:
Werkstoff:
Benennung:
Gasentnahmesonde / sample gas probe
GAS 222.30-JB Ex1 / Ex2
mit Optionen / with options
ZeichnungsNr.: 46/140-Z07-10-2B
Art.Nr.:
Alle Kanten gratfrei
Alle Rechte vorbehalten
Maße ohne Toleranzangabe nach ISO 2768-mK
Flansch / flange
G3/4
A-A
Kugelhahn / ball valve
Isolierung / insulation
Messgas Aus /
sample gas out
NPT 1/4
27
E
F
Werkstoff / material
-Flansch, Körper / flange, body 1.4571
-Kugelhahn / ball valve 1.4408 / 1.4462 / PTFE
Steuerdruck Pneumatikzylinder / pilot pressure pneumatic actuator 6 bar
270
290
282
282
ØA
ØB
ØC
A

Sample gas probe GAS 222.30 Ex2

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Unheated probe with shut-off valve and upstream filter
- For dust loads up to 200 g/m³, non-condensable gases
- The probe is permitted for use in explosive areas

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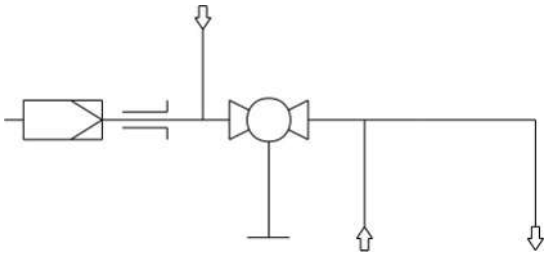
Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-4 to 176 °F	
Ambient temperature for accessories:	**Component**	**Ambient temperature range**
	Valve for pressurized air:	-22 °F < T_{amb} < 131 °F
	Solenoid valve for pneumatic actuator:	14 °F < T_{amb} < 131 °F
	Pneumatic actuator:	-4 °F < T_{amb} < 176 °F
	Limit switch:	-13 °F < T_{amb} < 140 °F
	Junction box:	-4 °F < T_{amb} < 158 °F
Max. gas inlet temperature:	383 °F (T3)/266 °F (T4)	
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Valve for pressurized air:	14 °F to 176 °F
	Solenoid valve for pneumatic actuator:	14 °F to 212 °F
Max. operating pressure:	85 psia	
Materials in contact with media		
Flange:	Stainless steel 1.4571	
Probe body:	Stainless steel 1.4571	
Ball valve:	Stainless steel 1.4408/1.4462/PTFE	
Seal:	Stainless steel 1.4404/graphite/and see filter	
Markings:	ATEX: Ⓔx II 3G Ex ec mb IIC T3/T4 Gc IECEx: Ex ec mb IIC T3/T4 Gc	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622230	X	X	X	X	X	X	0	0	X	X	X	X	X	X	Product characteristics
															Junction box
	0														No
	1														Yes
															Flange
		0	1												Flange DN65 PN6
		0	2												Flange DN3"-150
															Hazardous area Outside and Inside
				2	9										Ex-Zone 2 outside, none inside
				2	2										Ex-Zone 2 outside and inside
															Temperature class
						3									T3
						4									T4
															Power supply sample probe
							0								none
															Calibration gas port
									0						No
									1						6 mm
									2						6 mm with check valve
									3						1/4"
									4						1/4" with check valve
															Capacitive vessel *
										0					No
										1					Yes
															Valve for pressurized air *
											0				Ball valve
											1				Solenoid valve 110 V (marked with "mb")
											2				Solenoid valve 230 V (marked with "mb")
											3				Solenoid valve 24 V (marked with "mb")
											9				none
															Pneumatic actuator for internal ball valve
												0			No
												1			Mono stable depressurized open
												2			Mono stable depressurized closed
															Limit switch for pneumatic actuator
													0		No
													1		Yes
															Solenoid valve for pneumatic actuator
														0	No
														1	110 V (marked with "mb")
														2	230 V (marked with "mb")
														3	24 V (marked with "mb")

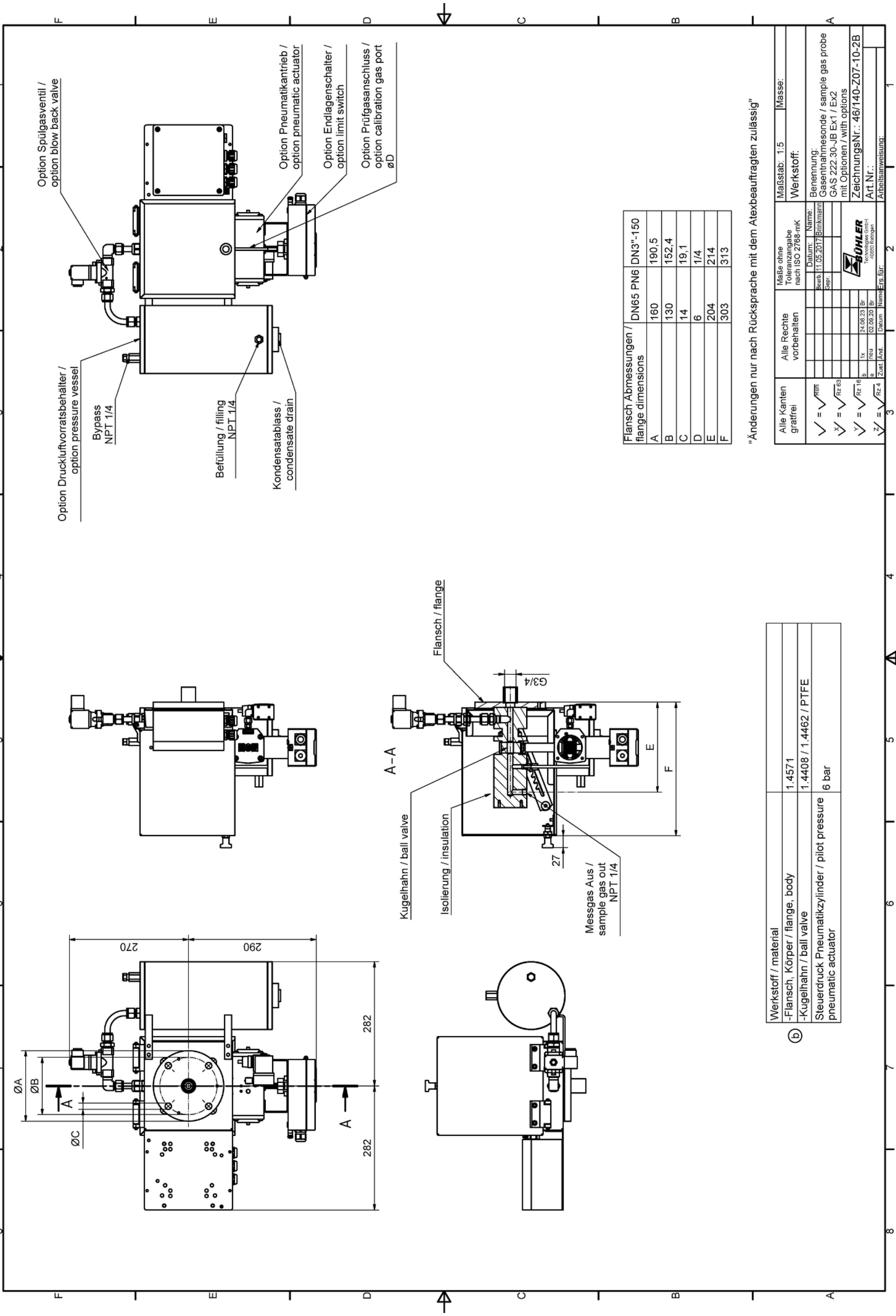
* Blowback of explosive atmosphere prohibited.

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions



Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	204	214
F	303	313

Werkstoff / material	
-Flansch, Körper / flange, body	1.4571
-Kugelhahn / ball valve	1.4408 / 1.4462 / PTFE
Steuerdruck Pneumatikzylinder / pilot pressure pneumatic actuator	6 bar

Sample gas probe GAS 222.31

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with shut-off valve, upstream filter and weather hood
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Electronic temperature controller up to 395 °F with low/high temperature alarm and display
- For dust loads up to 200 g/m³
- This probe is not suitable for use in Ex areas

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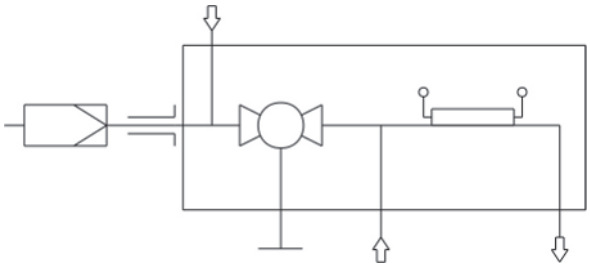
Flow chart



Technical Data

Gas Probe Technical Data

Probe operating temperature:	max. 392 °F	
Ambient temperature without accessories:	-4 to 158 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	14 °F < T_{amb} < +131 °F
	Pneumatic drive:	-4 °F < T_{amb} < 176 °F
	Limit switch:	-4 °F < T_{amb} < 212 °F
	Solenoid valve for pneumatic drive:	14 °F < T_{amb} < 131 °F
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Compressed air valve:	14 °F to 176 °F
	Solenoid valve for pneumatic drive:	14 °F to 212 °F
Regulator setting range:	50 to 392 °F	
Low/high temperature alarm:	Alarm adjustable ±5.....30 K from setpoint, factory preset 15 K Max. switching current 1 A	
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	
IP rating:	IP54	
Max. operating pressure:	85 psia	
Materials in contact with media		
Flange:	Stainless steel 1.4571	
Probe body:	Stainless steel 1.4571	
Ball valve:	Stainless steel 1.4408/1.4462/PTFE	
Seal:	Stainless steel 1.4404/graphite/and see filter	

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622231	X	9	9	0	X	X	X	X	X	X	X	X	X	Product Characteristics
														Flange
	0													DIN DN65 PN6
	2													ANSI 3"-150 lbs - without CSA C & US approval
														Power supply sample probe
					1									115 V
					2									230 V
														Calibrating gas connection
						0								No calibrating gas connection
						1								6 mm
						2								6 mm + check valve
						3								1/4"
						4								1/4" + check valve
														Connection heated extension
							0							No
							1							Yes
														Built-in temperature controller [1]
								0						No
								1						Yes
														Blowback with air reservoir [2]
														Air reservoir heating
									1					Yes
									9					No
														Built-in blowback control [1]
										1				Internal controller
										9				No
														Compressed air valve / valve voltage information
											0			Manual
											1			115 V
											2			230 V
											3			24 V
											9			None (if no blowback requested)
														Pneumatic drive for ball valve
												0		Manual
												1		Monostable pressure-free open
												2		Monostable pressure-free closed
												3		Bi-stable
														Limit switch for pneumatic drive
													1	Yes
													9	No
														Control valve for pneumatic drive
													3	3/2-way valve
													5	5/2-way valve
													9	No control valve

[1] The electronics can either be equipped with temperature controller for heated extension or blowback control.

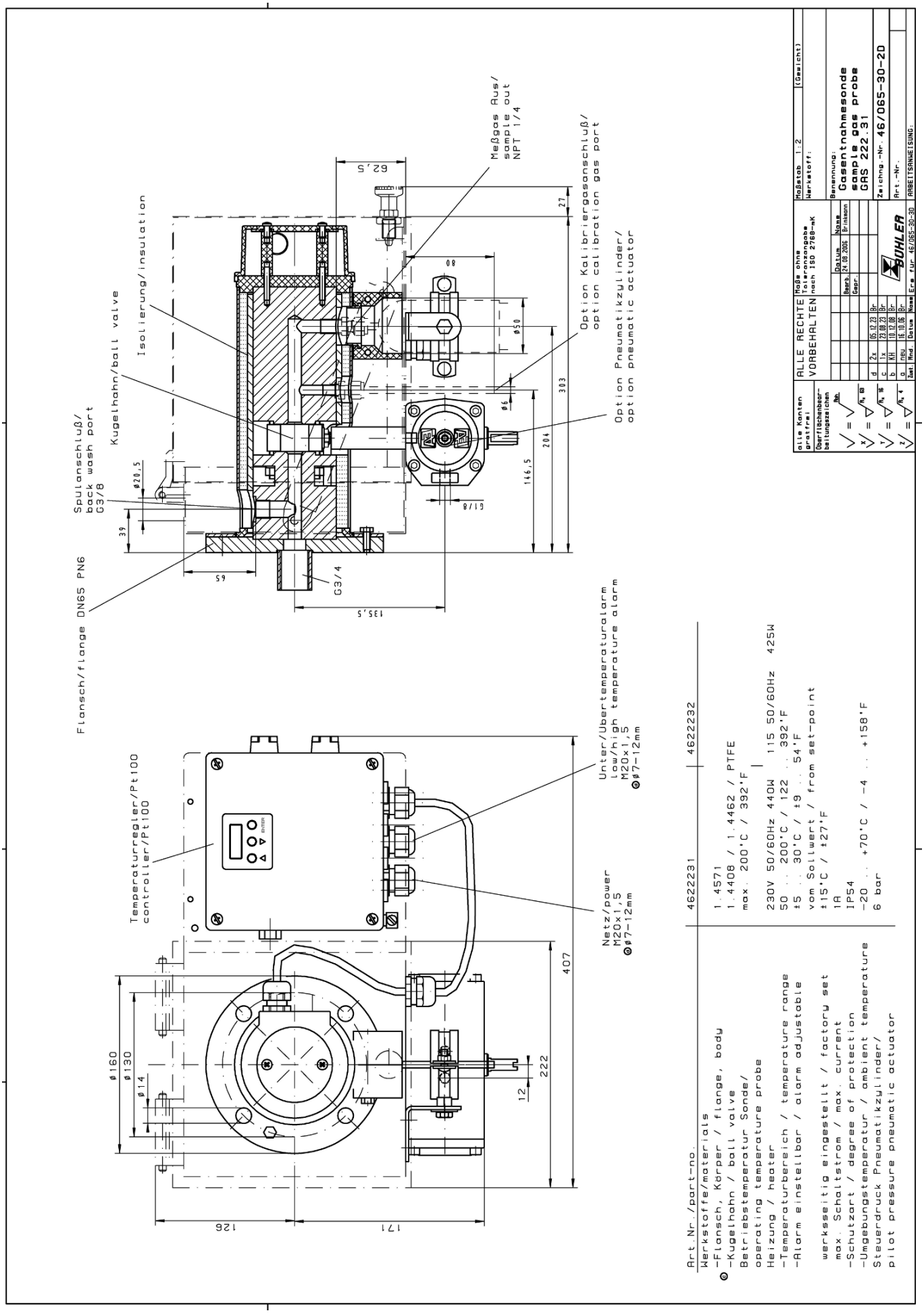
[2] For flammable sample gas, always use inert gas for blowback. Probe blowback prohibited when using explosive gases!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

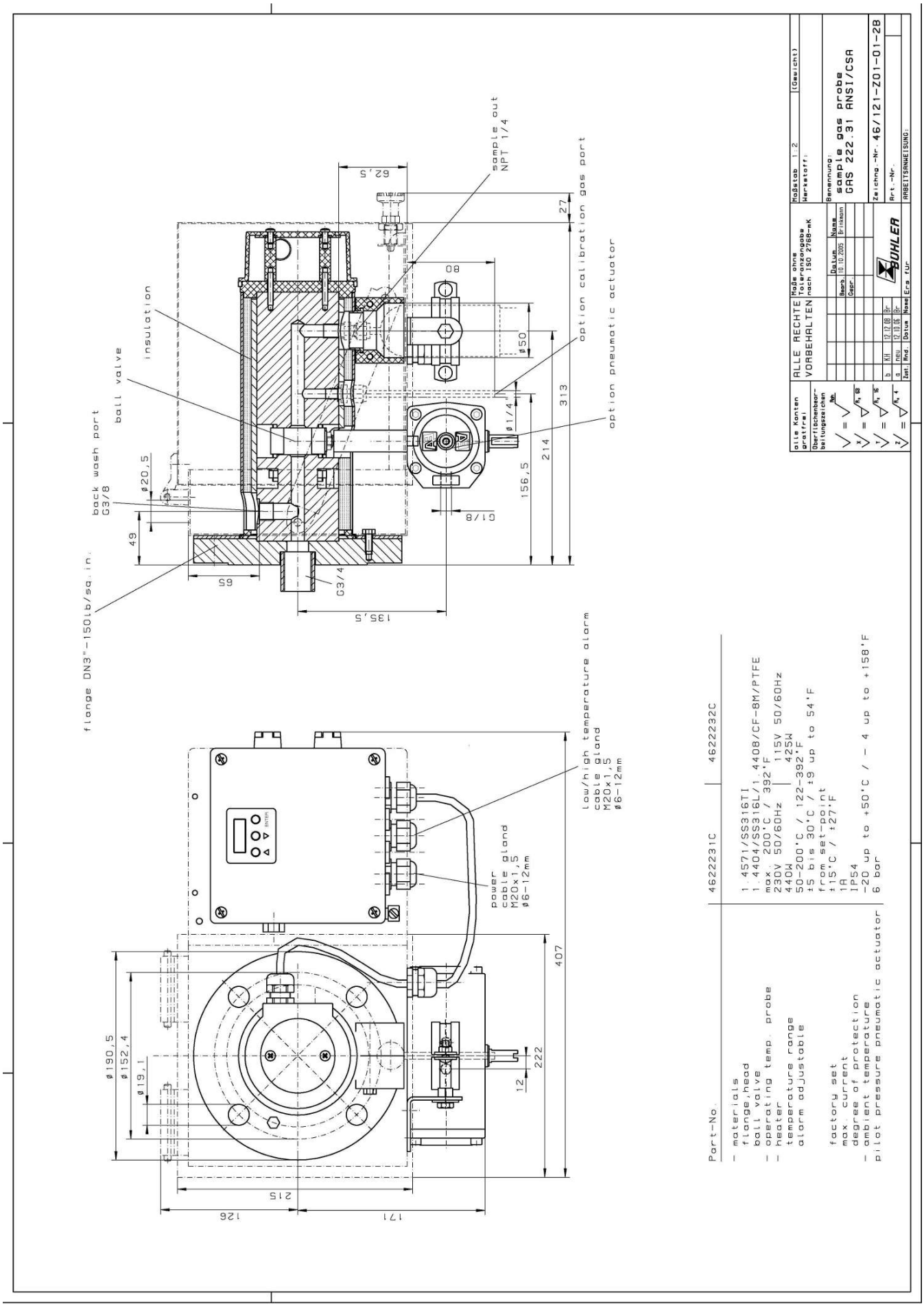
Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Meßgas Aus/
sample out
NPT 1/4
Option Kalibriergasanschluß/
option calibration gas port
Option Pneumatikzylinder/
option pneumatic actuator
Kugelhahn/ball valve
Isolierung/insulation
Spulanschluß/
back wash port
G3/8
Flansch/flange DN65 PN6
Temperaturregler/Pt100
controller/Pt100
Unter/Übertemperaturalarm
Low/high temperature alarm
M20x1,5
Ø7–12mm
Netz/power
M20x1,5
Ø7–12mm
62,5
27
Ø8
Ø50
Ø6
303
204
146,5
135,5
G1/8
G3/4
65
39
Ø20,5
407
222
12
126
171
Ø160
Ø130
Ø14
ALLE RECHTE VORBEHALTEN
alle Kanten gratfrei
Oberflächenbearbeitungszeichen
Maßstab 1:2
(Gewicht)
Werkstoff:
Benennung:
Gasentnahmesonde
sample gas probe
GAS 222.31
Zeichng.-Nr. 46/065-30-2D
Art.-Nr.
ARBEITSANWEISUNG:
Ers. für 46/065-30
Name
Datum
Bearb. 24.08.2006 Brinkmann
Gepr.
Art.Nr./part-no. 4622231 4622232
Werkstoffe/materials
-Flansch, Körper / flange, body 1.4571
-Kugelhahn / ball valve 1.4408 / 1.4462 / PTFE
Betriebstemperatur Sonde/ max. 200°C / 392°F
operating temperature probe
Heizung / heater 230V 50/60Hz 440W 115 50/60Hz 425W
-Temperaturbereich / temperature range 50 ... 200°C / 122 ... 392°F
-Alarm einstellbar / alarm adjustable ±5 ... 30°C / ±9 ... 54°F
vom Sollwert / from set-point
werksseitig eingestellt / factory set ±15°C / ±27°F
max. Schaltstrom / max. current 1A
-Schutzart / degree of protection IP54
-Umgebungstemperatur / ambient temperature -20 ... +70°C / -4 ... +158°F
Steuerdruck Pneumatikzylinder/ 6 bar
pilot pressure pneumatic actuator

Dimensions (ANSI flange)

NOTICE! ANSI flange only available without CSA approval.



Sample gas probe GAS 222.31 Ex1

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Heated probe with shut-off valve, upstream filter and weather hood
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Heater self-regulating to approx. 194 °F
- For dust loads up to 200 g/m³
- This probe is suitable for use in explosive areas.
  Atex: use in zone 1 and 21 and sampling from zone 0 and 20
  IECEx: Use in zone 1 and sampling from zone 0

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Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-40 to 131 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	-22 °F < T_{amb} < 131 °F
	Solenoid valve for pneumatic drive:	14 °F < T_{amb} < 131 °F
	Pneumatic drive:	-4 °F < T_{amb} < 131 °F
	Limit switch:	-13 °F < T_{amb} < 131 °F
Permissible gas inlet temperatures:	**Outer zone temperature class**	**Permissible gas inlet temperature**
	T2	275 °F
	T3	275 °F
	T4	266 °F
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Compressed air valve:	14 °F to 176 °F
	Solenoid valve for pneumatic drive:	14 °F to 212 °F
Self-regulating heater:	194 °F	
Electrical data:	Probe: 230 V, 150 W, 50/60 Hz 115 V, 150 W, 50/60 Hz	External circuit breaker type C: 230 V, 3 A, 50/60 Hz 115 V, 4 A, 50/60 Hz
Max. operating pressure:	85 psia	
Max. flow rate:	16.66 lpm	
Materials in contact with media Flange: Probe body: Ball valve: Seal:	 Stainless steel 1.4571 Stainless steel 1.4571 Stainless steel 1.4408/1.4462/PTFE Stainless steel 1.4404/graphite/and see filter	
Probe marking, depending on the selected options and temperature class:	**for zone 0/1:** ATEX: Ⓔx II 1G/2G Ex db[1] eb mb[2] IIC T5/T6...T1/T2 Ga/Gb IECEx: Ex db[1] eb mb[2] IIC T5/T6...T1/T2 Ga/Gb **for zone 1:** ATEX: Ⓔx II 2G Ex db[1] eb mb[2] IIC T6...T2 Gb IECEx: Ex db[1] eb mb[2] IIC T6...T2 Gb **for zone 0/21:** ATEX: Ⓔx II 1G/2D Ex db[1] eb mb[2] IIC T5 ... T1 Ga Ex tb mb[2] IIIC T80 °C ... T226 °C Db IECEx: - **for zone 20/1:** ATEX: Ⓔx II 1D/2G Ex ta IIIC T120 °C ... T300 °C Da Ex db[1] eb mb[2] IIC T6 ... T2 Gb IECEx: - **for zone 20/21:** ATEX: Ⓔx II 1D/2D Ex ta/tb mb[2] IIIC T120°C/T80°C...T300°C/T226°C Da/Db IECEx: - **for zone 21:** ATEX: Ⓔx II 2D Ex tb mb[2] IIIC T80°C...T226°C Db IECEx: - [1] "db" only for GAS 222.21/31 versions with limit switch [2] "mb" only for versions with solenoid valve	
Applied standards:	IEC 60079-0 (Ed. 6.0); IEC 60079-7 (Ed. 5.0); IEC 60079-26 (Ed. 3.0); EN 60079-0:2012+A11:2013; EN 60079-7:2015; EN 60079-26:2015	
IECEx certificate number:	IECEx IBE 17.0024X	
ATEX certificate number:	IBExU17ATEX1088X	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

46222311	X	X	X	X	4	X	0	X	X	X	X	X	X	Product Characteristics			
														Flange			
	0	1												Flange DN65 PN6			
	0	2												Flange DN3"-150			
	x	x												Other			
														Hazardous area			
														Outside			
			4											Zone 1 (Atex/IECEx)			
			7											Zone 21 (Atex)			
			9											none			
														Inside			
				3										Zone 0 (Atex/IECEx)			
				4										Zone 1 (Atex/IECEx)			
				6										Zone 20 (Atex)			
				7										Zone 21 (Atex)			
				9										none			
														Temperature class inside/outside (dust only ATEX)			
														Ga/Gb	**Ga/Db**	**Da/Gb**	**Da/Db**
					4									T3/T4	T3/T130°C	T175°C/T4	T175°C/T130°C
														Temperature class inside/outside (dust only ATEX)			
														Gb/Gb	**Gb/Db**	**Db/Gb**	**Db/Db**
					4									T4/T4	T4/T130°C	T130°C/T4	T130°C/T130°C
														Power supply sample probe			
						1								115 V			
						2								230 V			
														Calibration gas port			
								0						No			
								1						6 mm			
								2						6 mm with check valve			
								3						1/4"			
								4						1/4" with check valve			
														Pressure vessel *			
									0					No			
									1					Yes			
														Purge valve *			
										0				Ball valve			
										1				Solenoid valve 110 V (marked with "mb")			
										2				Solenoid valve 230 V (marked with "mb")			
										3				Solenoid valve 24 V (marked with "mb")			
										9				none			
														Pneumatic actuator for internal ball valve			
											0			No			
											1			Monostable pressure-free opened			
											2			Monostable pressure-free closed			
														Limit switch for pneumatic actuator			
												0		No			
												1		Yes (marked with "db" or "ta" or "tb")			
														Solenoid valve for pneumatic actuator			
													0	No			
													1	110 V (marked with "mb")			

2	230 V (marked with "mb")
3	24 V (marked with "mb")

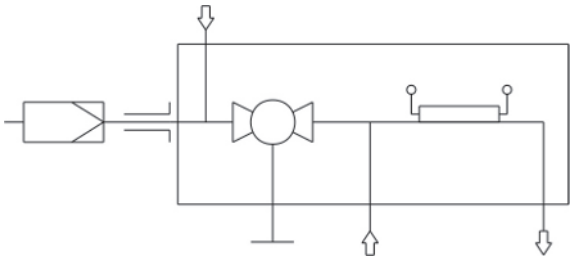
* Blowback of explosive atmosphere prohibited.

Options

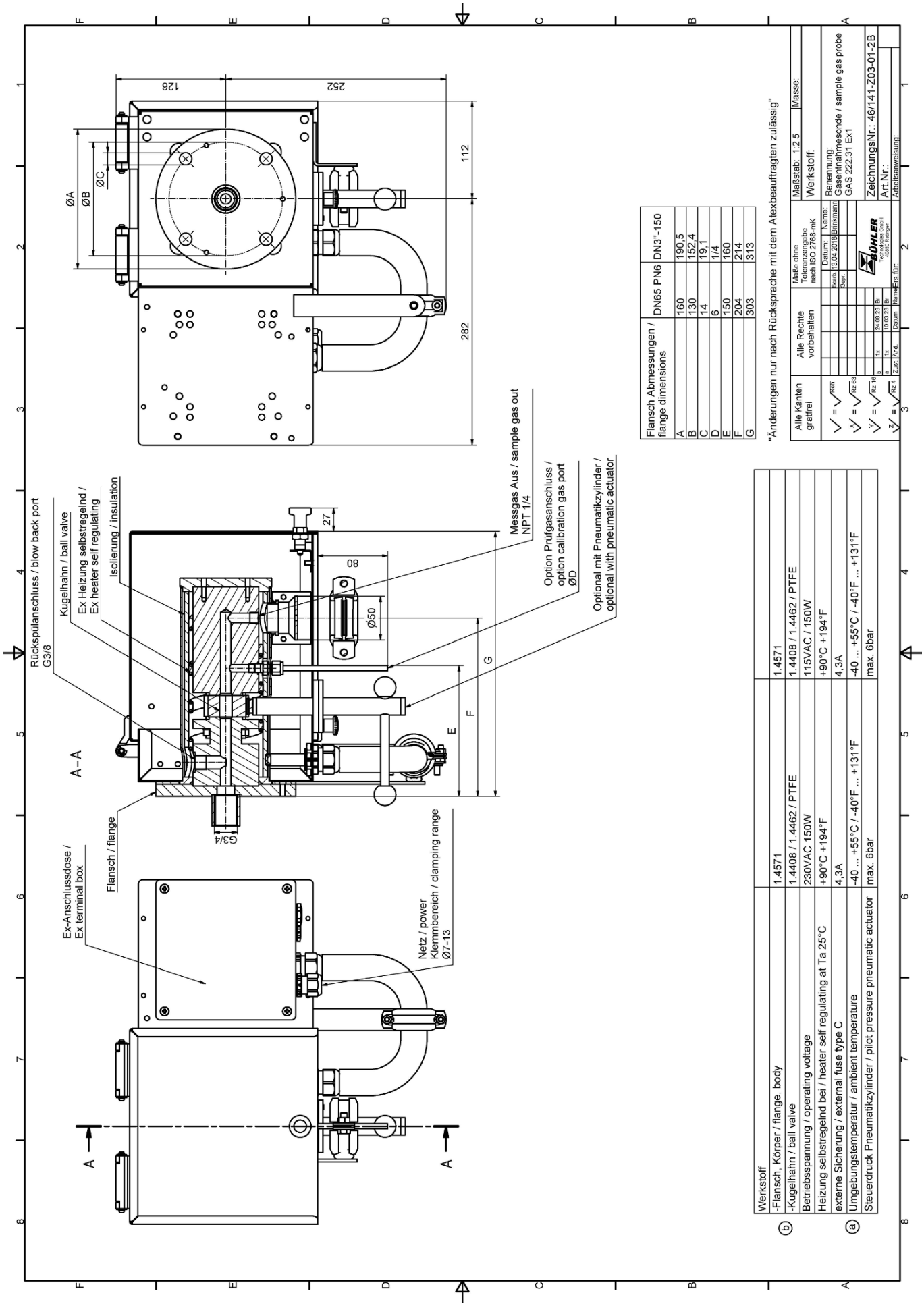
The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Flow chart



Dimensions



Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	150	160
F	204	214
G	303	313

	Werkstoff	
	-Flansch, Körper / flange, body	1.4571
ⓑ	-Kugelhahn / ball valve	1.4408 / 1.4462 / PTFE
	Betriebsspannung / operating voltage	230VAC 150W
	Heizung selbstregelnd bei / heater self regulating at Ta 25°C	+90°C +194°F
	externe Sicherung / external fuse type C	4,3A
ⓐ	Umgebungstemperatur / ambient temperature	-40 ... +55°C / -40°F ... +131°F
	Steuerdruck Pneumatikzylinder / pilot pressure pneumatic actuator	max. 6bar

	Werkstoff	
	-Flansch, Körper / flange, body	1.4571
ⓑ	-Kugelhahn / ball valve	1.4408 / 1.4462 / PTFE
	Betriebsspannung / operating voltage	115VAC / 150W
	Heizung selbstregelnd bei / heater self regulating at Ta 25°C	+90°C +194°F
	externe Sicherung / external fuse type C	4,3A
ⓐ	Umgebungstemperatur / ambient temperature	-40 ... +55°C / -40°F ... +131°F
	Steuerdruck Pneumatikzylinder / pilot pressure pneumatic actuator	max. 6bar

Gas Analysis

Sample gas probe GAS 222.31 Ex2

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Heated probe with shut-off valve, upstream filter and weather hood
- The probe body and the area around the screw connection for the heated sample gas line are completely insulated
- Heater self-regulating to approx. 248 °F (T3)/158 °F (T4) with low temperature alarm
- For dust loads up to 200 g/m³
- This probe is permitted for use in explosive areas

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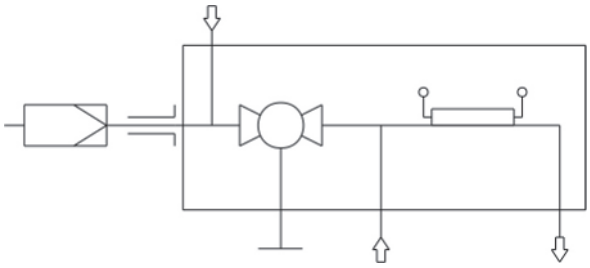
Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-4 to 176 °F	
Ambient temperature for accessories:	**Component**	**Ambient temperature range**
	Valve for pressurized air:	-22 °F < T_{amb} < 131 °F
	Solenoid valve for pneumatic actuator:	14 °F < T_{amb} < 131 °F
	Pneumatic actuator:	-4 °F < T_{amb} < 176 °F
	Limit switch:	-13 °F < T_{amb} < 140 °F
	Junction box:	-4 °F < T_{amb} < 158 °F
Max. gas inlet temperature:	383 °F (T3)/266 °F (T4)	
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Valve for pressurized air:	14 °F to 176 °F
	Solenoid valve for pneumatic actuator:	14 °F to 212 °F
Self-regulating heater:	248 °F (T3)/158 °F (T4)	
Low temperature alarm:	Contact switches at < 203 °F (T3) or < 122 °F (T4); Simple electrical equipment according to EN 60079-11; U_i 30 V, I_i = 100 mA; C_i/L_i~0	
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	
Max. operating pressure:	85 psia	
Materials in contact with media		
Flange:	Stainless steel 1.4571	
Probe body:	Stainless steel 1.4571	
Ball valve:	Stainless steel 1.4408/1.4462/PTFE	
Seal:	Stainless steel 1.4404/graphite/and see filter	
Markings:	ATEX: Ⓔx II 3G Ex ec ic mb IIC T3/T4 Gc IECEx: Ex ec ic mb IIC T3/T4 Gc	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622231	X	0	X	X	X	X	3	X	X	X	X	X	X	Product characteristics
														Junction box
	0													No
	1													Yes
														Flange
		0	1											Flange DN65 PN6
		0	2											Flange DN3"-150
														Hazardous area Outside and Inside
				2	9									Ex-Zone 2 outside, none inside
				2	2									Ex-Zone 2 outside and inside
														Temperature class
						3								T3
						4								T4
														Power supply sample probe
							3							115/230 V
														Low temperature alarm
								1						Opener (open at operating temperature) (marked with "ic")
								2						Closer (closed at operating temperature) (marked with "ic")
														Calibration gas port
									0					No
									1					6 mm
									2					6 mm with check valve
									3					1/4"
									4					1/4" with check valve
														Capacitive vessel *
										0				No
										1				Yes
														Valve for pressurized air *
											0			Ball valve
											1			Solenoid valve 110 V (marked with "mb")
											2			Solenoid valve 230 V (marked with "mb")
											3			Solenoid valve 24 V (marked with "mb")
											9			none
														Pneumatic actuator for internal ball valve
												0		No
												1		Mono stable depressurized open
												2		Mono stable depressurized closed
														Limit switch for pneumatic actuator
													0	No
													1	Yes
														Solenoid valve for pneumatic actuator
													0	No
													1	110 V (marked with "mb")
													2	230 V (marked with "mb")
													3	24 V (marked with "mb")

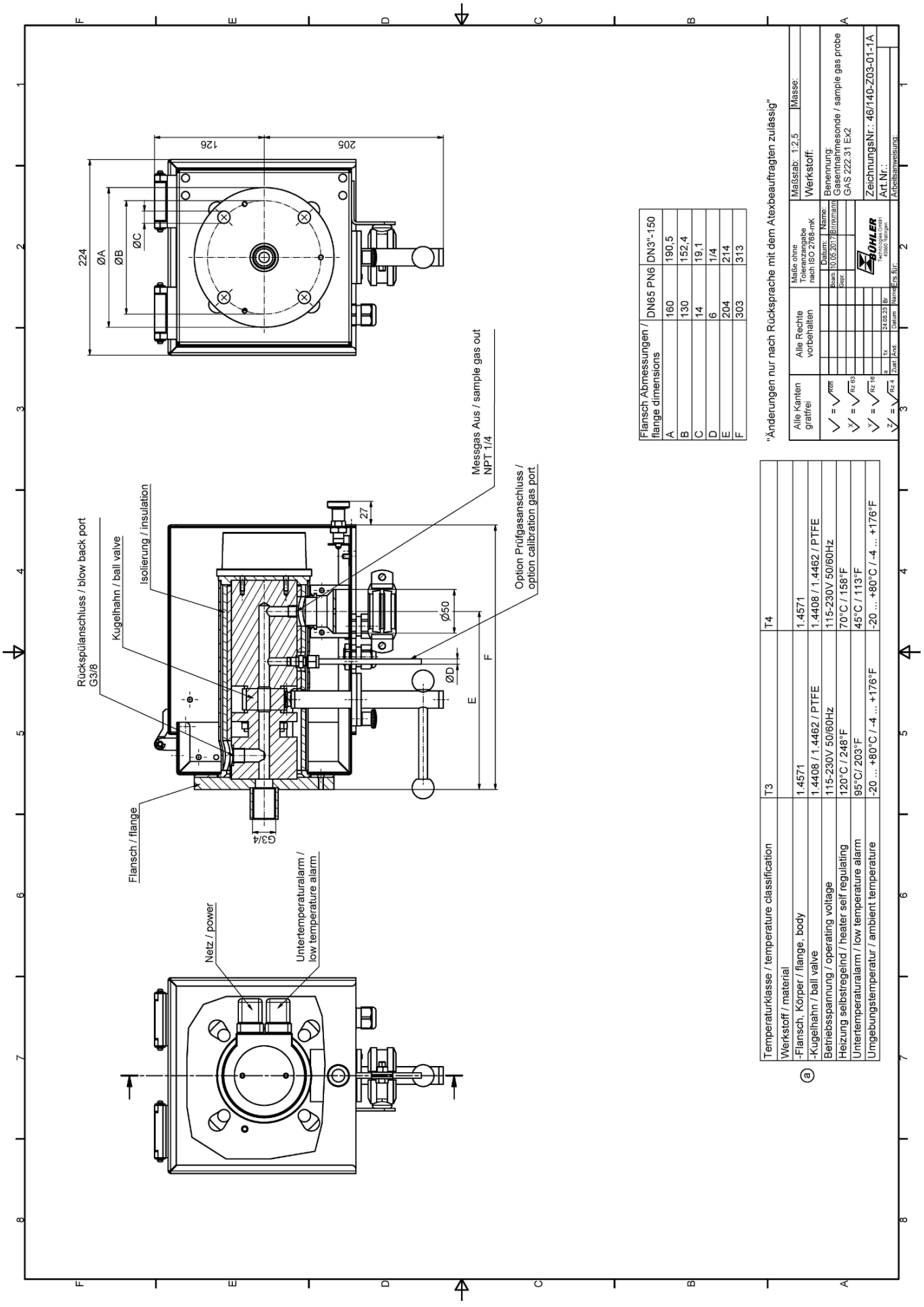
* Blowback of explosive atmosphere prohibited.

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions



Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	204	214
F	303	313

Temperaturklasse / temperature classification	T3	T4
Werkstoff / material		
-Flansch, Körper / flange, body	1.4571	1.4571
-Kugelhahn / ball valve	1.4408 / 1.4462 / PTFE	1.4408 / 1.4462 / PTFE
Betriebsspannung / operating voltage	115-230V 50/60Hz	115-230V 50/60Hz
Heizung selbstregelnd / heater self regulating	120°C / 248°F	70°C / 158°F
Untertemperaturalarm / low temperature alarm	95°C/ 203°F	45°C / 113°F
Umgebungstemperatur / ambient temperature	-20 ... +80°C / -4 ... +176°F	-20 ... +80°C / -4 ... +176°F

ⓐ

"Änderungen nur nach Rücksprache mit dem Atexbeauftragten zulässig"

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Maße ohne Toleranzangabe nach ISO 2768-mK

Maßstab: 1:2,5

Masse:

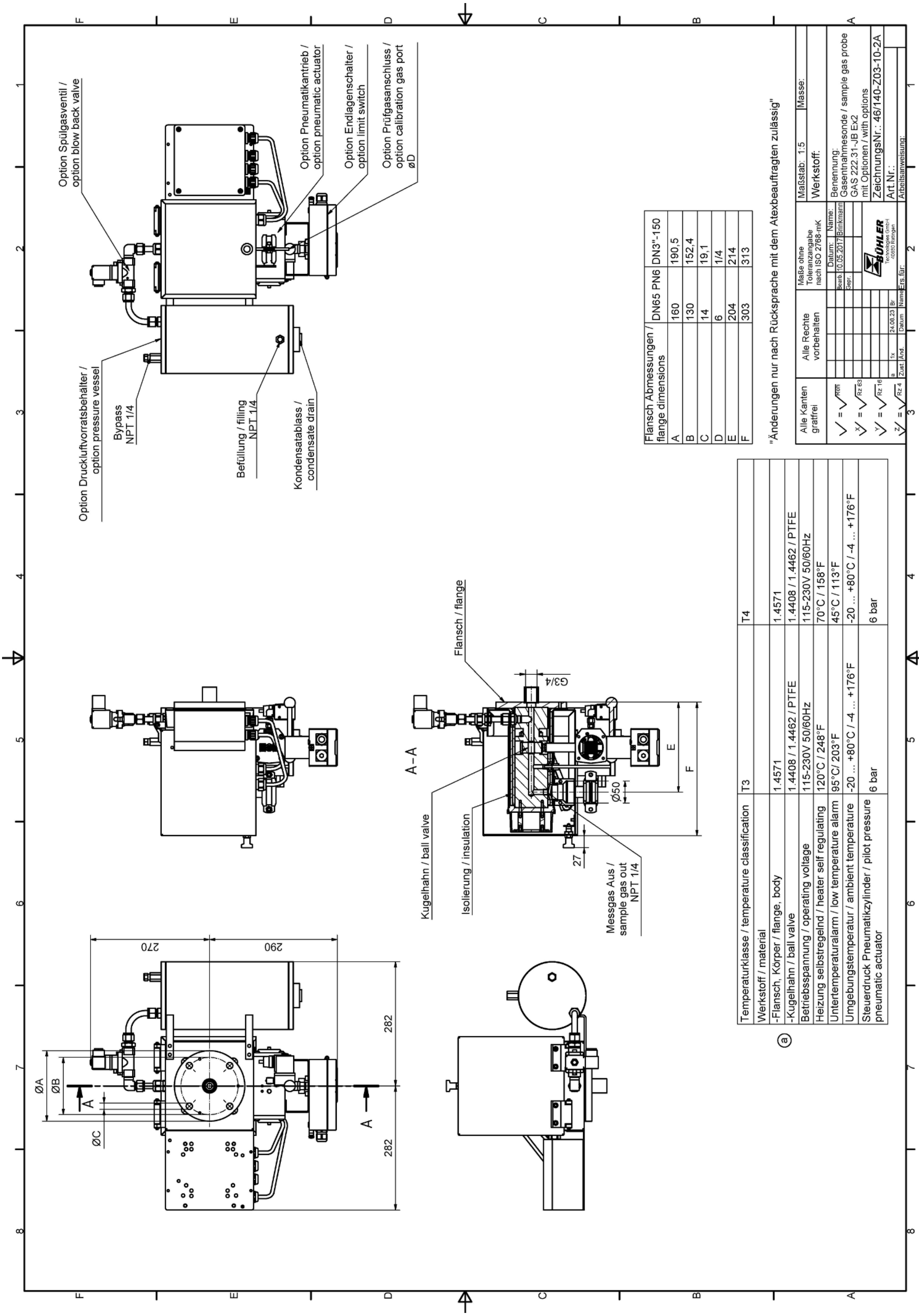
Werkstoff:

Benennung: Gasentnahmesonde / sample gas probe GAS 222.31 Ex2

ZeichnungsNr.: 46/140-Z03-01-1A

Art Nr.:

Arbeitsanweisung:



Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	204	214
F	303	313

Temperaturklasse / temperature classification	T3	T4
Werkstoff / material		
-Flansch, Körper / flange, body	1.4571	1.4571
-Kugelhahn / ball valve	1.4408 / 1.4462 / PTFE	1.4408 / 1.4462 / PTFE
Betriebsspannung / operating voltage	115-230V 50/60Hz	115-230V 50/60Hz
Heizung selbstregelnd / heater self regulating	120°C / 248°F	70°C / 158°F
Untertemperaturalarm / low temperature alarm	95°C/ 203°F	45°C / 113°F
Umgebungstemperatur / ambient temperature	-20 ... +80°C / -4 ... +176°F	-20 ... +80°C / -4 ... +176°F
Steuerdruck Pneumatikzylinder / pilot pressure pneumatic actuator	6 bar	6 bar

Sample gas probe GAS 222.35-U

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

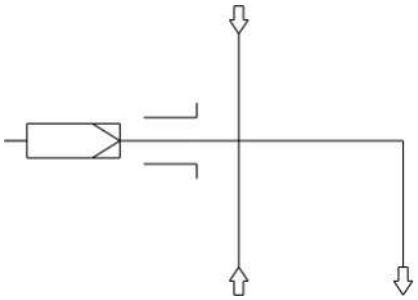
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Unheated probe with upstream filter
- The filter element can easily be removed by turning the handle 90°
- For dust loads up to 200 g/m³, non-condensable gases
- The probe is suitable for use in explosive areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data		
Operating temperature:	max. 392 °F	
Ambient temperature without accessories:	-4 to 176 °F	
Ambient temperature for accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	14 °F < T_{amb} < 131 °F
Medium temperature (blowback)	**Component**	**Medium temperature range**
	Compressed air valve:	14 °F to 176 °F
Max. operating pressure:	85 psia	
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622235	X	9	9	0	0	X	0	0	X	9	X	9	9	9	Product Characteristics
															Flange
	0														DIN DN65 PN6
	2														ANSI 3"-150 lbs - without CSA C & US approval
															Power supply sample probe
					0										none
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve
															Connection heated extension
							0								No
															Built-in temperature controller for heated extension
								0							No
															Blowback with air reservoir [1]
															Air reservoir bracket
															Air reservoir heating
									1						Yes
									9						No
															Built-in blowback control
										9					No
															Compressed air valve / valve voltage information
											0				Manual
											1				115 V
											2				230 V
											3				24 V
											9				None (if no blowback requested)
															Pneumatic drive for ball valve
												9			N/A
															Limit switch for pneumatic drive
													9		No
															Control valve for pneumatic drive
														9	No control valve

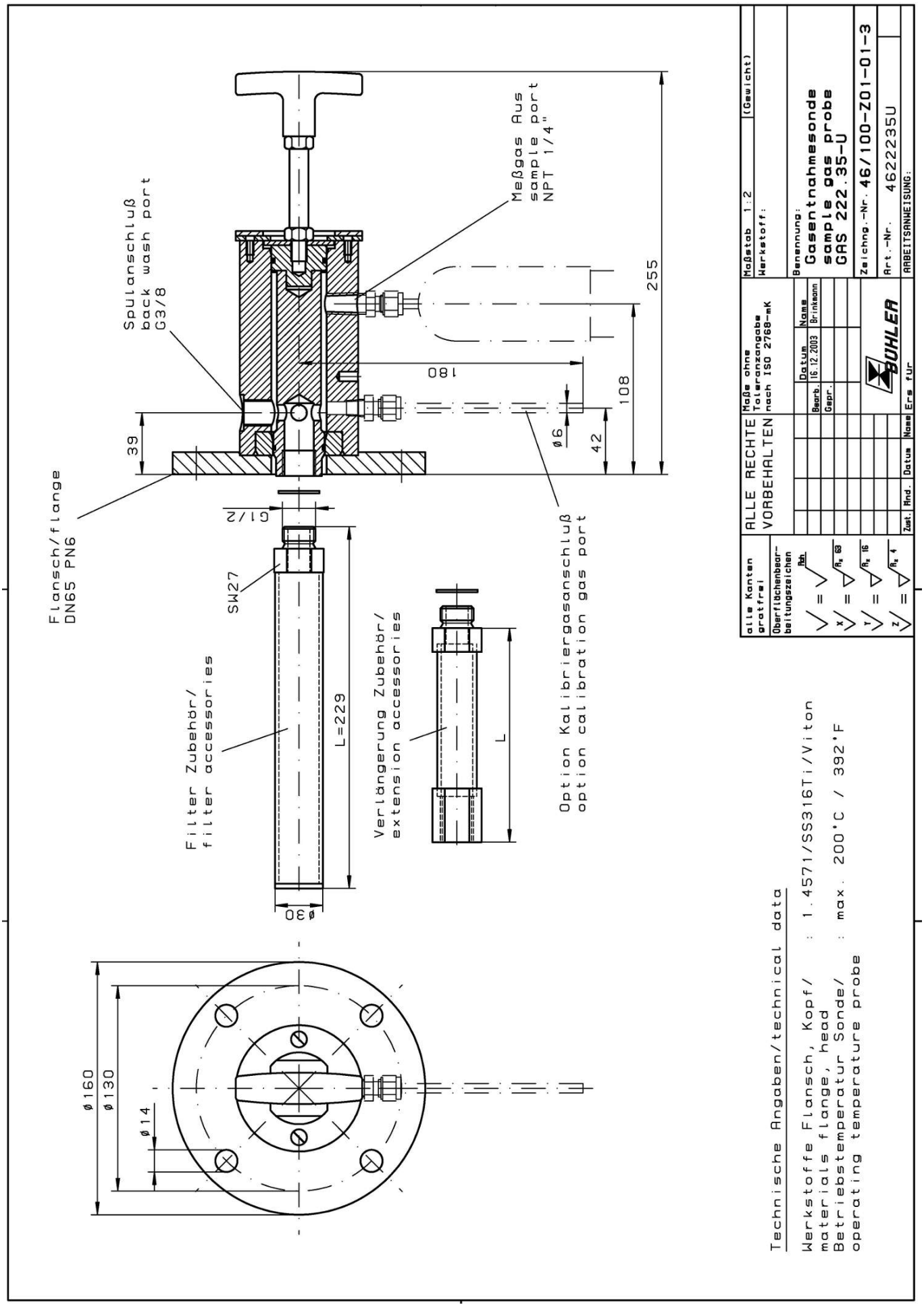
[1] For flammable sample gas, always use inert gas for blowback. Probe blowback prohibited when using explosive gases!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

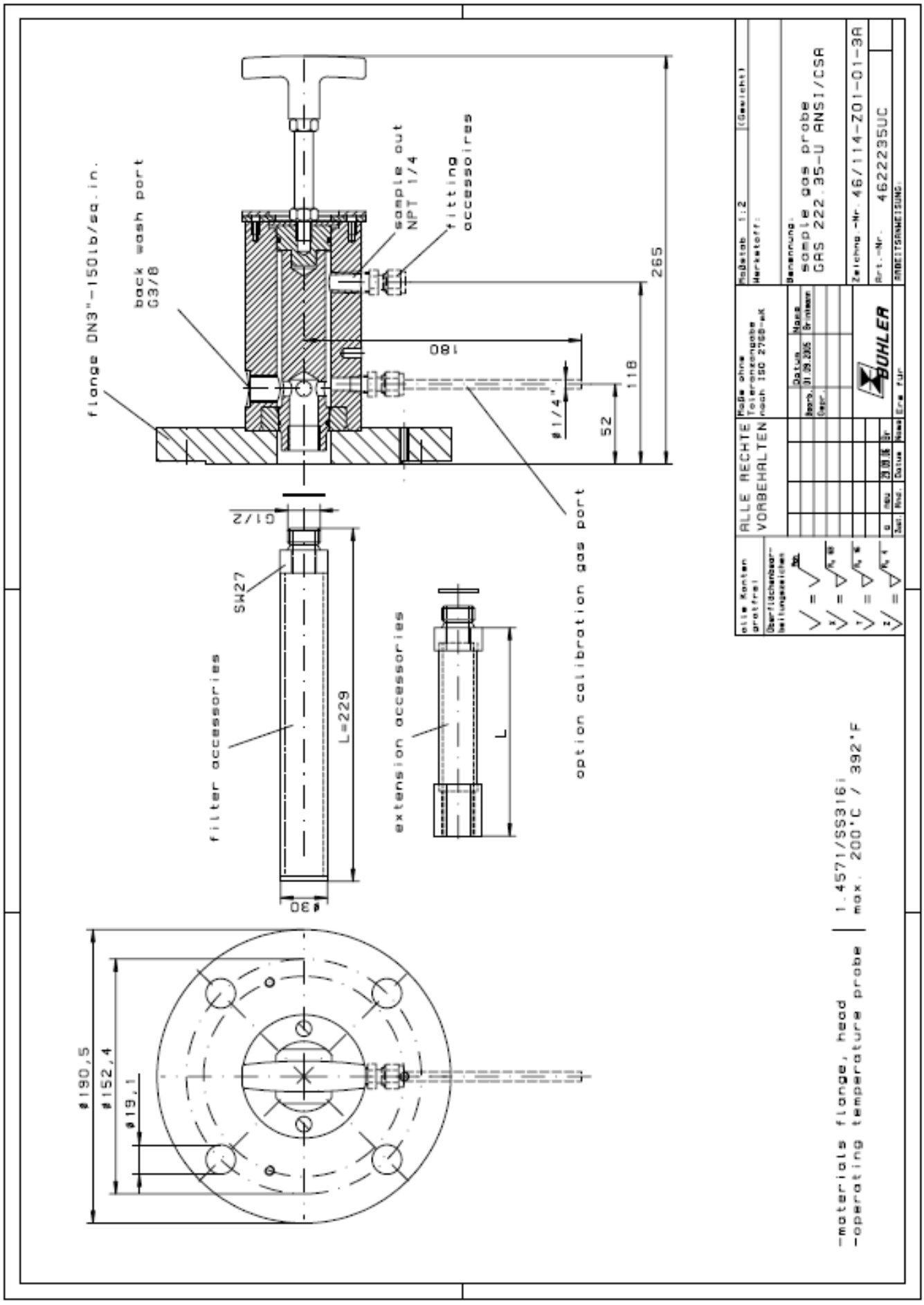
Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

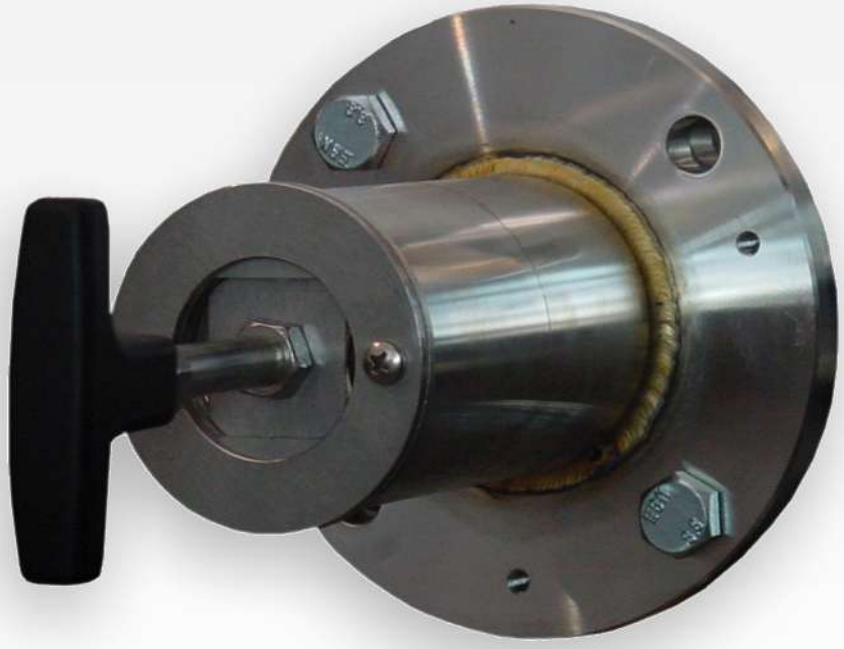
Dimensions



Dimensions (ANSI flange)

NOTICE! ANSI flange only available without CSA approval.





Sample gas probe GAS 222.35-U Ex1

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Unheated probe with upstream filter
- The filter element can easily be removed by turning the handle 90°
- For dust loads up to 200 g/m³, non-condensable gases
- This probe is designed for use in explosive areas.
  Use in zone 1 and 21 and sampling from zone 0 and 20.

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Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-40 to 131 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	-22 °F < T_{amb} < 131 °F
	Terminal box:	-4 °F < T_{amb} < 131 °F
Permissible gas inlet temperatures:	**Outer zone temperature class**	**Permissible gas inlet temperature**
	T2	275 °F
	T3	275 °F
	T4	266 °F
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Compressed air valve:	14 °F to 176 °F
Max. operating pressure	85 psia	
Max. flow rate:	16.66 lpm	
Material:	1.4571	
Parts in contact with media:	Seals: PTFE/graphite/1.4404 and see filter	
Probe marking, depending on the selected options and temperature class:	**for zone 0/1:** ATEX: Ⓔx II 1G/2G Ex db[1] eb mb[2] IIC T4 Ga/Gb IECEx: Ex db[1] eb mb[2] IIC T4 Ga/Gb **for zone 1:** ATEX: Ⓔx II 2G Ex db[1] eb mb[2] IIC T4 Gb IECEx: Ex db[1] eb mb[2] IIC T4 Gb **for zone 0/21:** ATEX: Ⓔx II 1G/2D Ex db[1] eb mb[2] IIC T4 Ga Ex tb mb[2] IIIC T130 °C Db IECEx: Ex db[1] eb mb[2] IIC T4 Ga Ex tb mb[2] IIIC T130 °C Db **for zone 20/1:** ATEX: Ⓔx II 1D/2G Ex ta IIIC T130 °C Da Ex db[1] eb mb[2] IIC T4 Gb IECEx: Ex ta IIIC T130 °C Da Ex db[1] eb mb[2] IIC T4 Gb **for zone 20/21:** ATEX: Ⓔx II 1D/2D Ex ta/tb mb[2] IIIC T130°C Da/Db IECEx: Ex ta/tb mb[2] IIIC T130°C Da/Db **for zone 21:** ATEX: Ⓔx II 2D Ex tb mb[2] IIIC T130°C Db IECEx: Ex tb mb[2] IIIC T130°C Db [1] "db" only for GAS 222.11/30 versions with limit switch [2] "mb" only for versions with solenoid valve	
Applied standards:	IEC 60079-0 (Ed. 6.0); IEC 60079-7 (Ed. 5.0); IEC 60079-26 (Ed. 3.0); EN 60079-0:2012+A11:2013; EN 60079-7:2015; EN 60079-26:2015	
IECEx certificate number:	IECEx IBE 17.0024X	
ATEX certificate number:	IBExU17ATEX1088X	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622235	X	X	X	X	X	4	0	0	X	X	X	X	X	X	Product Characteristics			
															Terminal box			
	0														No			
	1														Yes			
															Flange			
		0	1												Flange DN65 PN6			
		0	2												Flange DN3"-150			
		x	x												Other			
															Hazardous area			
															Outside			
				4											Zone 1 (Atex/IECEx)			
				7											Zone 21 (Atex/IECEx)			
				9											none			
															Inside			
					3										Zone 0 (Atex/IECEx)			
					4										Zone 1 (Atex/IECEx)			
					6										Zone 20 (Atex/IECEx)			
					7										Zone 21 (Atex/IECEx)			
					9										none			
															Temperature class (inside/outside)			
															Ga/Gb or Gb/Gb	**Ga/Db or Gb/Db**	**Da/Gb or Db/Gb**	**Da/Db or Db/Db**
						4									T4/T4	T4/T130 °C	T130 °C/T4	T130 °C/T130 °C
															Calibration gas port			
									0						No			
									1						6 mm			
									2						6 mm with check valve			
									3						1/4"			
									4						1/4" with check valve			
															Pressure vessel *			
										0					No			
										1					Yes			
															Purge valve *			
											0				Ball valve			
											1				Solenoid valve 110 V (marked with "mb")			
											2				Solenoid valve 230 V (marked with "mb")			
											3				Solenoid valve 24 V (marked with "mb")			
											9				none			

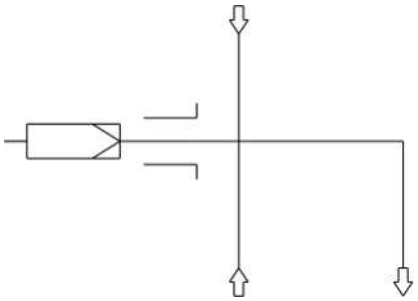
* Blowback of explosive atmosphere prohibited.

Options

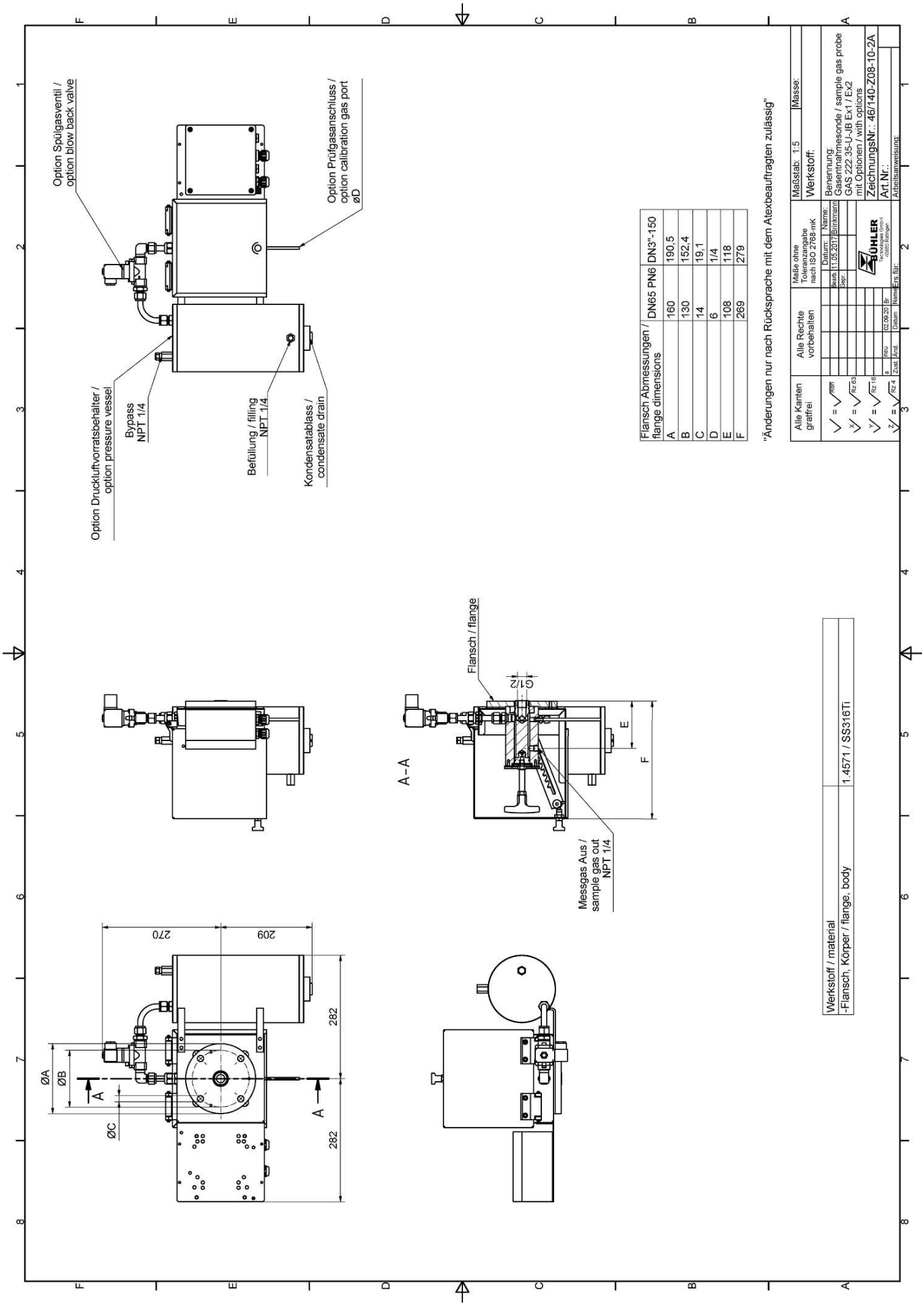
The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Flow chart



Dimensions


Option Spülgasventil / option blow back valve
Option Prüfgasanschluss / option calibration gas port øD
Option Druckluftvorratsbehälter / option pressure vessel
Bypass NPT 1/4
Befüllung / filling NPT 1/4
Kondensatablass / condensate drain
Flansch / flange
G1/2
A-A
E
F
Messgas Aus / sample gas out NPT 1/4
270
209
282
282
ØA
ØB
ØC
A
A
Flansch Abmessungen / flange dimensions
DN65 PN6
DN3"-150
A 160 190,5
B 130 152,4
C 14 19,1
D 6 1/4
E 108 118
F 269 279
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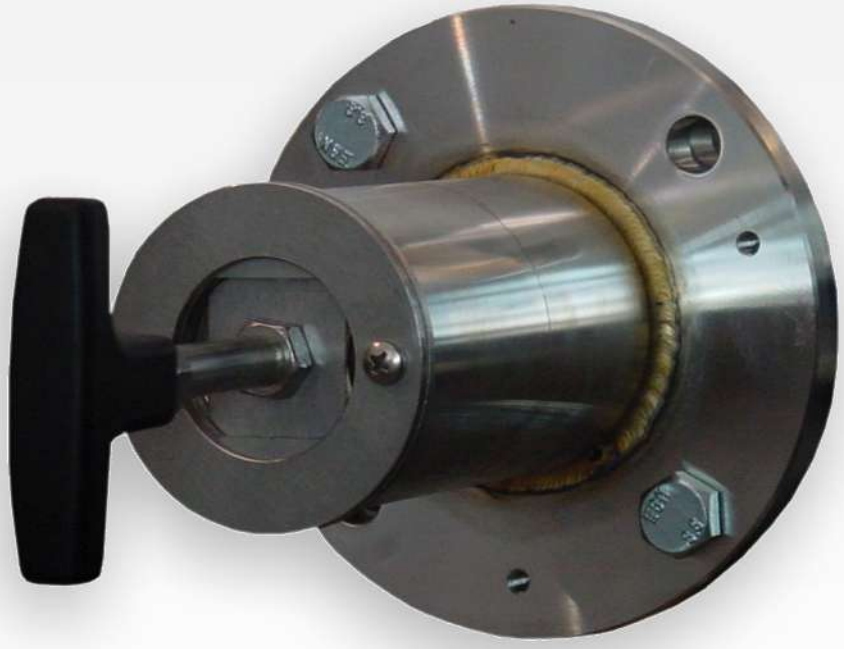
Alle Rechte vorbehalten
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab: 1:5
Masse:
Werkstoff:
Benennung: Gasentnahmesonde / sample gas probe GAS 222.35-U-JB Ex1 / Ex2 mit Optionen / with options
ZeichnungsNr.: 46/140-Z08-10-2A
Art.Nr.:
Arbeitsanweisung:
Werkstoff / material
-Flansch, Körper / flange, body
1.4571 / SS316Ti



Sample gas probe GAS 222.35U Ex2

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Unheated probe with upstream filter
- The filter element can easily be removed by turning the handle 90°
- For dust loads up to 200 g/m³, non-condensable gases
- The probe is permitted for use in explosive areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
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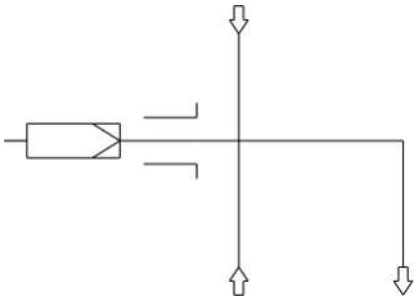
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-4 to 176 °F	
Ambient temperature for accessories:	**Component**	**Ambient temperature range**
	Valve for pressurized air:	-22 °F < T_{amb} < 131 °F
	Junction box:	-4 °F < T_{amb} < 158 °F
Max. gas inlet temperature:	383 °F (T3)/195 °F (T4)	
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Valve for pressurized air:	14 °F to 176 °F
Max. operating pressure	85 psia	
Material:	1.4571	
Parts in contact with media:	Seals: Graphite/1.4404 and see filter	
Markings:	ATEX: Ⓔx II 3G Ex ec mb IIC T3/T4 Gc IECEx: Ex ec mb IIC T3/T4 Gc	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622235	X	X	X	X	X	X	0	0	X	X	X	0	0	0	Product characteristics
															Junction box
	0														No
	1														Yes
															Flange
		0	1												Flange DN65 PN6
		0	2												Flange DN3"-150
															Hazardous area Outside and Inside
				2	9										Ex-Zone 2 outside, none inside
				2	2										Ex-Zone 2 outside and inside
															Temperature class
						3									T3
						4									T4
															Power supply sample probe
							0								none
															Calibration gas port
									0						No
									1						6 mm
									2						6 mm with check valve
									3						1/4"
									4						1/4" with check valve
															Capacitive vessel *
										0					No
										1					Yes
															Valve for pressurized air *
											0				Ball valve
											1				Solenoid valve 110 V (marked with "mb")
											2				Solenoid valve 230 V (marked with "mb")
											3				Solenoid valve 24 V (marked with "mb")
											9				none

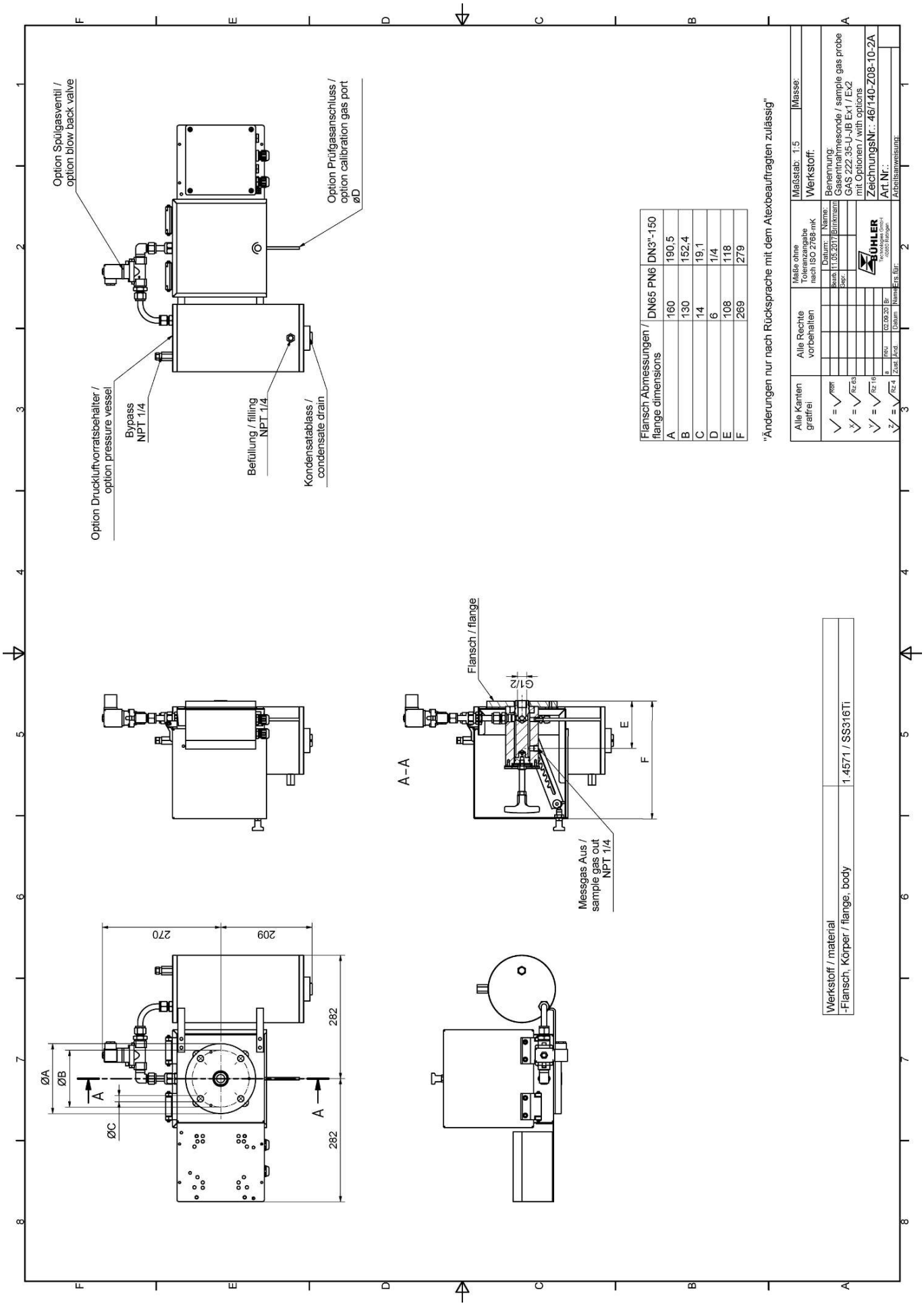
* Blowback of explosive atmosphere prohibited.

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Option Spülgasventil / option blow back valve
Option Prüfgasanschluss / option calibration gas port øD
Option Druckluftvorratsbehälter / option pressure vessel
Bypass NPT 1/4
Befüllung / filling NPT 1/4
Kondensatablass / condensate drain
Flansch / flange
G1/2
A-A
E
F
Messgas Aus / sample gas out NPT 1/4
270
209
282
282
ØA
ØB
ØC
A
A
Flansch Abmessungen / flange dimensions
DN65 PN6
DN3"-150
A 160 190,5
B 130 152,4
C 14 19,1
D 6 1/4
E 108 118
F 269 279
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Alle Rechte vorbehalten
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab: 1:5
Masse:
Werkstoff:
Benennung: Gasentnahmesonde / sample gas probe GAS 222.35-U-JB Ex1 / Ex2 mit Optionen / with options
ZeichnungsNr.: 46/140-Z08-10-2A
Art.Nr.:
Arbeitsanweisung:
Werkstoff / material
-Flansch, Körper / flange, body 1.4571 / SS316Ti

Sample gas probe GAS 222.35

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with upstream filter and weather hood
- The filter element can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Electronic temperature controller up to 395 °F with low/high temperature alarm and display
- For dust loads up to 200 g/m³
- This probe is not suitable for use in Ex areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
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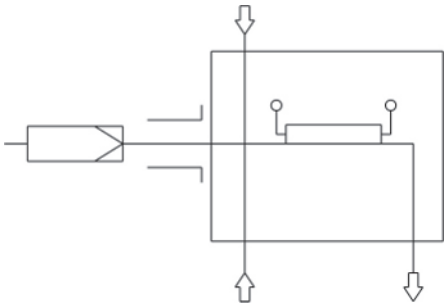
Flow chart



Technical Data

Gas Probe Technical Data		
Probe operating temperature:	max. 392 °F	
Ambient temperature without accessories:	-4 to 158 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	14 °F < T_{amb} < 131 °F
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Compressed air valve:	14 °F to 176 °F
Regulator setting range:	50 to 392 °F	
Low/high temperature alarm:	Alarm adjustable ±5.....30 K from setpoint, factory preset 15 K Max. switching current 1 A	
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	
IP rating:	IP54	
Max. operating pressure:	85 psia	
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622235	X	9	9	0	X	X	0	0	X	X	X	9	9	9	Product Characteristics
															Flange
	0														DIN DN65 PN6
	2														ANSI 3"-150 lbs - without CSA C & US approval
															Power supply sample probe
					1										115 V
					2										230 V
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve
															Connection heated extension
							0								No
															Built-in temperature controller [1]
								0							No
															Blowback with air reservoir [2]
															Air reservoir heating
									1						Yes
									9						No
															Built-in blowback control [1]
										1					Internal controller
										9					No
															Compressed air valve / valve voltage information
											0				Manual
											1				115 V
											2				230 V
											3				24 V
											9				None (if no blowback requested)
															Pneumatic drive for ball valve
												9			N/A
															Limit switch for pneumatic drive
													9		No
															Control valve for pneumatic drive
														9	No control valve

[1] The electronics can either be equipped with temperature controller for heated extension or blowback control.

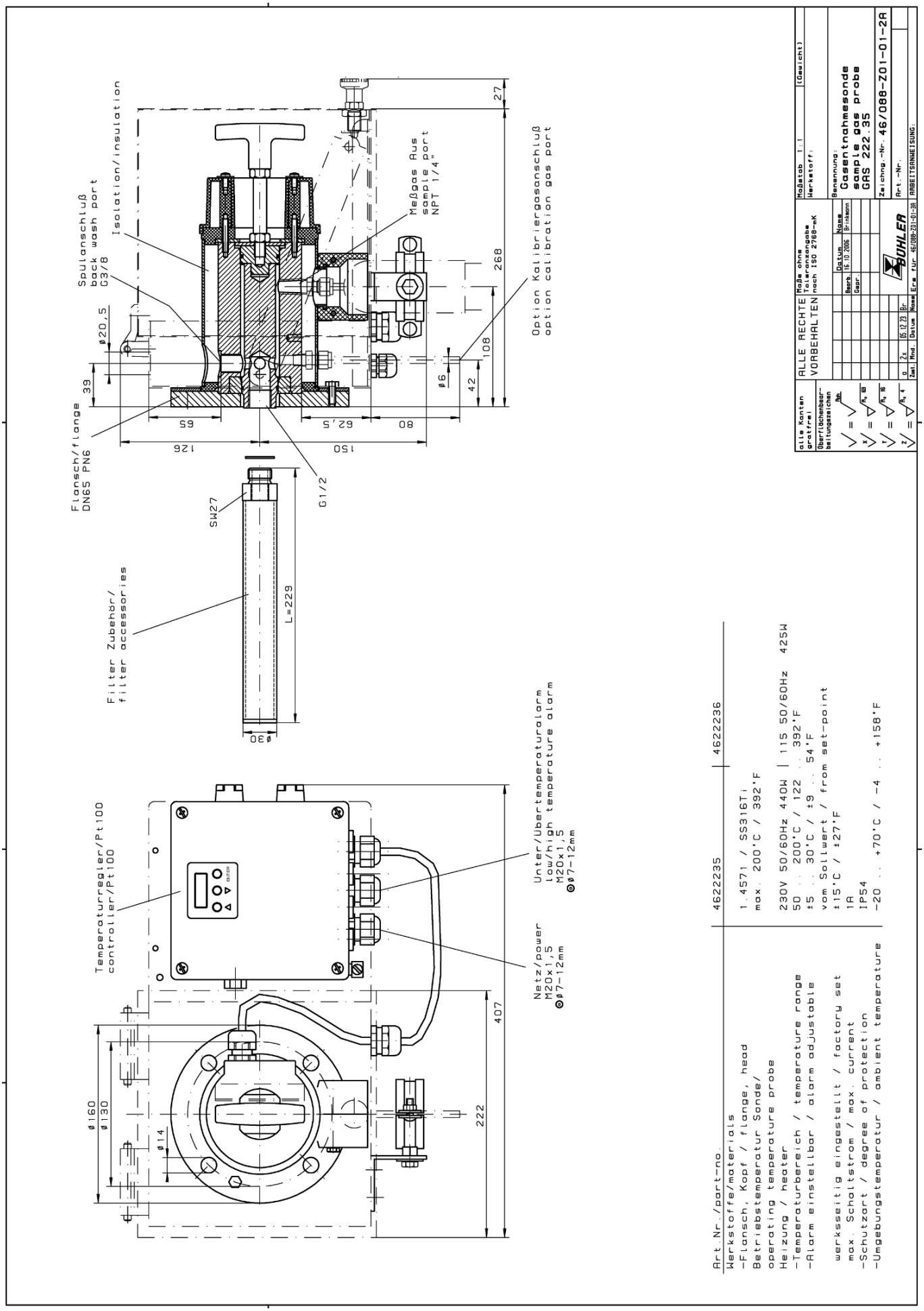
[2] For flammable sample gas, always use inert gas for blowback. Probe blowback prohibited when using explosive gases!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

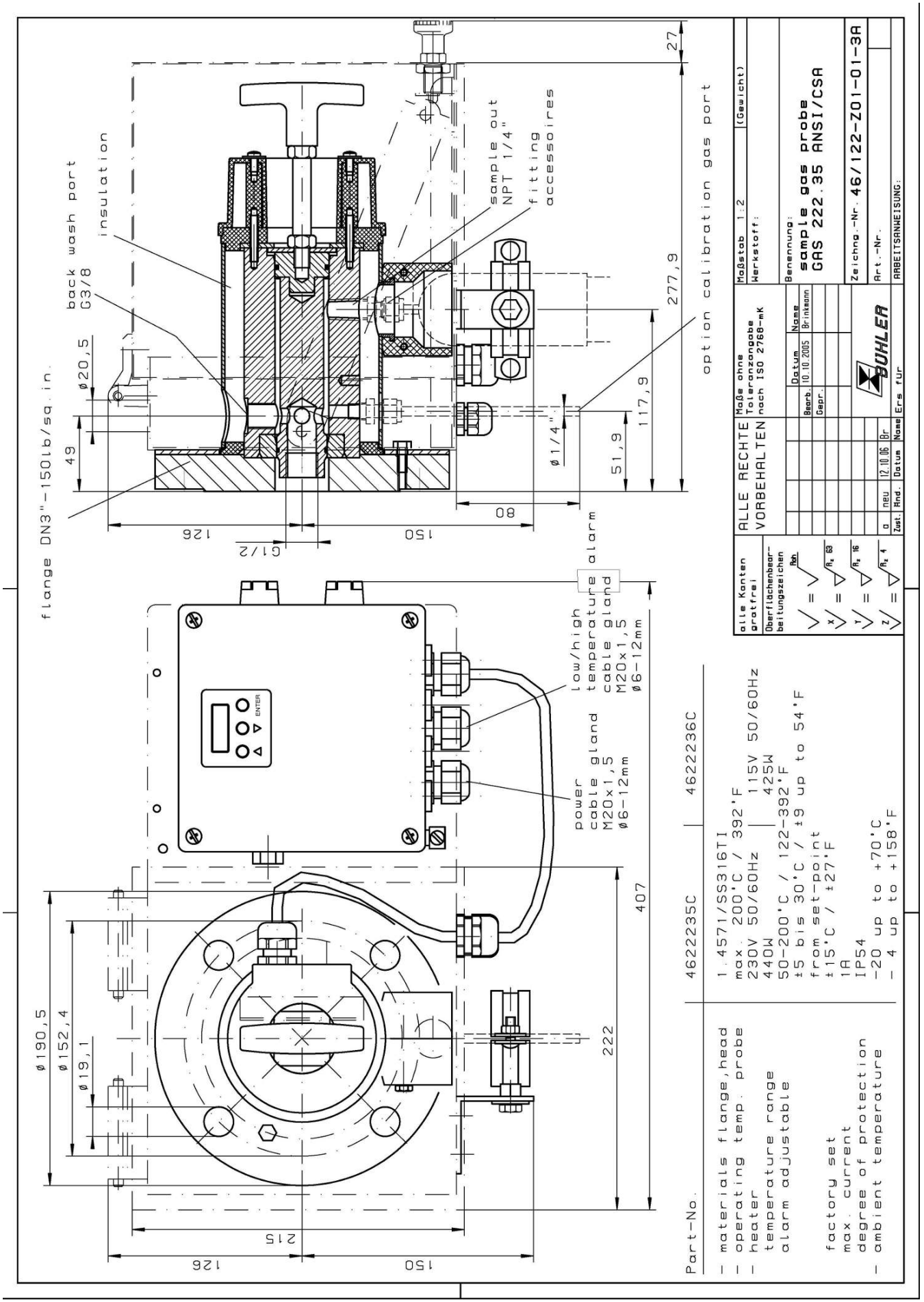
Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Spülanschluß
back wash port
G3/8
Isolation/insulation
Meßgas Aus
sample port
NPT 1/4"
Option Kalibriergasanschluß
option calibration gas port
Flansch/flange
DN65 PN6
Filter Zubehör/
filter accessories
SW27
G1/2
L=229
Temperaturregler/Pt100
controller/Pt100
Unter/Übertemperaturalarm
low/high temperature alarm
M20x1,5
Ø7–12mm
Netz/power
M20x1,5
Ø7–12mm
Art.Nr./part-no
4622235
4622236
Werkstoffe/materials
-Flansch, Kopf / flange, head
1.4571 / SS316Ti
Betriebstemperatur Sonde/
operating temperature probe
max. 200°C / 392°F
Heizung / heater
230V 50/60Hz 440W | 115 50/60Hz 425W
-Temperaturbereich / temperature range
50 .. 200°C / 122 .. 392°F
-Alarm einstellbar / alarm adjustable
±5 .. 30°C / ±9 .. 54°F
vom Sollwert / from set-point
werksseitig eingestellt / factory set
±15°C / ±27°F
max. Schaltstrom / max. current
1A
-Schutzart / degree of protection
IP54
-Umgebungstemperatur / ambient temperature
-20 .. +70°C / -4 .. +158°F
ALLE RECHTE VORBEHALTEN
Maßstab 1:1
(Gewicht)
Werkstoff:
Benennung:
Gasentnahmesonde
sample gas probe
GAS 222.35
Zeichng.-Nr. 46/088-Z01-01-2A
Art.-Nr.
ARBEITSANWEISUNG:

Dimensions (ANSI flange)

NOTICE! ANSI flange only available without CSA approval.



Sample gas probe GAS 222.35 Ex1

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Heated probe with upstream filter and weather hood
- The filter element can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely insulated
- Heater self-regulating to approx. 176 °F
- For dust loads up to 200 g/m³
- This probe is permitted for use in explosive areas.
  Atex: use in zone 1 and 21 and sampling from zone 0 and 20
  IECEx: Use in zone 1 and sampling from zone 0

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Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-40 to 131 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	-22 °F < T_{amb} < 131 °F
Permissible gas inlet temperatures:	**Outer zone temperature class**	**Permissible gas inlet temperature**
	T2	275 °F
	T3	275 °F
	T4	266 °F
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Compressed air valve:	14 °F to 176 °F
Self-regulating heater:	176 °F	
Electrical data:	Probe: 230 V, 100 W, 50/60 Hz 115 V, 100 W, 50/60 Hz	External circuit breaker type C: 230 V, 2 A, 50/60 Hz 115 V, 3 A, 50/60 Hz
Max. operating pressure	85 psia	
Max. flow rate:	16.66 lpm	
Material:	1.4571	
Parts in contact with media:	Seals: Graphite/1.4404 and see filter	
Probe marking, depending on the selected options and temperature class:	**for zone 0/1:** ATEX: Ⓔx II 1G/2G Ex db[1] eb mb[2] IIC T5/T6...T1/T2 Ga/Gb IECEx: Ex db[1] eb mb[2] IIC T5/T6...T1/T2 Ga/Gb **for zone 1:** ATEX: Ⓔx II 2G Ex db[1] eb mb[2] IIC T6...T2 Gb IECEx: Ex db[1] eb mb[2] IIC T6...T2 Gb **for zone 0/21:** ATEX: Ⓔx II 1G/2D Ex db[1] eb mb[2] IIC T5 ... T1 Ga Ex tb mb[2] IIIC T80 °C ... T226 °C Db IECEx: - **for zone 20/1:** ATEX: Ⓔx II 1D/2G Ex ta IIIC T120 °C ... T300 °C Da Ex db[1] eb mb[2] IIC T6 ... T2 Gb IECEx: - **for zone 20/21:** ATEX: Ⓔx II 1D/2D Ex ta/tb mb[2] IIIC T120°C/T80°C...T300°C/T226°C Da/Db IECEx: - **for zone 21:** ATEX: Ⓔx II 2D Ex tb mb[2] IIIC T80°C...T226°C Db IECEx: - [1] "db" only for GAS 222.21/31 versions with limit switch [2] "mb" only for versions with solenoid valve	
Applied standards:	IEC 60079-0 (Ed. 6.0); IEC 60079-7 (Ed. 5.0); IEC 60079-26 (Ed. 3.0); EN 60079-0:2012+A11:2013; EN 60079-7:2015; EN 60079-26:2015	
IECEx certificate number:	IECEx IBE 17.0024X	
ATEX certificate number:	IBExU17ATEX1088X	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

46222351	X	X	X	X	4	X	0	X	X	X	0	0	0	Product Characteristics			
														Flange			
	0	1												Flange DN65 PN6			
	0	2												Flange DN3"-150			
	x	x												Other			
														Hazardous area			
														Outside			
			4											Zone 1 (Atex/IECEx)			
			7											Zone 21 (Atex)			
			9											none			
														Inside			
				3										Zone 0 (Atex/IECEx)			
				4										Zone 1 (Atex/IECEx)			
				6										Zone 20 (Atex)			
				7										Zone 21 (Atex)			
				9										none			
														Temperature class inside/outside (dust only ATEX)			
														Ga/Gb	**Ga/Db**	**Da/Gb**	**Da/Db**
					4									T3/T4	T3/T130°C	T175°C/T4	T175°C/T130°C
														Temperature class inside/outside (dust only ATEX)			
														Gb/Gb	**Gb/Db**	**Db/Gb**	**Db/Db**
					4									T4/T4	T4/T130°C	T130°C/T4	T130°C/T130°C
														Power supply sample probe			
						1								115 V			
						2								230 V			
														Calibration gas port			
								0						No			
								1						6 mm			
								2						6 mm with check valve			
								3						1/4"			
								4						1/4" with check valve			
														Pressure vessel *			
									0					No			
									1					Yes			
														Purge valve *			
										0				Ball valve			
										1				Solenoid valve 110 V (marked with "mb")			
										2				Solenoid valve 230 V (marked with "mb")			
										3				Solenoid valve 24 V (marked with "mb")			
										9				none			

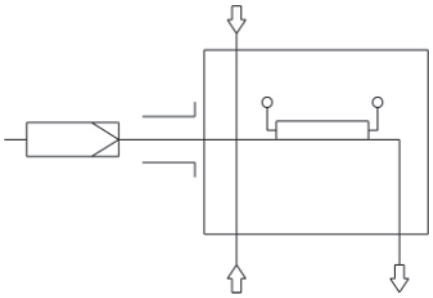
* Blowback of explosive atmosphere prohibited.

Options

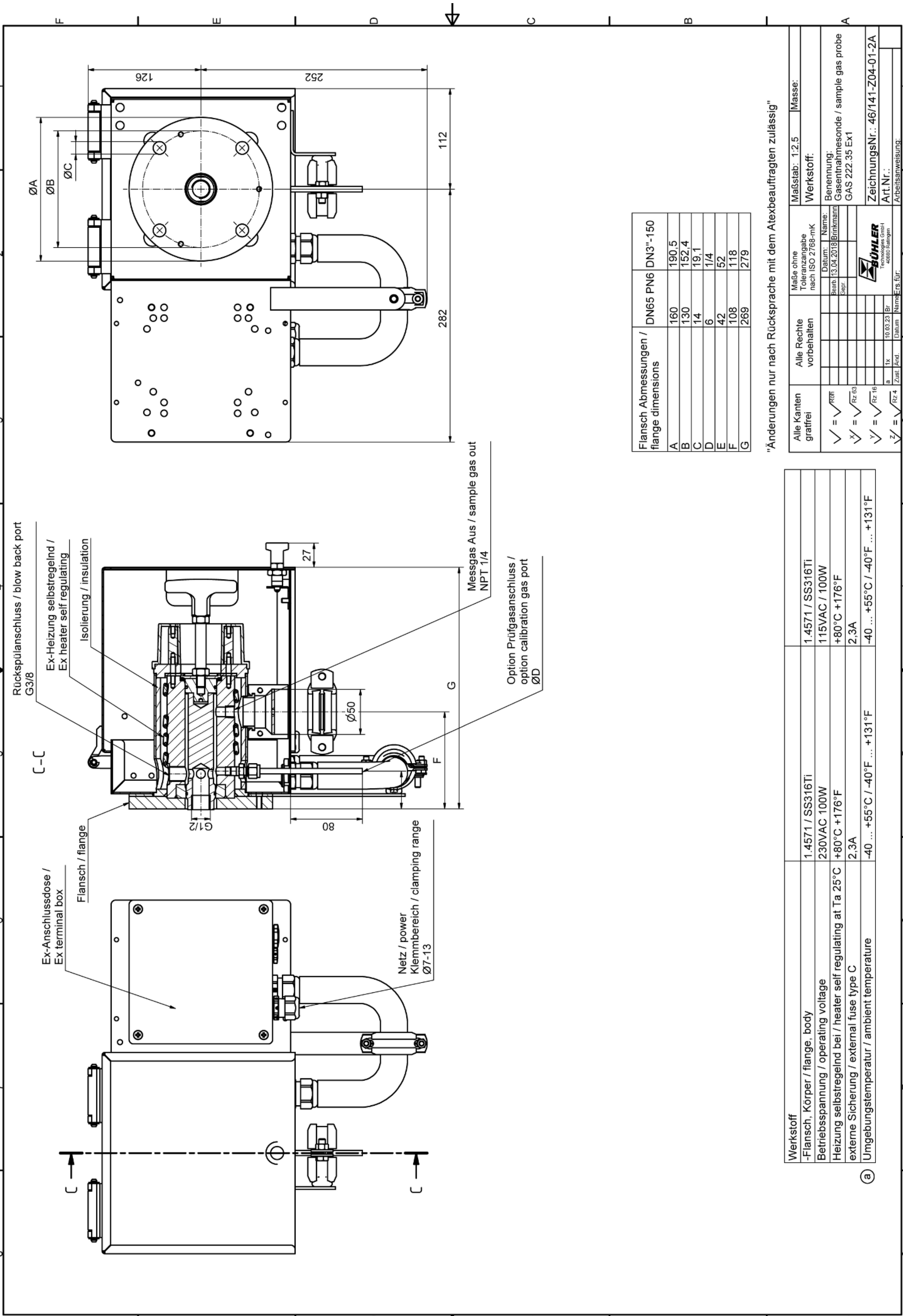
The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Flow chart



Dimensions



Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	42	52
F	108	118
G	269	279

Werkstoff		
-Flansch, Körper / flange, body	1.4571 / SS316Ti	1.4571 / SS316Ti
Betriebsspannung / operating voltage	230VAC 100W	115VAC / 100W
Heizung selbstregelnd bei / heater self regulating at Ta 25°C	+80°C +176°F	+80°C +176°F
externe Sicherung / external fuse type C	2,3A	2,3A
ⓐ Umgebungstemperatur / ambient temperature	-40 ... +55°C / -40°F ... +131°F	-40 ... +55°C / -40°F ... +131°F

Sample gas probe GAS 222.35 Ex2

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Heated probe with upstream filter and weather hood
- The filter element can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely insulated
- Heater self-regulating to approx. 266 °F (T3)/158 °F (T4) with low temperature alarm
- For dust loads up to 200 g/m³
- This probe is permitted for use in explosive areas

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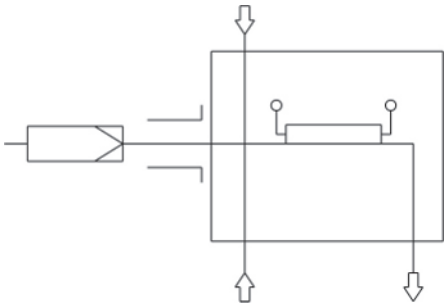
Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-20 to +80 °C	
Ambient temperature for accessories:	**Component**	**Ambient temperature range**
	Valve for pressurized air:	-4 °F < T_{amb} < 131 °F
	Junction box:	-4 °F < T_{amb} < 158 °F
Max. gas inlet temperature:	383 °F (T3)/266 °F (T4)	
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Valve for pressurized air:	14 °F to 176 °F
Self-regulating heater:	266 °F (T3)/158 °F (T4)	
Low temperature alarm:	Contact switches at < 203 °F (T3) or < 122 °F (T4); Simple electrical equipment according to EN 60079-11; U_i 30 V, I_i = 100 mA; C_i/L_i~0	
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	
Max. operating pressure	85 psia	
Material:	1.4571	
Parts in contact with media:	Seals: Graphite/1.4404 and see filter	
Markings:	ATEX: Ⓔx II 3G Ex ec ic mb IIC T3/T4 Gc IECEx: Ex ec ic mb IIC T3/T4 Gc	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622235	X	0	X	X	X	X	3	X	X	X	X	0	0	0	Product characteristics
															Junction box
	0														No
	1														Yes
															Flange
		0	1												Flange DN65 PN6
		0	2												Flange DN3"-150
															Hazardous area Outside and Inside
				2	9										Ex-Zone 2 outside, none inside
				2	2										Ex-Zone 2 outside and inside
															Temperature class
						3									T3
						4									T4
															Power supply sample probe
							3								115/230 V
															Low temperature alarm
								1							Opener (open at operating temperature) (marked with "ic")
								2							Closer (closed at operating temperature) (marked with "ic")
															Calibration gas port
									0						No
									1						6 mm
									2						6 mm with check valve
									3						1/4"
									4						1/4" with check valve
															Capacitive vessel *
										0					No
										1					Yes
															Valve for pressurized air *
											0				Ball valve
											1				Solenoid valve 110 V (marked with "mb")
											2				Solenoid valve 230 V (marked with "mb")
											3				Solenoid valve 24 V (marked with "mb")
											9				none

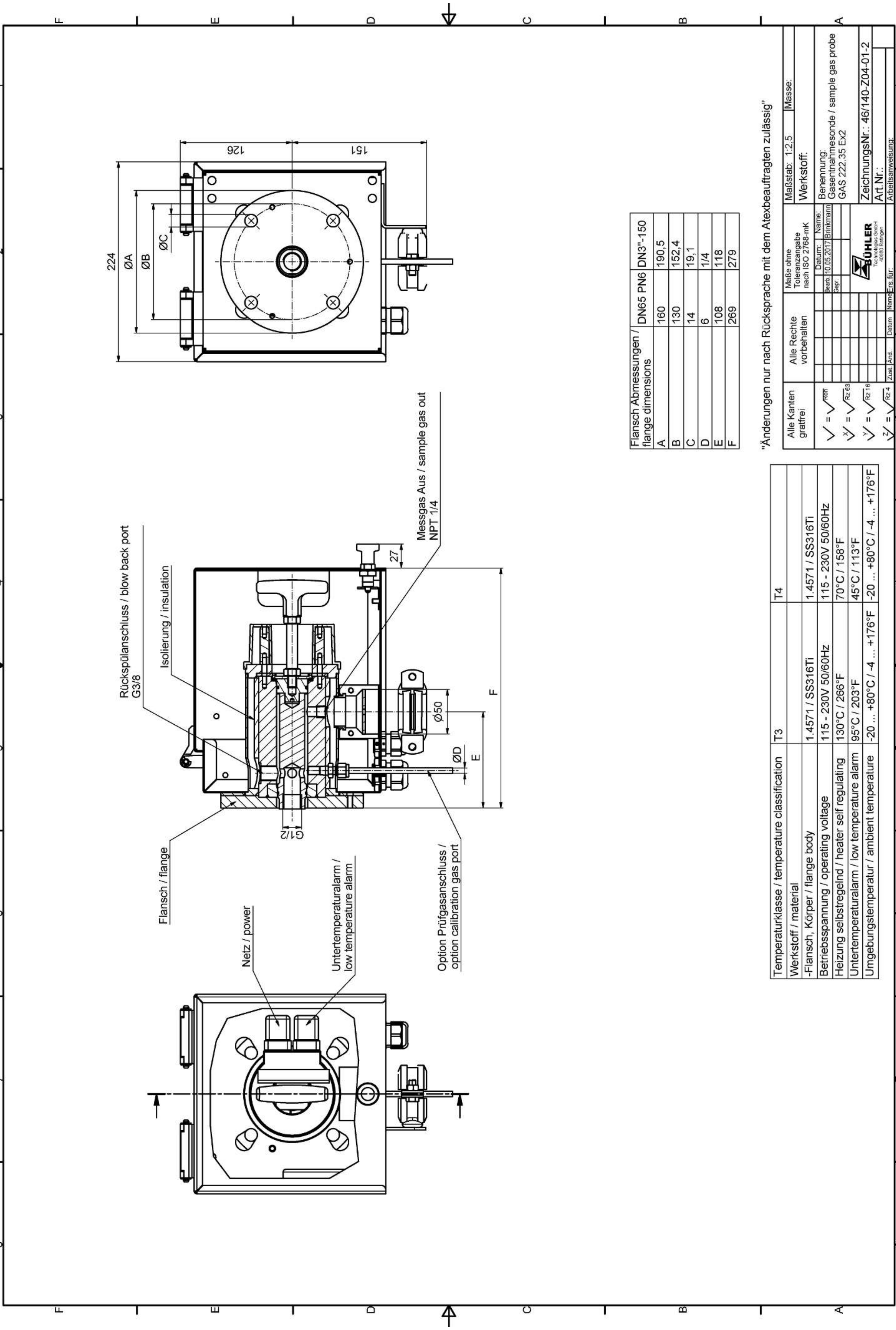
* Blowback of explosive atmosphere prohibited.

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

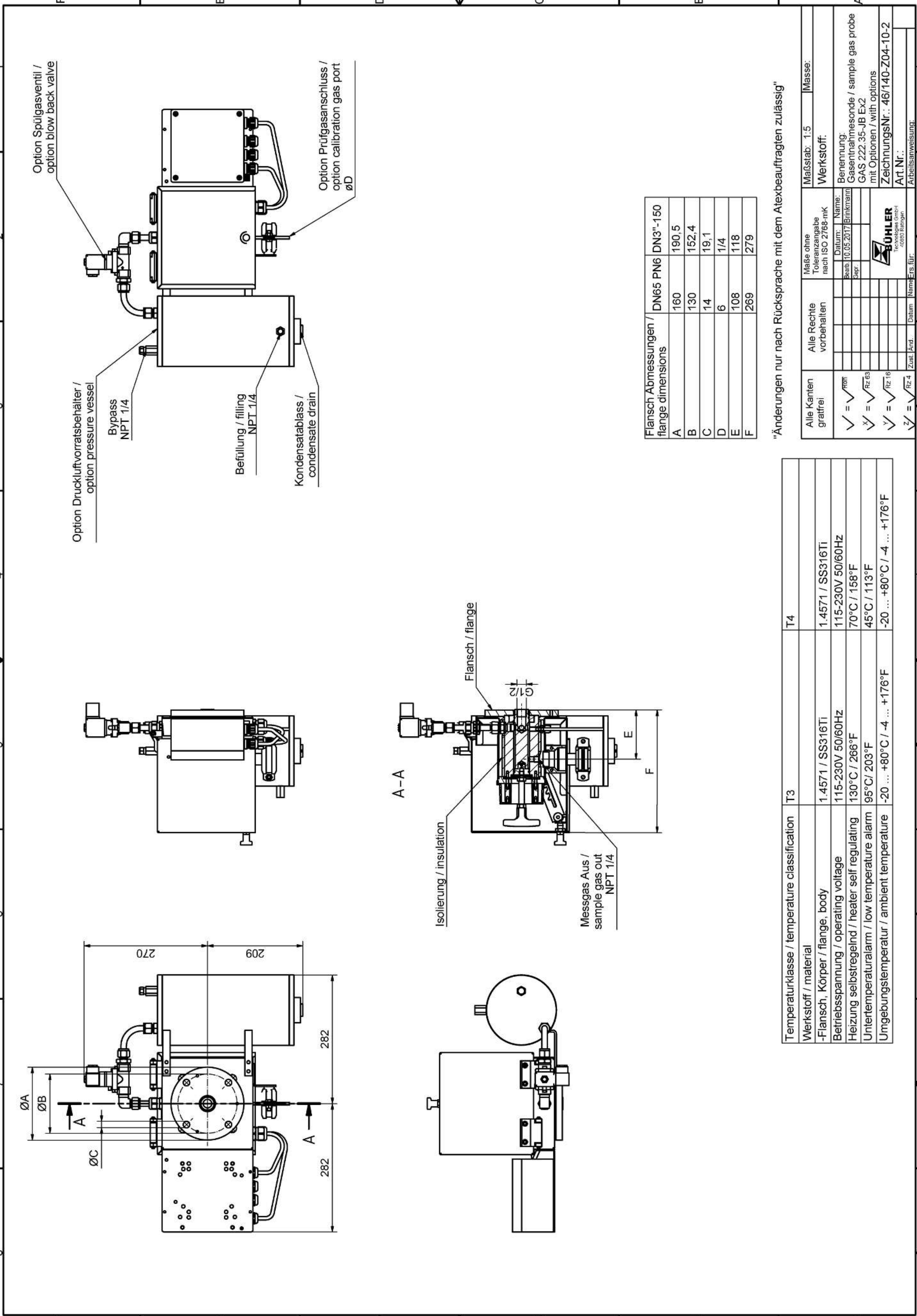
Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions



Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	108	118
F	269	279

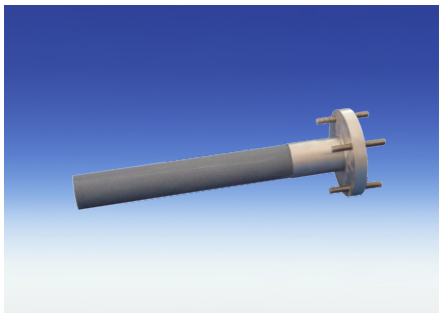
Temperaturklasse / temperature classification	T3	T4
Werkstoff / material		
-Flansch, Körper / flange body	1.4571 / SS316Ti	1.4571 / SS316Ti
Betriebsspannung / operating voltage	115 - 230V 50/60Hz	115 - 230V 50/60Hz
Heizung selbstregelnd / heater self regulating	130°C / 266°F	70°C / 158°F
Untertemperaturalarm / low temperature alarm	95°C / 203°F	45°C / 113°F
Umgebungstemperatur / ambient temperature	-20 ... +80°C / -4 ... +176°F	-20 ... +80°C / -4 ... +176°F

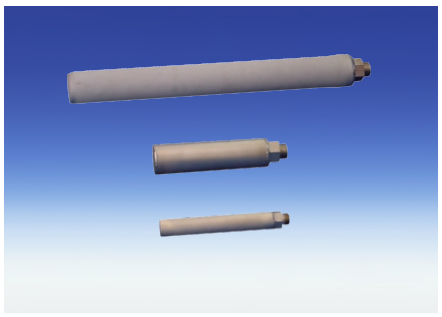


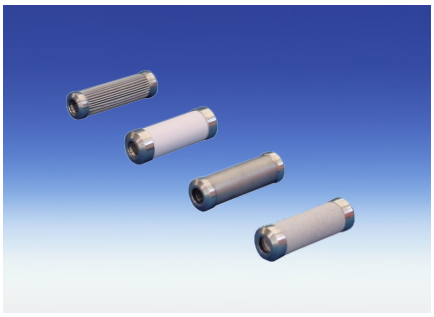
Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	108	118
F	269	279

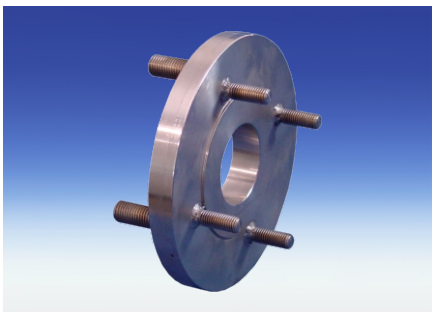
Temperaturklasse / temperature classification	T3	T4
Werkstoff / material		
-Flansch, Körper / flange, body	1.4571 / SS316Ti	1.4571 / SS316Ti
Betriebsspannung / operating voltage	115-230V 50/60Hz	115-230V 50/60Hz
Heizung selbstregelnd / heater self regulating	130°C / 266°F	70°C / 158°F
Untertemperaturalarm / low temperature alarm	95°C/ 203°F	45°C / 113°F
Umgebungstemperatur / ambient temperature	-20 ... +80°C / -4 ... +176°F	-20 ... +80°C / -4 ... +176°F

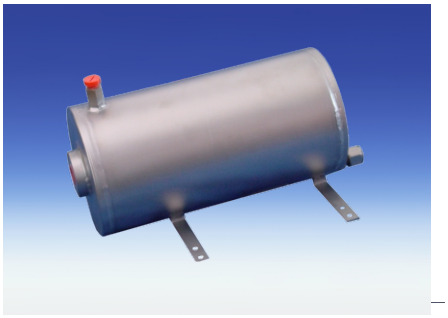
Accessories for Sample Gas Probe GAS 222

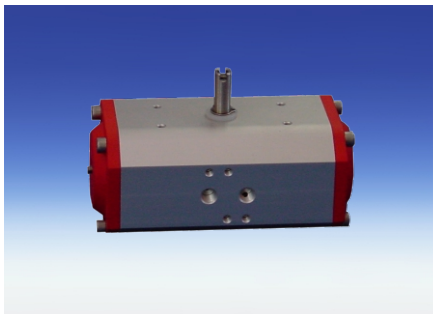












- **Sample tubes**
- **In-situ filters**
- **Extensions**

Page 2 - 4

- **Downstream filters**
- **Cal gas connections**
- **Adapter flanges**

Page 8

- **Capacitive vessel**
- **Pneumatic actuators**
- **3/2-way-solenoid valves**
- **Blowback controllers**

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For general information, see data sheet “Sample gas probes GAS 222” DA461000.

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Sample tubes, in-situ filters and extensions

- Various materials
- Various dimensions
- Heated or nonheated extensions

Sample tube					222.10	222.11	222.30	222.35-U	222.15	222.17	222.20	222.21	222.31	222.35	222.20 DH	222.20 Atex	222.21 Atex	222.31 Atex	222.35 Atex	222.20 Atex2	222.21 Atex2	222.31 Atex2	222.35 Atex2	222.10 ANSI	222.11 ANSI/ CSA	222.30 ANSI/ CSA	222.35-U ANSI/ CSA	222.15 ANSI/ CSA	222.17 ANSI/ CSA	222.20 ANSI/ CSA	222.21 ANSI/ CSA	222.31 ANSI/ CSA	222.35 ANSI/ CSA	222.20 DH ANSI/ CSA	222.20 AMEX	222.21 AMEX	222.31 AMEX	222.35 AMEX	Type GAS
	Material	T max.	Length	Part No.:																																			
01	1.4571	1100°F	300 mm (11.8 in)	462220010300	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
01	1.4571	1100°F	500 mm (19.7 in)	462220010500	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
01	1.4571	1100°F	1000 mm (39.4 in)	462220011000	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
01	1.4571	1100°F	1500 mm (59.0 in)	462220011500	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
01	1.4571	1100°F	2000 mm (78.7 in)	462220012000	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
02	Ceramics / 1.4571	2900°F	0.5 m (1.6 ft)	4622200205	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
02	Ceramics / 1.4571	2900°F	1.0 m (3.3 ft)	4622200210	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
02	Ceramics / 1.4571	2900°F	1.5 m (4.9 ft)	4622200215	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
06	Hastelloy / 1.4571	750°F	500 mm (19.7 in)	462220060500	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
06	Hastelloy / 1.4571	750°F	1000 mm (39.4 in)	462220061000	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
06	Hastelloy / 1.4571	750°F	1500 mm (59.0 in)	462220061500	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
06	Hastelloy / 1.4571	750°F	2000 mm (78.7 in)	462220062000	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
08	Inconel / 1.4571	1922°F	500 mm (19.7 in)	462220040500	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
08	Inconel / 1.4571	1922°F	1000 mm (39.4 in)	462220041000	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
08	Inconel / 1.4571	1922°F	1500 mm (59.0 in)	462220041500	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
08	Inconel / 1.4571	1922°F	2000 mm (78.7 in)	462220042000	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
08	Inconel / 1.4571	1922°F	2500 mm (98.4 in)	462220042500	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
12	1.4571	1112°F	500 mm (19.7 in)	462220160500	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
12	1.4571	1112°F	1000 mm (39.4 in)	462220161000	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
12	1.4571	1112°F	1500 mm (59.0 in)	462220161500	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
12	1.4571	1112°F	2000 mm (78.7 in)	462220162000	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
13	Kanthal / 1.4571	2500°F	up to 1 m (3.3 ft)	46222017	X	X			X	X	X	X			X					X	X			X	X			X	X	X	X			X	X	X		
	Sample tube with demister PVDF/ETFE	250°F	800 mm (31.5 in)	46222040	X	X			X	X	X	X			X									X	X			X	X	X	X			X				
	Demister ETFE / as spare part	250°F		462220402	X	X			X	X	X	X			X									X	X			X	X	X	X			X				
	Sample tube with demister / 1.4571	750°F	300 mm (11.8 in)	4622204203	X	X			X	X	X	X			X									X	X			X	X	X	X			X				
	Sample tube with demister / 1.4571	750°F	500 mm (19.7 in)	4622204205	X	X			X	X	X	X			X									X	X			X	X	X	X			X				
	Sample tube with demister / 1.4571	750°F	1000 mm (39.4 in)	4622204210	X	X			X	X	X	X			X									X	X			X	X	X	X			X				
	Demister 1.4571 / as spare part	750°F		4611004	X	X			X	X	X	X			X									X	X			X	X	X	X			X				

Sample tubes, in-situ filters and extensions

- Various materials
- Various dimensions
- Heated or nonheated extensions

In-situ filter							222.10	222.11	222.30	222.35-U	222.15	222.17	222.20	222.21	222.31	222.35	222.20 DH	222.20 Atex	222.21 Atex	222.31 Atex	222.35 Atex	222.20 Atex2	222.21 Atex2	222.31 Atex2	222.35 Atex2	222.10 ANSI	222.11 ANSI/ CSA	222.30 ANSI/ CSA	222.35-U ANSI/ CSA	222.15 ANSI/ CSA	222.17 ANSI/ CSA	222.20 ANSI/ CSA	222.21 ANSI/ CSA	222.31 ANSI/ CSA	222.35 ANSI/ CSA	222.20 DH ANSI/ CSA	222.20 AMEX	222.21 AMEX	222.31 AMEX	222.35 AMEX	Type GAS
	Material	**T max.**	**Length**		**Pore size**	**Part No.:**																																			
03	Stainless steel	1100°F	237 mm	(9.3 in)	5 µm	46222303		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
03F	Stainless steel	1100°F	237 mm	(9.3 in)	0.5 µm	46222303F*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
03H	Hastelloy	1100°F	237 mm	(9.3 in)	5 µm	46222303H*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
03HF	Hastelloy	1100°F	237 mm	(9.3 in)	0.5 µm	46222303HF*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
031	Stainless steel, with volume displacer	1100°F	237 mm	(9.3 in)	5 µm	462223031		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
031F	Stainless steel, with volume displacer	1100°F	237 mm	(9.3 in)	0.5 µm	462223031F*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
031H	Hastelloy, with volume displacer	1100°F	237 mm	(9.3 in)	5 µm	462223031H*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
031HF	Hastelloy, with volume displacer	1100°F	237 mm	(9.3 in)	0.5µm	462223031HF*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
04	Stainless steel	1100°F	538 mm	(21.2 in)	5 µm	46222304		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
04F	Stainless steel	1100°F	538 mm	(21.2 in)	0.5 µm	46222304F*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
04H	Hastelloy	1100°F	538 mm	(21.2 in)	5 µm	46222304H*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
04HF	Hastelloy	1100°F	538 mm	(21.2 in)	0.5 µm	46222304HF*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
041	Stainless steel, with volume displacer	1100°F	538 mm	(21.2 in)	5 µm	462223041		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
041F	Stainless steel, with volume displacer	1100°F	538 mm	(21.2 in)	0.5 µm	462223041F*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
041H	Hastelloy, with volume displacer	1100°F	538 mm	(21.2 in)	5 µm	462223041H*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
041HF	Hastelloy, with volume displacer	1100°F	538 mm	(21.2 in)	0.5 µm	462223041HF*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
07	Ceramics / 1.4571	1800°F[1)]	478 mm	(18.8 in)	2 µm	46222307		X	X					X	X				X	X			X	X																
07F	Ceramics / 1.4571	1800°F[1)]	478 mm	(18.8 in)	0.3 µm	46222307F*		X	X					X	X				X	X																				
07 ANSI	Ceramics / 1.4571	1800°F[1)]	478 mm	(18.8 in)	2 µm	46222307C																					X	X						X	X			X	X	
35	Stainless steel	1100°F	229 mm	(9.0 in)	5 µm	46222359				X						X					X				X			X								X					X
35F	Stainless steel	1100°F	229 mm	(9.0 in)	0.5 µm	46222359F*				X						X					X				X			X								X					X

1) Hot gas filtration, oxidizing atmosphere max. 1400 °F
Hot gas filtration, reductive atmosphere max. 1100 °F

* Prices and delivery time on request

Sample tubes, in-situ filters and extensions

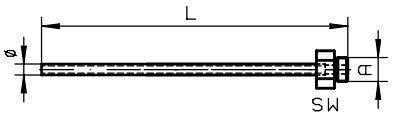
- Various materials
- Various dimensions
- Heated or nonheated extensions

Type GAS	Material	Mains Voltage	Length	Part No.	222.10	222.11	222.30	222.35-U	222.15	222.17	222.20	222.21	222.31	222.35	222.20 DH	222.20 Atex	222.21 Atex	222.31 Atex	222.35 Atex	222.20 Atex2	222.21 Atex2	222.31 Atex2	222.35 Atex2	222.10 ANSI	222.11 ANSI/ CSA	222.30 ANSI/ CSA	222.35-U ANSI/ CSA	222.15 ANSI/ CSA	222.17 ANSI/ CSA	222.20 ANSI/ CSA	222.21 ANSI/ CSA	222.31 ANSI/ CSA	222.35 ANSI/ CSA	222.20 DH ANSI/ CSA	222.20 AMEX	222.21 AMEX	222.31 AMEX	222.35 AMEX
Protection shield				**Part No.:**																																		
for in-situ filter 03				462223034		X	X					X	X				X	X			X	X			X	X					X	X				X	X	
for in-situ filter 04				462223044		X	X					X	X				X	X			X	X			X	X					X	X				X	X	
Extensions																																						
Type	Material	Mains Voltage	Length																																			
G3/4 nonheated	1.4571		0.2 m (0.7 ft)	4622230320200	X	X	X		X	X	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X	X		X	X	X	X	
G3/4 nonheated	1.4571		0.4 m (1.3 ft)	4622230320400	X	X	X		X	X	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X	X		X	X	X	X	
G3/4 nonheated	1.4571		0.5 m (1.6 ft)	4622230320500	X	X	X		X	X	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X	X		X	X	X	X	
G3/4 nonheated	1.4571		0.7 m (2.3 ft)	4622230320700	X	X	X		X	X	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X	X		X	X	X	X	
G3/4 nonheated	1.4571		1 m (3.3 ft)	4622230321000	X	X	X		X	X	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X	X		X	X	X	X	
G3/4 nonheated	1.4571		1,2 m (3.9 ft)	4622230321200	X	X	X		X	X	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X	X		X	X	X	X	
G3/4 nonheated	1.4571		1,5 m (4.9 ft)	4622230321500	X	X	X		X	X	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X	X		X	X	X	X	
G3/4 nonheated	1.4571		2 m (6.6 ft)	4622230322000	X	X	X		X	X	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X	X		X	X	X	X	
G1/2 nonheated	1.4571		0,25 m (0.8 ft)	4622235910250				X						X					X				X				X						X					X
G1/2 nonheated	1.4571		0,5 m (1.6 ft)	4622235910500				X						X					X				X				X						X					X
G1/2 nonheated	1.4571		0,7 m (2.3 ft)	4622235910700				X						X					X				X				X						X					X
G1/2 nonheated	1.4571		1,5 m (4.9 ft)	4622235911500				X						X					X				X				X						X					X
GF heated*	1.4571	230V	0.5 m (1.6 ft)	462223036							X	X	X																									
GF heated*	1.4571	230V	1 m (3.3 ft)	462223033							X	X	X																									
GF ANSI / CSA, heated*	1.4571	115V	0.5 m (1.6 ft)	462223036C1																										X	X	X						
GF ANSI / CSA, heated*	1.4571	115V	1 m (3.3 ft)	462223033C1																										X	X	X						
Controller for heated extension integrated into probe controller				46222292							X	X	X																	X	X	X						

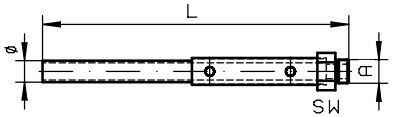
* Mounting is only possible at a plain flange without G3/4 thread. Therefore a G has to be added to the part number, e.g. 4622220G.
It is not possible to add a heated extension after delivery.

Entnahmerohre / tubes

Typ	L	ø	A	SW
01	var.	12	G3/4	36
06	var.	12	G3/4	36
08	var.	21,3	G3/4	36
12	var.	20	G3/4	36
13	var.	15	G3/4	36
14	var.	18	G3/4	36



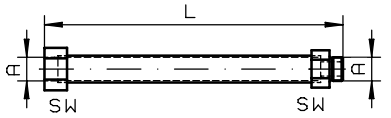
Typ	L	ø	A	SW
02-0,5	500	24	G3/4	36
02-1,0	1000	24	G3/4	36
02-1,5	1500	24	G3/4	36

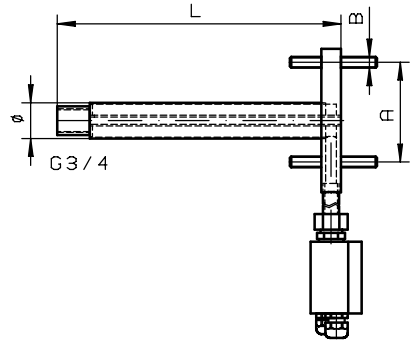


Verlängerungen / extensions

Unbeheizt / unheated

Typ	L	A	SW
G3/4	0,2-2 m	G3/4	36
G1/2	0,25-1,5m	G1/2	27



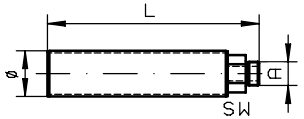


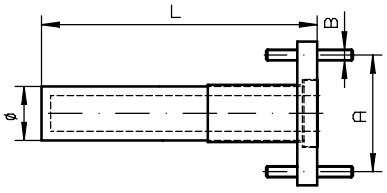
Beheizt / heated

Typ	L	ø	A	B
GF	500	40	DN65 PN6	M12
GF	1000	40	DN65 PN6	M12
GF ANSI/CSA	500	40	DN3"-150	M16
GF ANSI/CSA	1000	40	DN3"-150	M16

Eintritssfilter / in-situ filter

Typ	L	ø	A	SW
03	237	51	G3/4	36
031	237	51	G3/4	36
04	538	60	G3/4	36
041	538	60	G3/4	36
35	229	29	G1/2	27



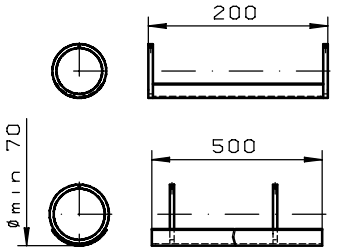


Typ	L	ø	A	B
07	500	60	DN65 PN6	M12
07 ANSI	500	60	DN3"-150	M16

Abweisblech / protection shield

Eintrittsfilter / in-situ filter 03

Eintrittsfilter / in-situ filter 04



alle Kanten gratfrei	ALLE RECHTE VORBEHALTEN	Maße ohne Toleranzangabe nach ISO 2768-mK						Maßstab 1 5	(Gewicht)
Oberflächenbearbeitungszeichen								Werkstoff	
						Datum	Name	Benennung	
					Bearb	21 01 2004	Brinkmann	Rohre/Filter/Verlängerungen tubes/filter/extensions GAS 222	
					Gepr				
								Zeichng -Nr	46/107-Z01-01-3A
						BÜHLER		Art -Nr	
a	neu	29 09 06	Br					ARBEITSANWEISUNG	
Zust	Änd	Datum	Name	Ers für					

Blowback

- With ball valve or solenoid valve
- Heated or non-heated
- Manual or automatic control

Capacitive vessel	Ambient temperature	Part No.:	222.10	222.11	222.30	222.35-U	222.15	222.17	222.20	222.21	222.31	222.35	222.20 DH	222.20 Atex	222.21 Atex	222.31 Atex	222.35 Atex	222.20 Atex2	222.21 Atex2	222.31 Atex2	222.35 Atex2	222.10 ANSI	222.11 ANSI/ CSA	222.30 ANSI/ CSA	222.35-U ANSI/ CSA	222.15 ANSI/ CSA	222.17 ANSI/ CSA	222.20 ANSI/ CSA	222.21 ANSI/ CSA	222.31 ANSI/ CSA	222.35 ANSI/ CSA	222.20 DH ANSI/ CSA	222.20 AMEX	222.21 AMEX	222.31 AMEX	222.35 AMEX	Type GAS
PAV 01		46222PAV		X	X	X				X	X	X			X	X	X		X	X	X		X	X	X				X	X	X			X	X	X
Accessories for capacitive vessel																																					
ball valve		46222PAVKH		X	X	X				X	X	X			X	X	X		X	X	X		X	X	X				X	X	X			X	X	X
2/2-way-MV 24VDC	15 to 130 °F	46222PAVMV1		X	X	X				X	X	X																								
2/2-way-MV 110V 50Hz	15 to 130 °F	46222PAVMV2		X	X	X				X	X	X																								
2/2-way-MV 220-230V 50/60Hz	15 to 130 °F	46222PAVMV3		X	X	X				X	X	X																								
2/2-way-MV 24VUC Atex II 2G/D EEx m II T4 IP65	15 to 140 °F	46222PAVMV4		X	X	X									X	X	X		X	X	X															
2/2-way-MV 110VUC Atex II 2G/D EEx m II T4 IP65	15 to 140 °F	46222PAVMV5		X	X	X									X	X	X		X	X	X															
2/2-way-MV 230VUC Atex II 2G/D EEx m II T4 IP65	15 to 140 °F	46222PAVMV6		X	X	X									X	X	X		X	X	X															
2/2- way- AMEX 24 V/ 60 Hz Cl. I Div 2	15 to 130 °F	46222PAVMV14																					X	X	X				X	X	X			X	X	X
2/2- way- AMEX 120 V/ 60 Hz Cl. I Div 2	15 to 130 °F	46222PAVMV8																					X	X	X				X	X	X			X	X	X
2/2- way- AMEX 240 V/ 60 Hz Cl. I Div 2	15 to 130 °F	46222PAVMV9																					X	X	X				X	X	X			X	X	X
self regulated heating system 115/230V 50/60Hz		46222PAVHZ1		X	X	X				X	X	X											X	X	X				X	X	X					
self regulated heating system 115-230V 50/60Hz Atex 2 II 3G Ex nA IIC T3 Gc X		46222PAVHZ2																	X	X	X															
self regulated heating system 115-230V 50/60Hz Atex 2 II 3G Ex nA IIC T4 Gc X		46222PAVHZ3																	X	X	X															
self regulated heating system AMEX,115-230V,50/60 Hz, Cl. I Div 2 B,C,D,T3		46222PAVHZ4																																X	X	X
self regulated heating system AMEX,115-230V,50/60 Hz, Cl. I Div 2 B,C,D,T4		46222PAVHZ6																																X	X	X
pressurized vessel support		462223502				X																			X											
Bourdon tube pressure gauge 0-10 bar		46222PAVMA		X	X	X				X	X	X			X	X	X		X	X	X		X	X	X				X	X	X			X	X	X
Pneumatic actuators																																				
spring return, opened unpressurized		46222008		X	X					X	X				X	X			X	X			X	X					X	X				X	X	
spring return, closed unpressurized		46222030		X	X					X	X				X	X			X	X			X	X					X	X				X	X	
double action		46222009		X	X					X	X																									
limit switch		9008928		X	X					X	X																									
limit switch Atex II 2G/3D IIC T6 IP65		9008930													X	X			X	X																
limit switch Atex II 2G/2D IIC T6 IP65		9027002													X	X			X	X																
3/2-way-SV for pneumatic actuator control																																				
24VDC	15 to 130 °F	46222075		X	X					X	X																									
110V 50Hz	15 to 130 °F	46222076		X	X					X	X																									
230V 50Hz	15 to 130 °F	46222077		X	X					X	X																									
ATEX 24 V UC II 2G/D EEx m II T4	15 to 140 °F	46222078		X	X										X	X			X	X																
ATEX 110 V UC II 2G/D EEx m II T4	15 to 140 °F	46222079		X	X										X	X			X	X																
ATEX 230 V UC II 2G/D EEx m II T4	15 to 140 °F	46222080		X	X										X	X			X	X																
AMEX 24 V 60 Hz, NPT1/4", Cl. I Div 2	15 to 130 °F	46222116																					X	X					X	X				X	X	
AMEX 120 V 60 Hz, NPT1/4", Cl. I Div 2	15 to 130 °F	46222050																					X	X					X	X				X	X	
AMEX 240 V 60 Hz, NPT1/4", Cl. I Div 2	15 to 130 °F	46222056																					X	X					X	X				X	X	
5/2-way-SV for pneumatic actuator control	15 to 160 °F	9148000117		X	X					X	X																									
Blowback controller																																				
RSS 24VDC, IP65		46222199		X	X	X				X	X	X																								
RSS 115/230 VAC, IP65		46222299		X	X	X				X	X	X																								
RSS-MC integrated into probe controller cabinet		46222392								X	X	X																		X	X	X					

*max. pressure 6 bar

Details:

A) Blowback

Ordering note for capacitive vessel:

For attachment to GAS 222.11 / 30 / 35-U, a support is required.

Ordering note for pneumatic actuator:

If a blowback controller is required, only actuator P/N 46222030 is possible.

We advise the installation of a position indicator switch to control the pneumatic actuator.

Integrated blowback controller in the probe controller

In addition to the stand-alone blowback controller (RRS), an integrated blowback controller is optionally available

Blowback cycle time and actual blowback time can be adjusted via the keys and menu of the controller. The blowback and manual operation will be shown on the display. The blowback controller can be programmed via the keys – manual or automatic operation is possible. Besides the status output of the controller, a blowback status signal is provided. Blowback will be usually initiated by signals coming from the main controls.

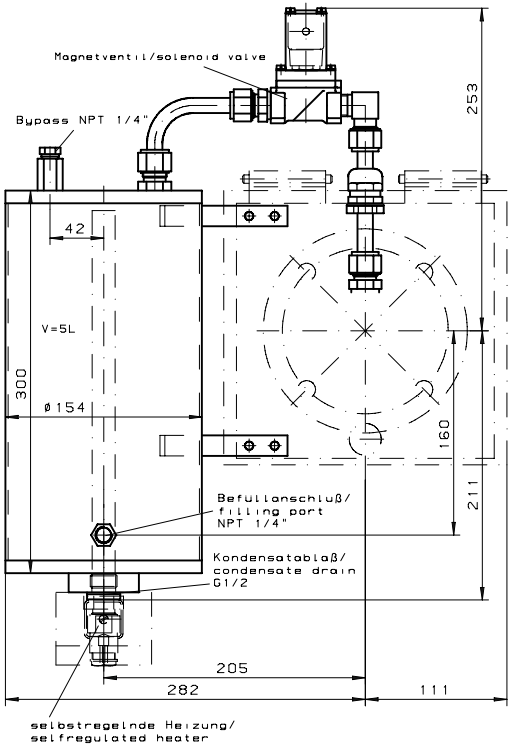
If the position indicator switch is installed, the controller will use this input for the process logic.

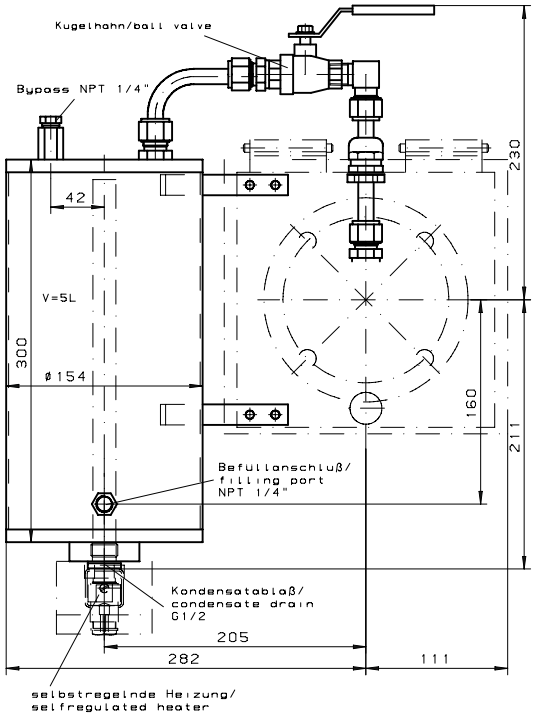
B) Hazardous Areas

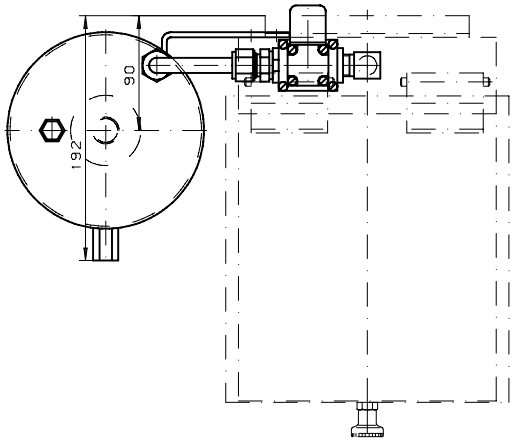
Please note that installed accessories may change the approved category of the probe.
Follow strictly the advices given in the installation- and operation manual and regard the marking on the type plate.

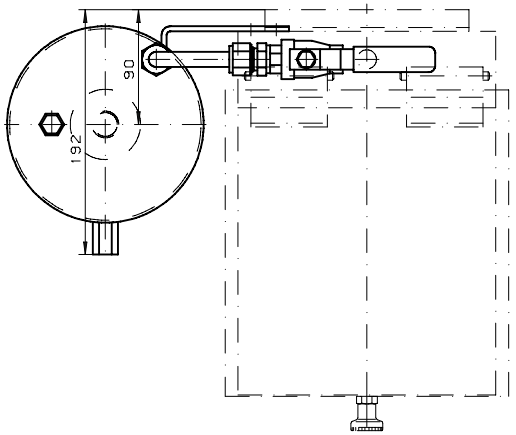
Sample Gas Probe GAS 222.xx Atex		
Model	**with Accessories**	**resuting restircted area; marking**
21 Atex, 31 Atex, 35 Atex	Pressure vessel PAV 01 (Part-No. 46222PAV with accessories)	II 1D / 2GD
21 Atex, 31 Atex,	In situ filter*, ceramics (Art.-Nr.:46222307 + 46222307F)	II 1D 3G / 2GD
20 Atex , 21 Atex,	Downstream filter*, ceramic (Part-No. 46222026 + 46222026P)	II 1D 3G / 2GD
20 Atex, 21 Atex,	Sample tube (Part-No. 46222001, 462220011, 46222006, 46222004, 46222016)	II 1G / 2GD
20 Atex, 21 Atex,	Sample tube**, ceramics (Part-No. 4622200205, 4622200210, 4622200215)	II 3G / 2GD
21 Atex, 31 Atex,	Pneumatic cylinder with end switch Atex (Part-No. 46222019)	II 1GD / 2G3D

* Accessory not suitable for sampling dust with extremely low ignition energy < 3mJ.
** When gases are sampled from Zone 2, ceramic sample tube must be used only if application related or process related electrostatic charging is eliminated.









max Betriebsdruck/operating pressure 10bar
max Betriebstemperatur/operating temperature 50°C

"Änderungen nur nach Rücksprache
mit dem Atexbeauftragten zulässig"

alle Kanten gratfrei	ALLE RECHTE VORBEHALTEN	Maße ohne Toleranzangabe nach ISO 2768-mK				Maßstab 1 2,5	(Gewicht)
Oberflächenbearbeitungszeichen						Werkstoff	
				Datum	Name	Benennung	
			Bearb	05 07 2004	Brinksann	Druckluftbehälter/ capacitive vessel PAV 01	
			Gepr				
				BÜHLER		Zeichng -Nr	46/106-Z01-01-2
						Art -Nr	
Zust	Änd	Datum	Name	Ers für		ARBEITSANWEISUNG	

Downstream filter elements and further options

Downstream filter			Part no.:	222.10	222.11	222.30	222.35-U	222.15	222.17	222.20	222.21	222.31	222.35	222.20 DH	222.20 Atex	222.21 Atex	222.31 Atex	222.35 Atex	222.20 Atex2	222.21 Atex2	222.31 Atex2	222.35 Atex2	222.10 ANSI	222.11 ANSI/ CSA	222.30 ANSI/ CSA	222.35-U ANSI/ CSA	222.15 ANSI/ CSA	222.17 ANSI/ CSA	222.20 ANSI/ CSA	222.21 ANSI/ CSA	222.31 ANSI/ CSA	222.35 ANSI/ CSA	222.20 DH ANSI/ CSA	222.20 AMEX	222.21 AMEX	222.31 AMEX	222.35 AMEX	Type GAS
Material	**O-Rings**	**Pore size**																																			
Ceramics	Viton	3 µm	46222026	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
Ceramics	Perfluorelastomer	3 µm	46222026P	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
Sintered stainless steel	Viton	5 µm	46222010	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
Sintered stainless steel	Perfluorelastomer	5 µm	46222010P	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
Sintered stainless steel	Viton	0,5 µm	46222010F*	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
Sintered stainless steel	Perfluorelastomer	0,5 µm	46222010FP*	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
Pleated stainless steel	Viton	10 µm	46222011	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
Pleated stainless steel	Perfluorelastomer	10 µm	46222011P	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
Handle to hold the micro-fibreglass filter element			46222067	X	X			X	X	X	X			X									X	X			X	X	X	X			X	X	X		
Micro glass fiber with silicate binder	Viton		462220671	X	X			X	X	X	X			X									X	X			X	X	X	X			X	X	X		
Micro glass fiber with silicate binder	Perfluorelastomer		462220671P	X	X			X	X	X	X			X									X	X			X	X	X	X			X	X	X		
Closing handle with filter tube and filter wool	Viton		46222163	X	X			X	X	X	X			X									X	X			X	X	X	X			X	X	X		
Closing handle with filter tube and filter wool	Perfluorelastomer		46222163P	X	X			X	X	X	X			X									X	X			X	X	X	X			X	X	X		
Filter wool			46222167	X	X			X	X	X	X			X									X	X			X	X	X	X			X	X	X		
Set of O-rings Viton incl. grease			46222012	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
Set of O-rings Perfluorelastomer incl. grease			46222024	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
Further options																																					
Adapter flange ANSI 3“-150lbs			46222014	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X															
Cal gas connection ø6mm			46222309	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cal gas connection ø6mm with check valve			46222311	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cal gas connection ø1/4"			46222336	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cal gas connection ø1/4" with check vavle			46222337	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fitting for sample gas port ø6mm			9008173	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fitting for sample gas port ø8mm			9008174	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fitting for back wash port ø12mm			9008369		X	X	X				X	X	X			X	X	X		X	X	X		X	X	X				X	X	X			X	X	X
Fitting for sample gas port ø1/4"			9008584	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fitting for sample gas port ø3/8"			9008583	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fitting for back wash port ø1/2"			9028033		X	X	X				X	X	X			X	X	X		X	X	X		X	X	X				X	X	X			X	X	X
Locking screw G3/8 for backflush connection			9008084			X	X				X	X	X			X	X	X		X	X	X			X	X				X	X	X			X	X	X
Sealing ring for sealing the backflush connection with a locking screw			9009258			X	X				X	X	X			X	X	X		X	X	X			X	X				X	X	X			X	X	X
Mounting bracket with clamp ring for DN65 PN6			462220102					X																													
Mounting bracket with clamp ring for ANSI 3”-150 lbs			462220102C																									X									

* Prices and delivery time on request

Blowback control RSS24, RSS230

The blowback control RSS 24 / RSS 230 allows scheduled or manual probe filter cleaning. It is designed as a controller for probes suitable for blowback but can also control other external solenoid valves. One special application is controlling ATEX solenoid valves, however the RSS must be set up in a secure area.

The blowback control RSS 24 / RSS 230 has all equipment and controls required for control inside an IP65 housing. The cleaning time as well as the measuring time between cleaning intervals can be set within large ranges. The time is set using the programmable controller inside the housing to prevent accidental adjustments.

The front panel holds switches for activating the controller and setting the operating mode (auto or manual). A button allows manual blowback whenever needed. A green light indicates when the unit is in auto mode and a red light indicates manual mode. Both lights are switched internally by the controller, hence simultaneously serving as operation display for the blowback control. The status signals can be output on the outside via the internal terminal strips.

The blowback control RSS 24 / RSS 230 is designed for wall-mounting. At the back of the housing are 4 M6 threaded bushings for mounting. The leads are run through the PG screw connection at the bottom of the housing.

External solenoid valves must be equipped with contact protective circuit. On blowback controls complete with BÜHLER sample gas probe this protective circuit is already included in the supplied plug-in connectors for the solenoid valves.

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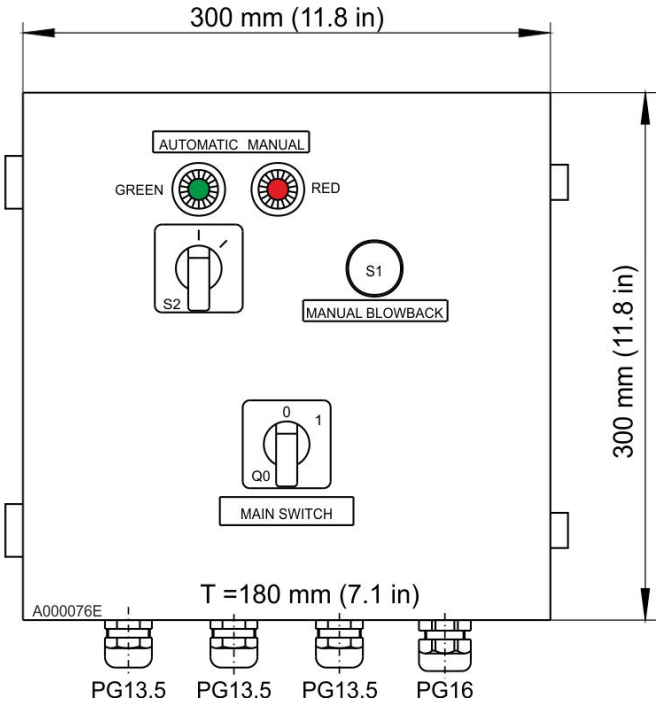
Internet: www.buhlertech.com

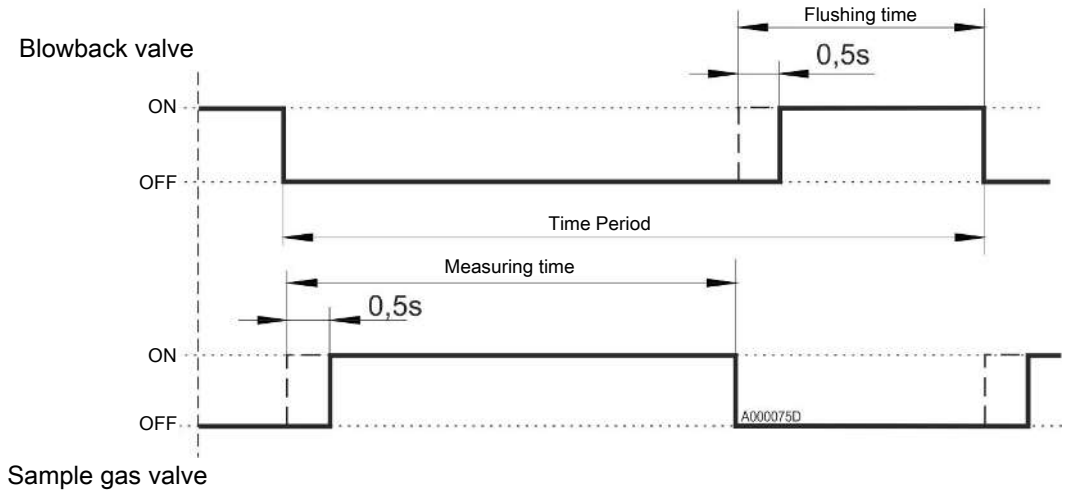
Technical Data

Type	RSS 24	RSS 230
Supply voltage:	24 VDC ± 10%	85 – 265 VAC 50/60 Hz
Protection:	5 A (delayed action)	1 A, delayed action
Relay switching capacity:	max. 10 A / 24 VDC / 75 W	max. 10 A / 230 VAC / 690 VA
Temperature range:	32 – 130 °F	32 – 130 °F
Blowback time	0 – 60 s	0 – 60 s
Test time	1 min – 99:59 h	1 min – 99:59 h
IP rating:	IP65	IP65
Weight:	approx. 6.6 lb	approx. 6.6 lb
Dimensions (H x W x D)	11.8 x 11.8 x 7.1	11.8 x 11.8 x 7.1

Dimensions



Time flowchart



Ordering Instructions

Item no.	Type
46 22 2199	Blowback control RSS 24, supply voltage 24 VDC
46 22 2299	Blowback control RRSS 230, supply voltage 115/230 VAC

Sample gas probe APO

The **APO** series sample gas probes are unheated probes for standard applications. A DN65 PN16 flange made from 1.4571 with G3/8" connector serves as the basis. This series also has versions made entirely from special materials and custom versions. Please feel free to request our specialist.

- compact installation
- modular design
- easy installation
- various materials

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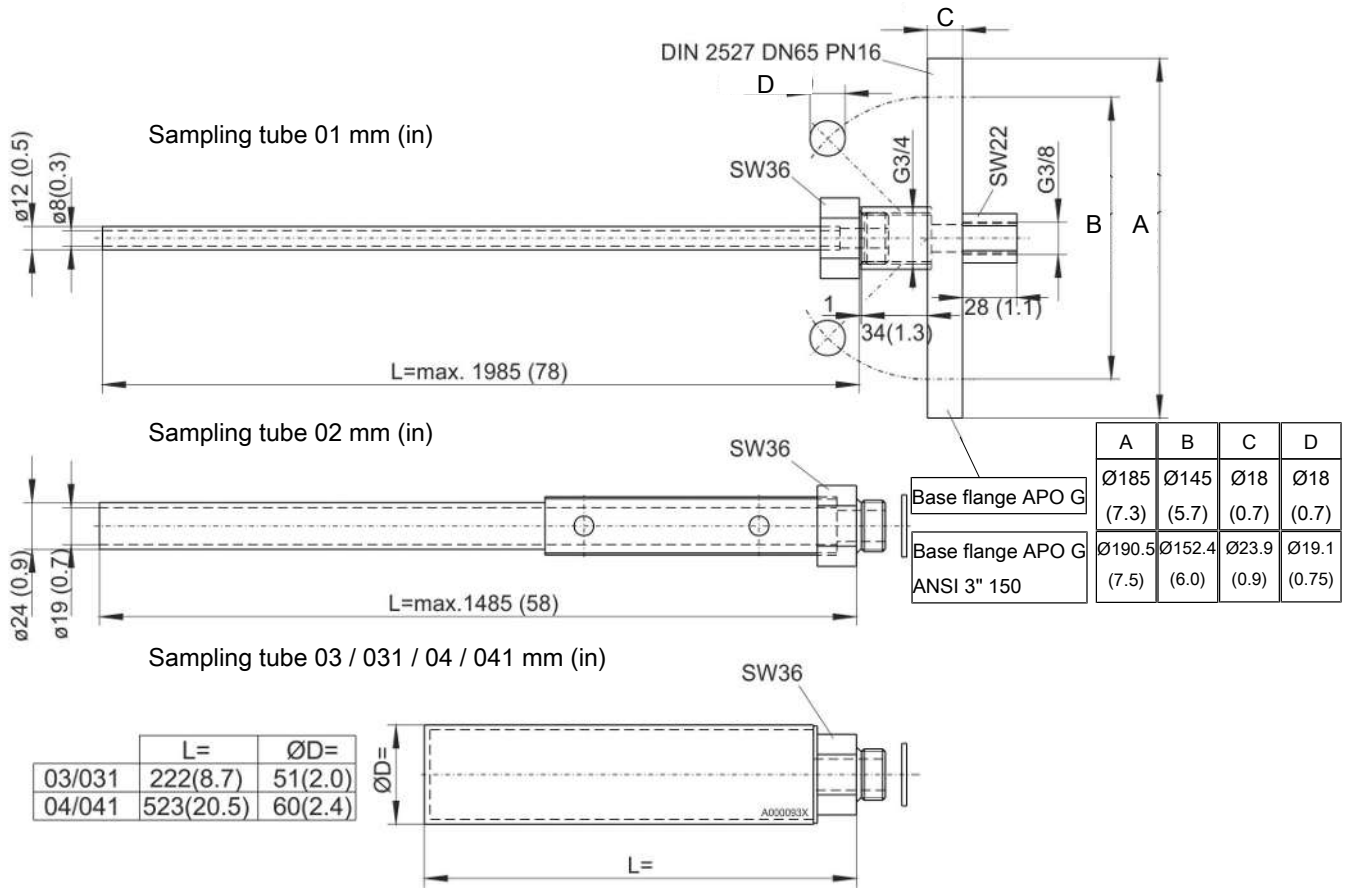
Modular standard APO-G

The modular standard series APO-G consists of a base flange APO-G and a sampling tube of your choice. Choose from a variety of sampling tubes in different lengths and materials.



A	B	C	D
Ø185 (7.3)	Ø145 (5.7)	Ø18 (0.7)	Ø18 (0.7)
Ø190.5 (7.5)	Ø152.4 (6.0)	Ø23.9 (0.9)	Ø19.1 (0.75)

	L=	ØD=
03/031	222(8.7)	51(2.0)
04/041	523(20.5)	60(2.4)

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Ordering Instructions

Description	Material	Gas temperature	Length	Item no.
Base flange APO-G	1.4571	Up to 1110 °F	--	46 006 000
Base flange APO-G ANSI 3" 150 lbs	1.4571	Up to 1110 °F		46 006 000C
Sampling tube				
Sampling tube 01	1.4571	Up to 1110 °F	max. 39.4 in	46 222 001 1000
Sampling tube 02	Ceramic/1.4571	Up to 2910 °F	max. 39.4 in	46 222 002 10
Sampling filter 03 / inlet filter dust load <4.4 gr/ft³	Sintered stainless steel 1.4404/1.4571	Up to 1110 °F	8.7 in	46 222 303
Sampling filter 031 / inlet filter dust load <4.4 gr/ft³ with built-in displacement	Sintered stainless steel 1.4404/1.4571	Up to 1110 °F	8.7 in	46 222 3031
Sampling filter 04 / inlet filter dust load >4.4 gr/ft³	Sintered stainless steel 1.4404/1.4571	Up to 1110 °F	20.6 in	46 222 304
Sampling filter 041 / Inlet filter dust load >4.4 gr/ft³ with built-in displacement	Sintered stainless steel 1.4404/1.4571	Up to 1110 °F	20.6 in	46 222 3041

3 Sample Pumps

Sample gas pumps overview

System description



In gas analysis, conveying the gas to be analysed poses particularly high demands for the sample gas pump. These are caused by **aggressive gas compositions or condensate** in the sample gas due to the dew point not being reached.

The sample gas pumps of Bühler Technologies GmbH work with a **PTFE bellow**which has been characterised by its high chemical resistance and long service life throughout many years of use. For conveying sample gas with condensate content, the pump head is turned downward.

To make it easier to use the pumps in **hot applications**, the pump head and drive motor are thermally and mechanically decoupled in P2.4, P2.74 and P2.84. This allows the pump head to be mounted in a heated cabinet while the pump motor remains on the outside and thus in a lower ambient temperature.

The P4.3 and P4.83 pumps are used to convey **sample gas in two separate gas paths**. They consist of two separate pump heads mounted on a joint motor shaft. The P4.83 pump may also be operated in parallel mode if very high delivery volumes are required.

Sample gas pumps for standard applications in gas analysis

Flow rate	Gas paths	Pump	Intermediate flange	Supply voltage	Data sheet no.
4.7 lpm	1	P1.1		24 V / 115 V / 230 V	420011
6.7 lpm	1	P2.3		115 V / 230 V / 400 V	420008
6.7 lpm	1	P2.4	X	115 V / 230 V / 400 V	420008
13.3 lpm	1	P2.83		115 V / 230 V / 400 V	420008
13.3 lpm	1	P2.84	X	115 V / 230 V / 400 V	420008
2x 6.7 lpm	2	P4.3		115 V / 230 V / 400 V	420010
2x 13.3 lpm	2	P4.83		115 V / 230 V / 400 V	420010

Tab. 1: Sample gas pumps for standard applications in gas analysis

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Sample gas pumps for use in explosive areas



The series are available for various Ex hazard and classification zones.

Flow rate	Pump	Intermediate flange	Supply voltage	Version for Ex zones [1]	Data sheet no.
4.7 lpm	P1.2		115 V / 230 V	Conveying flammable gasses: Zone 2 [2]	420011
4.7 lpm	P1.3		24 V / 115 V / 230 V	Zone 2 / Class I Div. 2	420013
6.7 lpm	P2.2 ATEX		115 V / 230 V / 380-420 V / 500 V	Zone 1	420009
6.7 lpm	P2.2 AMEX		115 V / 230 V	Class I Div. 2	420012
6.7 lpm	P2.3C		115 V / 230 V / 400 V	Conveying flammable gasses: Zone 2 [2]	420008
6.7 lpm	P2.4 ATEX	X	115 V / 230 V / 380-420 V / 500 V	Zone 1	420009
6.7 lpm	P2.4 AMEX	X	115 V / 230 V	Class I Div. 2	420012
11.7 lpm	P2.72 ATEX		115 V / 230 V / 380-420 V / 500 V	Zone 1	420009
11.7 lpm	P2.74 ATEX	X	115 V / 230 V / 380-420 V / 500 V	Zone 1	420009
6.7 lpm	P2.4C	X	115 V / 230 V / 400 V	Conveying flammable gasses: Zone 2 [2]	420008
13.3 lpm	P2.82 AMEX		115 V / 230 V	Class I Div. 2	420012
13.3 lpm	P2.84 AMEX	X	115 V / 230 V	Class I Div. 2	420012

Tab. 2: Sample gas pumps for use in explosive areas

[1] Please refer to the data sheet for the corresponding approval.

[2] The sample gas pumps may only be used to convey explosion class IIA and IIB flammable gaseous media which are not explosive during normal operation, as well as non-flammable gaseous media.

Sample gas pumps optimised for use with H2 or O2



If gases with a high hydrogen or oxygen content are to be pumped, as is the case when monitoring the LEL in electrolysis, for example, the pump must meet the specific requirements of the respective sample gas:

Hydrogen is very volatile and leads to hydrogen embrittlement in its elemental form. Special care must therefore be taken when selecting materials. The pumps are also subjected to a helium leak test.

Oxygen, on the other hand, is highly reactive and oxidising. For this reason, all parts are cleaned and installed in special clean rooms to ensure that there is no dust/grease/oil in the system.

The product portfolio includes the following pumps:

Flow rate	Pump	Intermediate flange	Supply voltage	Version for Ex zones [1]	Data sheet no.
H_2: Optimised for high-purity hydrogen					
6.7 lpm	P2.2 ATEX-H2		115 V / 230 V	Zone 1	420016
6.7 lpm	P2.2 AMEX-H2		115 V / 230 V	Class I Div. 2	420017
6.7 lpm	P2.4 ATEX-H2	X	115 V / 230 V	Zone 1	420016
6.7 lpm	P2.4 AMEX-H2	X	115 V / 230 V	Class I Div. 2	420017
11.7 lpm	P2.72 ATEX-H2		115 V / 230 V	Zone 1	420016
11.7 lpm	P2.74 ATEX-H2	X	115 V / 230 V	Zone 1	420016
O_2: Optimised for high-purity oxygen					
6.7 lpm	P2.2 ATEX-O2		115 V / 230 V	Zone 1	420016
6.7 lpm	P2.2 AMEX-O2		115 V / 230 V	Class I Div. 2	420017
6.7 lpm	P2.4 ATEX-O2	X	115 V / 230 V	Zone 1	420016
6.7 lpm	P2.4 AMEX-O2	X	115 V / 230 V	Class I Div. 2	420017
11.7 lpm	P2.72 ATEX-O2		115 V / 230 V	Zone 1	420016
11.7 lpm	P2.74 ATEX-O2	X	115 V / 230 V	Zone 1	420016

Tab. 3: Sample gas pumps optimised for use with H2 or O2

[1] Please refer to the data sheet for the corresponding approval.

Selection guide

1. Determine the application area: Is it a standard application for the secure area (Table 1)? Is the pump intended for an application in the Ex-area (Table 2)? Or is an application with high-purity H_2 or O_2 planned, e.g. electrolysis (Table 3)?
2. What is the required flow rate?
3. Should the pump have an intermediate flange?

Sample gas pumps P1.1, P1.1E, P1.2, P1.2E

Gas analysis is key for safe and efficient system operation in the chemical industry, petrochemistry or biochemistry. Many of the analysis processes used in these fields require sample gas extraction and conditioning.

Sample gas pumps convey the sample gas from the sampling point to the conditioning system. The main item in these pumps designed specifically for the application is the PTFE single-piece bellow. Combined with the pump head, also single-piece, this solution provides high resistance against particularly aggressive sample gas. Turning the pump head allows gas with condensate to be conveyed without a problem.

- Easy to replace valves
- Single-piece bellows
- Conveys sample gas with condensate
- Proven pump technology
- Attractive price
- Requires little space
- Housing version IP20
- Optionally with built-in bypass valve
- FM C-US approval (general purpose) optional
- Used in **DNV-GL and LR type-tested** conditioning unit
- Can be used in a system to maintain **the IMO MARPOL MEPC.259(68)**
- Special design for use in high vibration environments

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Technical data

Technical data P1.1/P1.1E	
Nominal voltage/Power input:	230 V 50 Hz, 0.48 A 115 V 60 Hz, 0.84 A 12 V DC, 1.55 A 24 V DC, 0.8 A
Protection class OEM/housing & 12 V/24 V:	IP 00/IP 20
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) 2 Hz-13.2 Hz Amplitude ± 1.0 mm 13.2 Hz -100 Hz 0.7g acceleration
Weight (without accessories):	approx. 2.9 lb (12 V/24 V approx. 1.8 lb)
Medium temperature:	158 °F
Ambient temperature:	32 °F to 122 °F
Nominal output:	280 l/h (4.7 lpm)
Materials in contact with media vary by configuration:	PTFE, PVDF, 1.4571, 1.4401, Viton

Technical Data P1.2/P1.2E	
Nominal voltage/Power input:	230 V 50 Hz, 0.48 A 115 V 60 Hz, 0.84 A
Protection class OEM/housing:	IP 00/IP 20
Weight (without accessories):	approx. 2.9 lb
Medium temperature:	see temperature classes
Ambient temperature:	32 °F to 122 °F
Nominal output:	280 l/h (4.7 lpm)
Materials in contact with media vary by configuration:	PTFE, PVDF, 1.4571, 1.4401, Viton

The gas lines are connected via screw-in connections (G1/4 thread). The respective screw-in connections as well as mounting bracket and vibration absorber are sold separately.

Temperature classes

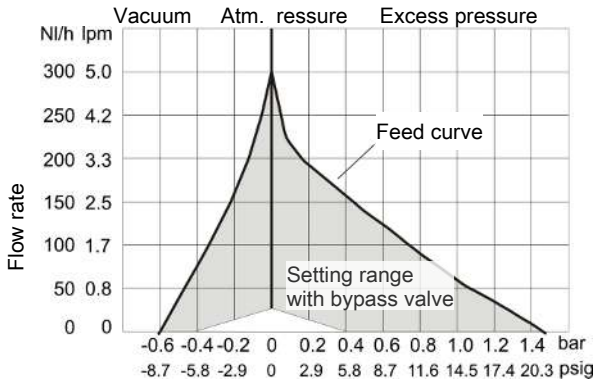
Pump models P1.2/P1.2E		Medium temperature
no flammable gasses in the gas circuit		158 °F
Flammable gasses in the gas circuit above the LEL	T3	158 °F
	T4	122 °F

Marking P1.2/P1.2E

II 3G/- c IIB T4

Note: This device is not suitable for use in explosive areas!

Feed curve

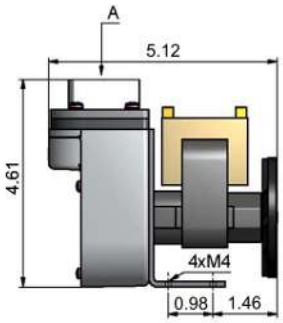


At 60 Hz +10% flow rate

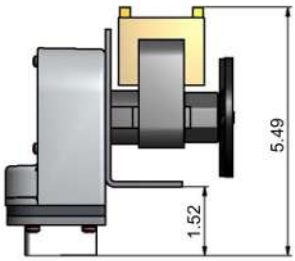
Dimensions P1.1 / P1.2 pump (115 V or 230 V)

The P1.1/P1.2 sample gas pump is connected to electricity via blade receptacles.

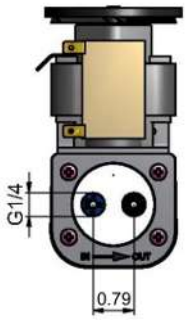
without accessories:



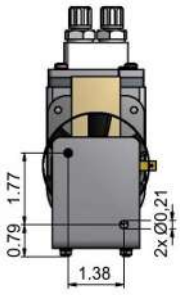
Pump head rotated

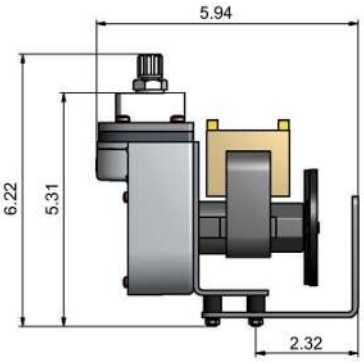


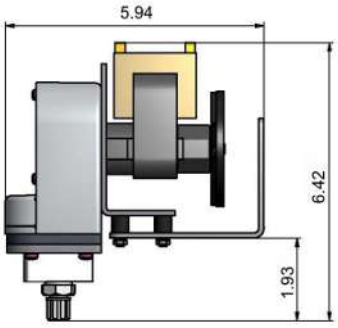
View A

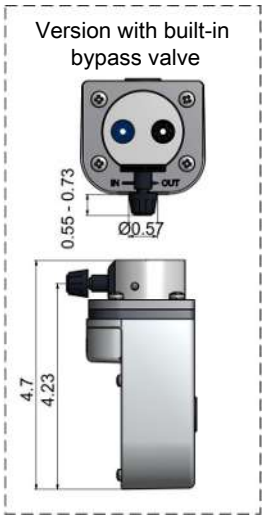


with accessories:



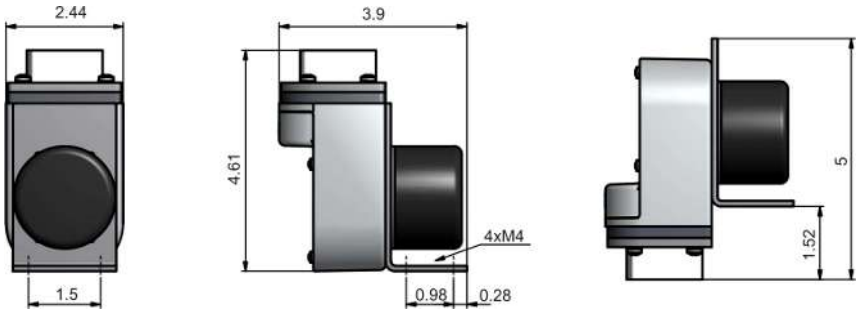






Dimensions P1.1 (12 V DC or 24 V DC)

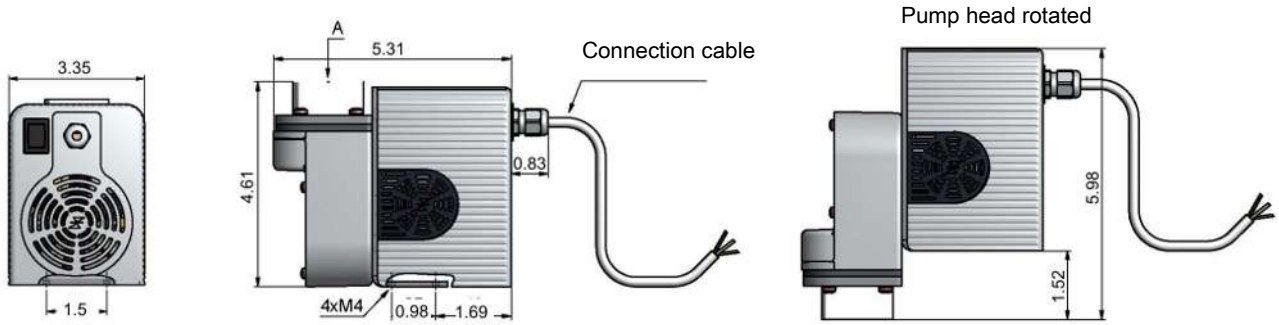
The P1.1 (24 V DC) sample gas pump may be connected by standard 3 m (9.8 ft) connecting cable.



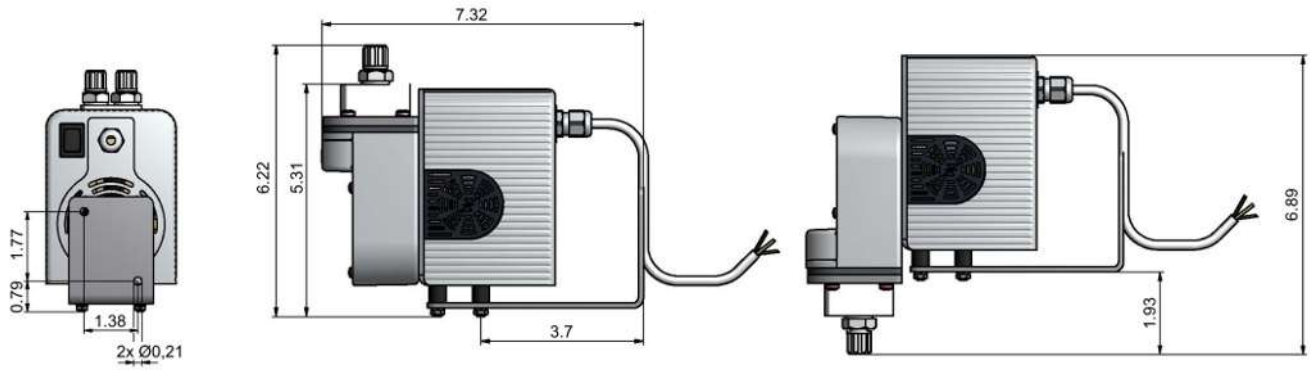
Dimensions P1.1E / P1.2E pump (all voltages)

The P1.1E/P1.2E sample gas pump may be connected by standard 3 m (9.8 ft) connecting cable.

without accessories:



with accessories:



Ordering instructions P1.1 / P1.1E

42	28	x	x	x	1	x	x	x	00	xx	Product feature
											Motor voltage
		1									230 V 50 Hz 0.48 A
		2									115 V 60 Hz 0.84 A
		3									12 V DC 1.55 A (on request)
		4									24 V DC 0.8 A
											Pump head position
			1								Normal position vertical
			2								turned by 180°
											Pump head material
				1							PTFE
				2							VA (1.4571)
				3							PVDF with bypass valve
				4							PVDF
											Valve material
					1						up to 158 °F; PTFE/PVDF
											Screw-in connections/pipe fittings
						0					without
						1					PVDF DN 4/6 *
						2					PVDF 1/4”-1/6” *
						3					PVDF 1/4"-1/8" *
						5					VA (1.4401) 6 mm **
						6					VA (1.4401) 1/4" **
											Mounting accessories
							0				without
							1				Mounting bracket and set of vibration dampers
							2				set of vibration dampers only
											Housing
								0			without
								1			Housing incl. 3 m (9.8 ft) connection cable
								2			Housing with on/off switch incl. 3 m (9.8 ft) connection cable ***
											Options
									00		without
											Approval
										--	without
										FM	FM-Approval

* PTFE or PVDF pump body only

** VA pump body only

*** not possible with 12V/24V and/or FM approval

Ordering instructions P1.2 / P1.2E

42	29	x	x	x	1	x	x	x	00	Product characteristic
										Motor voltage
		1								230 V 50 Hz 0.48 A
		2								115 V 60 Hz 0.84 A
										Pump head position
			1							Normal position vertical
			2							turned by 180°
										Pump head material
				1						PTFE
				2						VA (1.4571)
				3						PVDF with bypass valve
				4						PVDF
										Valve material
					1					up to 158 °F; PTFE/PVDF
										Screw-in connections/pipe fittings
						0				without
						1				PVDF DN 4/6 *
						2				PVDF 1/4"-1/6" *
						3				PVDF 1/4"-1/8" *
						5				VA (1.4401) 6 mm **
						6				VA (1.4401) 1/4" **
										Mounting accessories
							0			without
							1			Mounting bracket and set of vibration dampers
							2			set of vibration dampers only
										Housing
								0		without
								1		Housing incl. 3 m (9.8 ft) connection cable
								2		Housing with on/off switch incl. 3 m (9.8 ft) connection cable

* PTFE or PVDF pump body only

** VA pump body only

Sample gas pumps P1.3

Even in explosive systems in the chemical industry, petrochemistry or biochemistry, gas analysis is key for safe operation. Many of the analysis processes used in these fields require extracting and special conditioning of the sample gas. The P1.3 sample gas pump is the right solution for Atex Zone 2 gases and ambient as well as Class I, Division 2.

Sample gas pumps convey the sample gas from the sampling point to the conditioning system. The main item in these pumps designed specifically for the application is the PTFE single-piece bellow. Combined with the pump head, also single-piece, this solution provides high resistance against particularly aggressive sample gas. Turning the pump head allows gas with condensate to be conveyed without a problem.

- Atex and IECEx Zone 2 Approval
- FM C-US Approval for Class I, Division 2
- Easy to replace valves
- Single-piece bellows
- Conveys sample gas with condensate
- Proven pump technology
- Attractive price
- Requires little space
- Mounting accessories and screw connections sold separately
- IP20 housing version
- Optionally with built-in bypass valve
- 12 V/24 V version available

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

The following applies for all pump types with FM US/CANADA approval:

The apparatus is to be installed in a tool-secured enclosure in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application.

The following applies for all pump types with IECEx/ATEX approval:

The pump shall be mounted in an enclosure providing a minimum degree of protection of IP54 in accordance with IEC/EN 60079-15, and shall be installed within a tool-secured enclosure which meets the requirements of IEC/EN 60079-0 and IEC/EN 60079-15.

Technical data

Technical data	
Nominal voltage/current consumption:	230 V 50 Hz, 0,48 A 115 V 60 Hz, 0,84 A 12 V DC, 1,55 A 24 V DC, 0,8 A
Protection class OEM/housing & 12 V/24 V:	IP 00/IP 20
Weight (without accessories):	approx. 2.9 lb (12 V/24 V approx. 1.8 lb)
Medium temperature:	see “Temperature classes”
Surrounding temperature:	32 °F to 122 °F
Nominal output:	280 l/h (4.7 lpm)
Materials in contact with media vary by configuration:	PTFE, PVDF, 1.4571, 1.4401, Viton

The gas lines are connected via screw-in connections (G1/4 thread). The respective screw-in connections as well as mounting bracket and vibration absorber are sold separately.

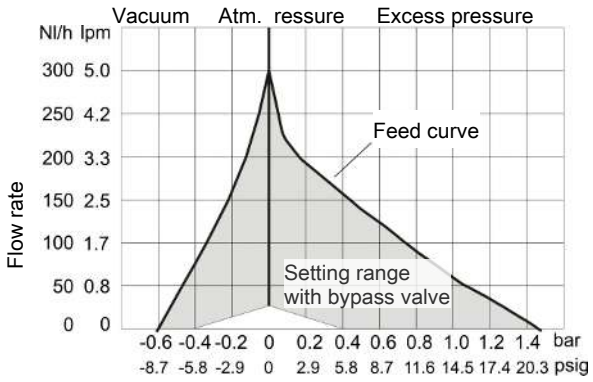
Temperature classes

Type of gas	Maximum medium temperature	Temperature class	
		at installation site	in gas path
non-flammable	122 °F	T4	---
	158 °F	T3	---
flammable	122 °F	T4	T3

Protection marking

P1.3 Atex	FM16ATEX0018X	II 3G Ex nA nC IIC T4...T3 Gc
	---	II 3/3G c IIC T3/T4 X (Examined by Bühler Technologies GmbH)
P1.3 IECEx	IECEx FMG 16.0012X	Ex nA nC IIC T4...T3 Gc
P1.3 US/Canada	Cl. I, Div. 2, Gps. A, B, C, D, T4...T3	

Feed curve



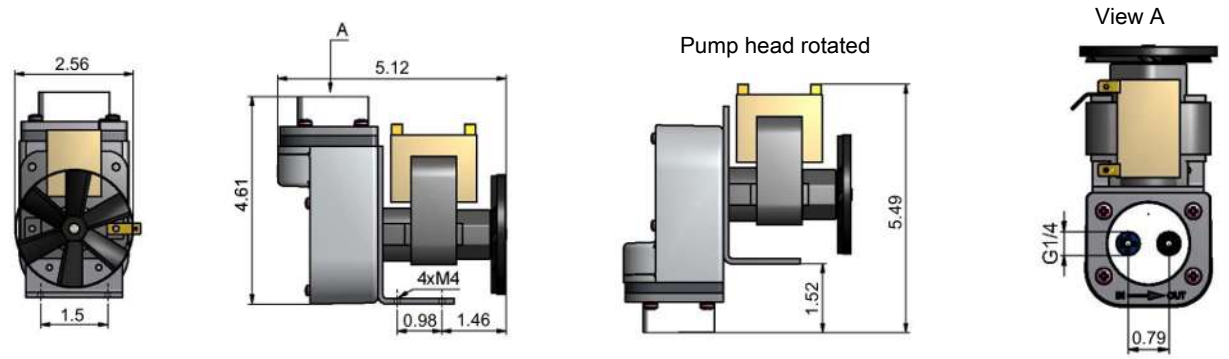
At 60 Hz +10% flow rate

Note: The notices regarding the pressure and flow rates in chapter 5 of the operating instructions (no. 420023) must be observed!

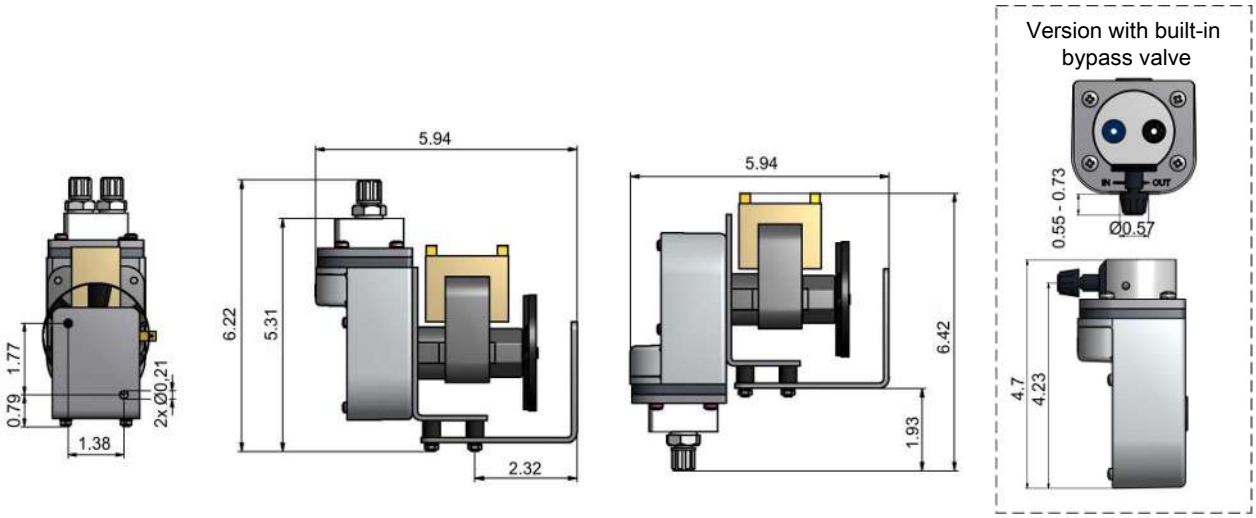
Dimensions P1.3 (115 V / 230 V)

The P1.3 sample gas pump is connected to electricity via blade receptacles..

without accessories:

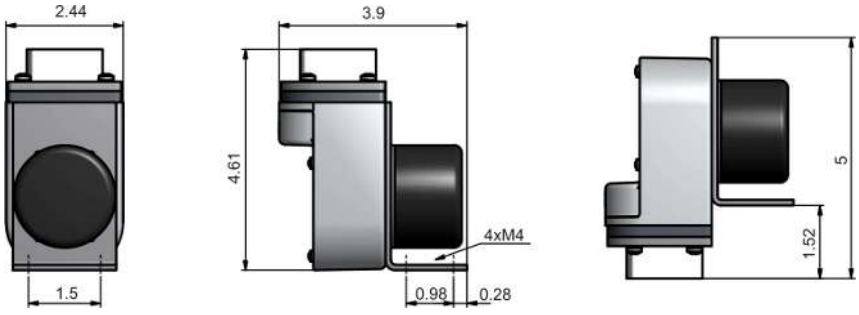


with accessories:



Dimensions P1.3 (24 V DC / 12 V DC)

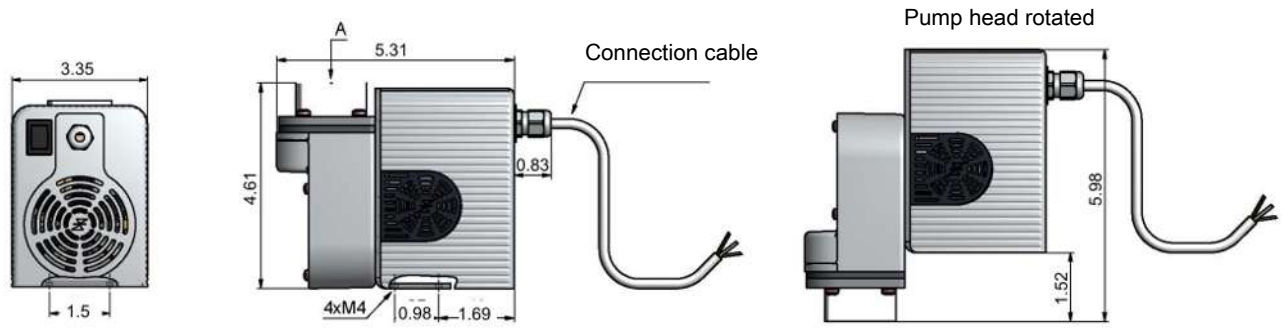
The P1.3 (24 V DC / 12 V DC) sample gas pump may be connected by standard 3 m (9.8 ft) connecting cable.



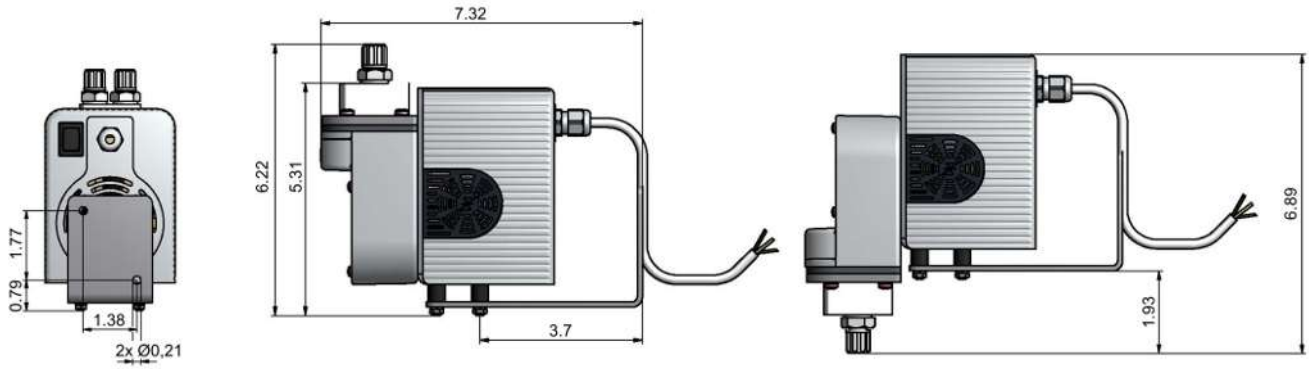
Dimensions P1.3E (all voltages)

The P1.3E sample gas pump may be connected by standard 3 m (9.8 ft) connecting cable.

without accessories:



with accessories:



Ordering instructions

42	xx	x	x	x	1	x	x	x	00	Product feature
										Basic model
	30									P1.3 ATEX, IECEx, US/Canada
										Motor voltage
		1								230 V 50 Hz 0,48 A
		2								115 V 60 Hz 0,84 A
		3								12 V DC 1,55 A (on request)
		4								24 V DC 0,8 A
										Pump head position
			1							Normal position vertical
			2							Turned by 180°
										Pump head material
				1						PTFE
				2						VA (1.4571)
				3						PVDF with bypass valve
				4						PVDF
										Valve material
					1					Up to 70 °C (158 °F); PTFE/PVDF
										Screw in connections (depending on pump head)
						0				without
						1				PVDF DN 4/6 *
						2				PVDF 1/4“-1/6“ *
						3				PVDF 1/4“-1/8“ *
						5				VA (1.4401) 6 mm **
						6				VA (1.4401) 1/4“ **
										Mounting accessories
							0			without
							1			Mounting bracket and set of vibration dampers
							2			Set of vibration dampers only
										Housing
								0		without
								1		Housing incl. 3 m connection cable

* PTFE or PVDF pump body only.

** VA pump body only.

Sample gas pumps P 2.3, P 2.3C, P 2.83, P 2.4, P 2.4C, P 2.84

Gas analysis is key for safe and efficient system operation in the chemical industry, petrochemistry or biochemistry. Many of the analysis processes used in these fields require sample gas extraction and conditioning.

Sample gas pumps convey the sample gas from the sampling point to the conditioning system. The main item in these pumps designed specifically for the application is the PTFE single-piece bellow. Combined with the pump head, also single-piece, this solution provides high resistance against particularly aggressive sample gas. Turning the pump head allows gas with condensate to be conveyed without a problem.

- Simple, sturdy construction
- Easy to replace valves
- Single-piece bellows
- Conveys sample gas with condensate
- Long life
- Atex versions (see separate data sheet)
- Low noise emission
- 115 V - versions with FM C-US approval
- C-versions specifically for conveying flammable gasses
- Bypass valve for PTFE and VA pump body

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
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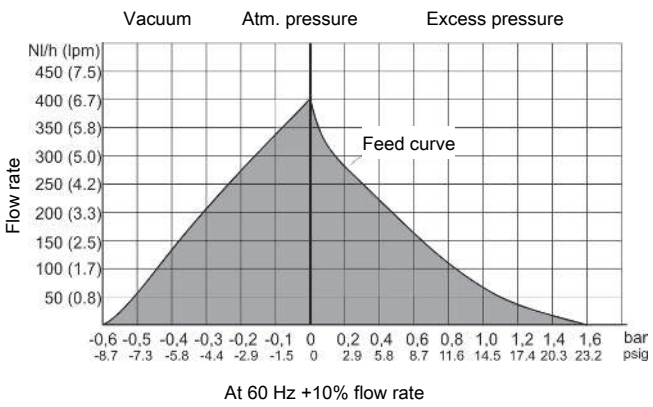
Internet: www.buhlertech.com

General specifications for all pumps

General Specifications	
Nominal voltage:	see ordering information
Protection class:	electric IP55 mechanical IP20
Dead volume:	0.5 cu.in.
Materials of parts in contact with media by pump type:	PTFE / PVDF (standard pump with 212 °F valves) + PEEK (standard pump with 320 °F valves) + Viton (standard pump with 212 °F valves and bypass valve) + PCTFE, Viton (standard pump with 320 °F valves and bypass valve) + 1.4571 (VA pump body) + 1.4401, Viton (VA pipe fitting) + Viton (VA pump body with bypass valve)

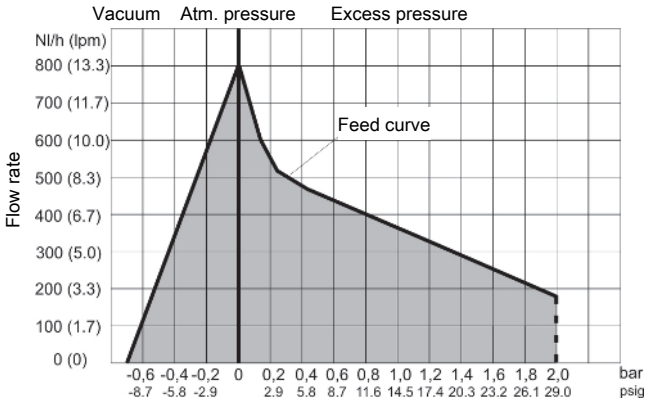
Feed Curves

P2.3, P2.3C, P2.4, P2.4C



At 60 Hz +10% flow rate

P2.83, P2.84



At 60 Hz +10% flow rate

P2.3 and P2.83 Pump Models

For easier installation, the P2.3 and P2.83 pumps include a mounting bracket with rubber mounting.

The pump head can optionally be ordered with adjustable bypass valve.

The difference between the P2.3 and P2.83 is the flow rate. The P2.3 pump has a capacity of 400 L/h (6.7 lpm) free flow and the P2.83 has a capacity of 800 L/h (13.3 lpm) free flow.

The P2.3 and P2.83 pumps are not suitable for use in explosive areas. The corresponding types for use in explosive areas are P2.2 ATEX (data sheet 420009), P2.2 AMEX and P2.82 AMEX (data sheet 420012), or US-P2.6Ex (data sheet 420005).

Technical data for P2.3 and P2.83

P2.3/P2.83 Technical Data	
Weight:	approx. 14.3 lb
FM C-US (115 V only) FM approval no.:	3038101/3038101C
Ambient temperature:	max. 140 °F
Media temperature:	PTFE/PVDF valves max. 212 °F PTFE/PEEK valves max. 320 °F

P2.4 and P2.84 Pump Models

When installed inside an electric cabinet, wall thicknesses of up to 30 mm can be bridged without additional modifications.

The difference between the P2.4 and P2.84 is the flow rate. The P2.4 pump has a capacity of 400 L/h (6.7 lpm) free flow and the P2.84 has a capacity of 800 L/h (13.3 lpm) free flow.

The P2.4 and P2.84 pumps are not suitable for use in explosive areas. The corresponding types for use in explosive areas are P2.4 ATEX (data sheet 420009), P2.4 AMEX and P2.84 AMEX (data sheet 420012).

Technical data for P2.4 and P2.84

P2.4/P2.84 Technical Data	
Weight:	approx. 15.4 lb
FM C-US (115 V only) FM approval no.:	 3038101/3038101C
Ambient temperature Motor: Pump head:	 max. 140 °F max. 212 °F
Media temperature:	PTFE/PEEK valves max. 320 °F

P2.3C and P2.4C Pump Models

Pump models P2.3C and P2.4C are suitable for conveying flammable gasses in zone 2. The pumps are not suitable for use in explosive areas according to Atex.

Technical data for P2.3C and P2.4C

P2.3C/P2.4C Technical Data	
Weight P2.3 C: P2.4 C:	 approx. 14.3 lb approx. 15.4 lb
Marking:	Ex II 3G/- Ex h IIB T4 Gc
Ambient temperature Motor: Pump head:	 max. 122 °F see table
Medium temperature:	see table

NOTICE! The devices are not suitable for use in explosive areas!

Temperature classes for P2.3C and P2.4C

P 2.3C		Medium temperature
no flammable gasses in the gas circuit		see P2.3/P.283
Flammable gasses in the gas circuit above the LEL	T3	248 °F
	T4	122 °F

P 2.4C		Medium temperature	Pump head temperature
no flammable gasses in the gas circuit		see P2.4/P2.84	
Flammable gasses in the gas circuit above the LEL	T3	212 °F	176 °F
	T4	122 °F	122 °F

P2.3, P2.4, P2.83, P2.84 Ordering instructions

42	xx	x	x	x	x	x	9	0	0	0	Product characteristic	
											Base model	
	56										P2.3 400 L/h (direct operation without intermediate flange)	
	57										P2.4 400 L/h (with intermediate flange)	
	63										P2.83 800 L/h (direct operation without intermediate flange)	
	64										P2.84 800 L/h (with intermediate flange)	
											Motor voltage	
		1									230 V 50/60 Hz; 0,78/0,86 A	
		2									115 V 50/60 Hz; 1,56/1,72 A	
		5									400 V 50 Hz; 0,52 A	
											Pump head position	
			1								Normal position vertical	
			2								turned by 180° [1]	
											Pump body material	
				1							PTFE	
				2							Stainless steel 1.4571	
				3							PTFE with bypass valve [1]	
				4							Stainless steel 1.4571 with bypass valve [1]	
											Valve material	
					1						up to 100 °C; PTFE/PVDF [2]	
					2						up to 160 °C; PTFE/PEEK	
											Screw-in connections (for 230 V and 400 V voltage)	
											PTFE Pump body	**Stainless steel pump body**
						9					DN 4/6 (Standard)	6 mm (Standard)
						1					DN 6/8	8 mm
						2					3/8"-1/4"	3/8"
						3					1/4"-1/8"	
						4					1/4"-1/6"	1/4"
											Screw-in connections (for 115 V voltage)	
											PTFE Pump body	**Stainless steel pump body**
						9					1/4"-1/6" (Standard)	1/4" (Standard)
						1					DN 6/8	8 mm
						2					3/8"-1/4"	3/8"
						3					1/4"-1/8"	
						5					DN 4/6	6 mm
											Mounting accessories	
							9				incl. mounting bracket and bumper [1]	

[1] not for P2.4 & P2.84.

[2] not for P2.4, P2.83 & P2.84.

P2.3C, P2.4C Ordering instructions

42	xx	x	x	x	x	x	9	0	00	Product characteristic	
										Base model	
	52									P2.3C 400 l/h (II 3G/- Ex h IIB T4 Gc) (direct operation without intermediate flange)	
	53									P2.4C 400 l/h (II 3G/- Ex h IIB T4 Gc) (with intermediate flange)	
										Motor voltage	
		1								230 V 50/60 Hz; 0,78/0,86 A	
		2								115 V 50/60 Hz; 1,56/1,72 A	
		5								400 V 50 Hz; 0,52 A	
										Pump head position	
			1							Normal position vertical	
			2							turned by 180° *	
										Pump body material	
				1						PTFE	
				2						Stainless steel 1.4571	
				3						PTFE with bypass valve *	
				4						Stainless steel 1.4571 with bypass valve *	
										Valve material	
					1					up to 100 °C; PTFE / PVDF *	
					2					up to 160 °C; PTFE / PEEK	
										Screw-in connections (for 230 V and 400 V voltage)	
										PTFE Pump body	**Stainless steel pump body**
						9				DN 4/6 (Standard)	6 mm (Standard)
						1				DN 6/8	8 mm
						2				3/8"-1/4"	3/8"
						3				1/4"-1/8"	
						4				1/4"-1/6"	1/4"
										Screw-in connections (for 115 V voltage)	
										PTFE Pump body	**Stainless steel pump body**
						9				1/4"-1/6" (Standard)	1/4" (Standard)
						1				DN 6/8	8 mm
						2				3/8"-1/4"	3/8"
						3				1/4"-1/8"	
						5				DN 4/6	6 mm
										Mounting accessories	
							9			incl. mounting bracket and bumper *	

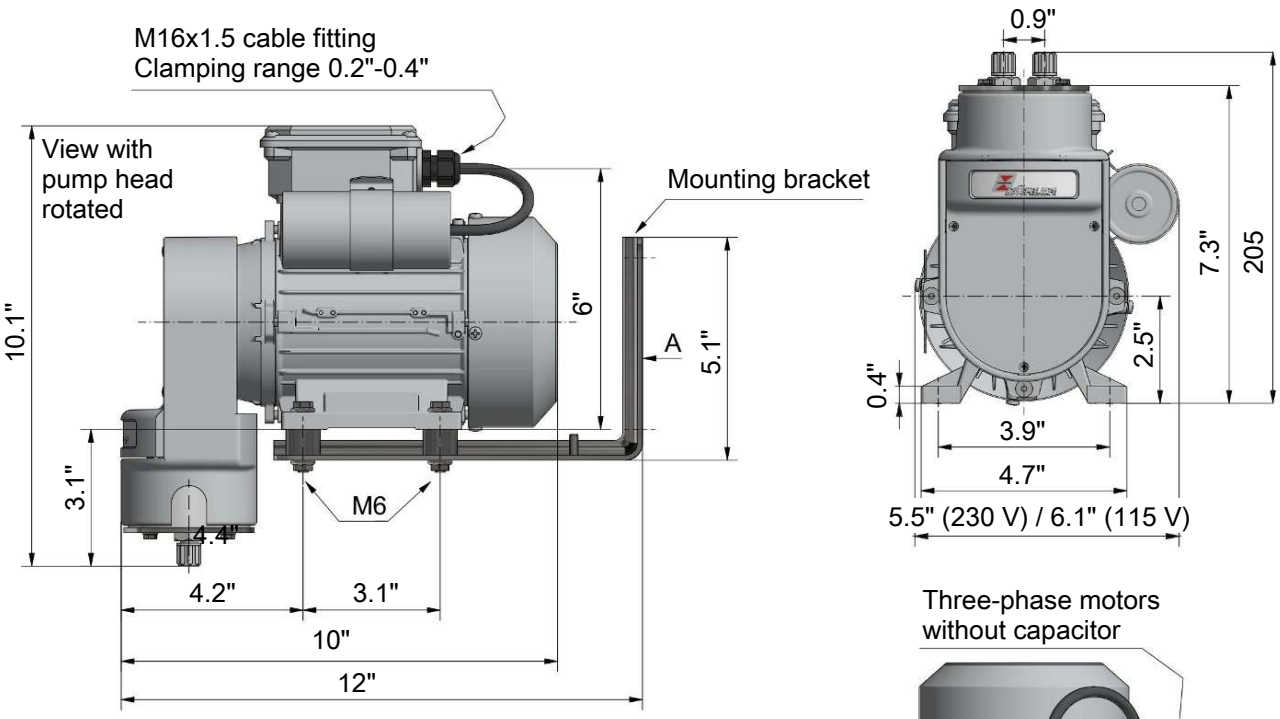
*not applicable to 2.4C

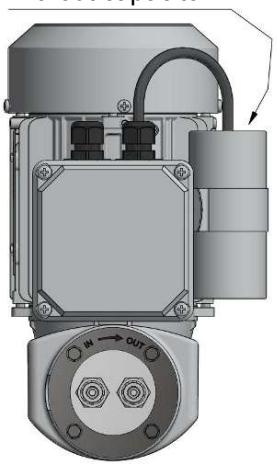
Ordering example

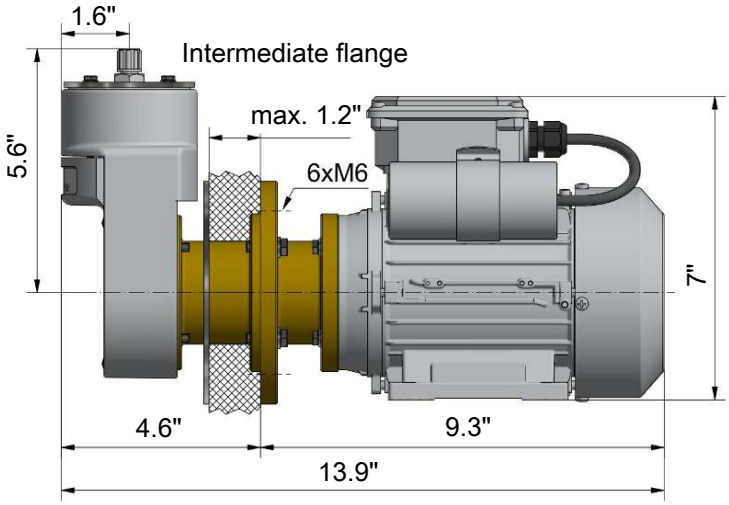
Item no.: 42 63 1112 99 000

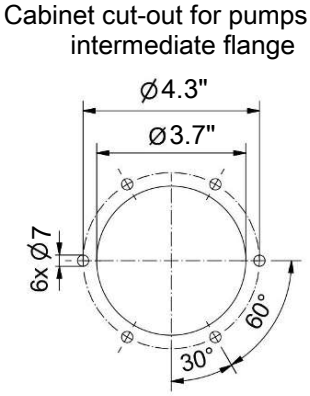
63	for 800 litre P2.83 pump
1	for 230V 50/60Hz motor
1	for pump head in normal position
1	PTFE pump head
2	for 160 °C valves
9	for DN4/6 screw-in connection
9	includes mounting bracket and bumpers

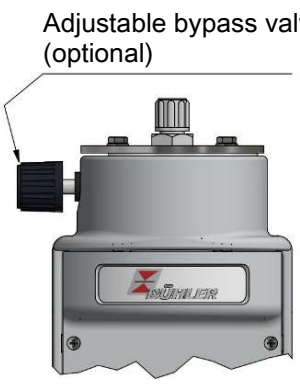
Dimensions

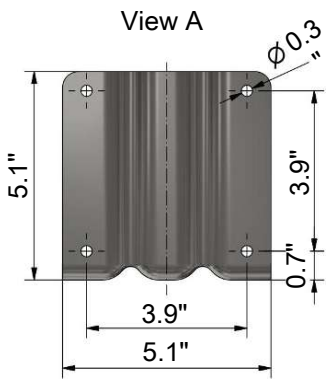












Installation notices:
1) This pump should be installed horizontally
2) If necessary, rotate the pump head during installation. When conveying gasses with condensate content it must be installed valves down.

Sample gas pumps P 4.3, P 4.83

Gas analysis is key for safe and efficient system operation in the chemical industry, petrochemistry or biochemistry. Many of the analysis processes used in these fields require sample gas extraction and conditioning.

Sample gas pumps convey the sample gas from the sampling point to the conditioning system. The main item in these pumps designed specifically for the application is the PTFE single-piece bellow. Combined with the pump head, also single-piece, this solution provides high resistance against particularly aggressive sample gas. Turning the pump head allows gas with condensate to be conveyed without a problem.

- Simple, sturdy construction
- Easy to replace valves
- Adjustable bypass valve (optional)
- Single-piece bellows
- Conveys sample gas with condensate
- Long life
- Low noise emission
- 115 V - versions with FM C-US approval
- Mounting bracket and rubber mounting standard
- Bypass valve for PTFE and VA pump body

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Phone: 248.652.1546, Fax: 248.652.1598
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Internet: www.buhlertech.com

P4.3 and P4.83 Pump Models

For easier installation, the P4.3 and P4.83 pumps include a mounting bracket with rubber mounting. The pump head can optionally be ordered with adjustable bypass valve (not applicable with parallel operation).

The difference between the P4.3 and P4.83 is the flow rate. The P4.3 pump has a capacity of 2 x 400 L/h (1.76 gpm) free flow and the P4.83 has a capacity of 2 x 800 L/h (3.52 gpm) free flow.

The P4.3 and P4.83 pumps are not suitable for use in explosive areas.

Connecting the two gas paths with the optional piping or tubing kit significantly increases the flow rate.

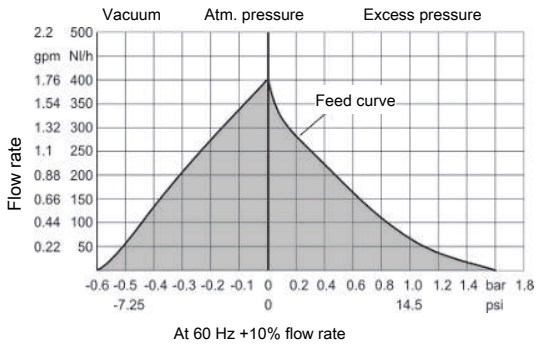
Technical Data

P4.3/P4.83 Technical Data

Nominal voltage:	see ordering information
Nominal current:	see ordering information
Protection class:	electric IP55 mechanical IP20
Weight:	approx. 27.6 lb
Dead volume:	2 x 0.5 cu.in.
FM C-US (115 V only) FM approval no.:	3038101/3038101C
Ambient temperature:	max. 140 °F
Media temperature:	PTFE/PVDF valves max. 212 °F PTFE/PEEK valves max. 320 °F
Materials of parts in contact with media by pump type:	PTFE / PVDF (standard pump with 212 °F valves) + PEEK (standard pump with 320 °F valves) + Viton (standard pump with 212 °F valves and bypass valve) + PCTFE, Viton (standard pump with 320 °F valves and bypass valve) + 1.4571 (VA pump body) + 1.4401, Viton (VA pipe fitting) + Viton (VA pump body with bypass valve)

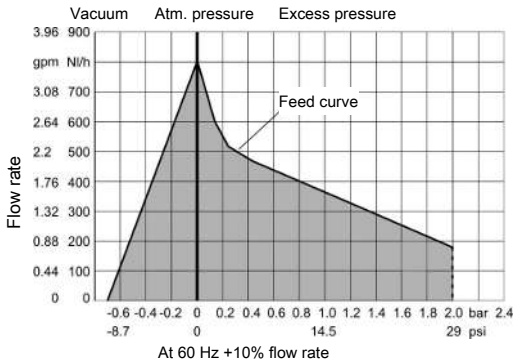
Feed Curves

P4.3 (per head)



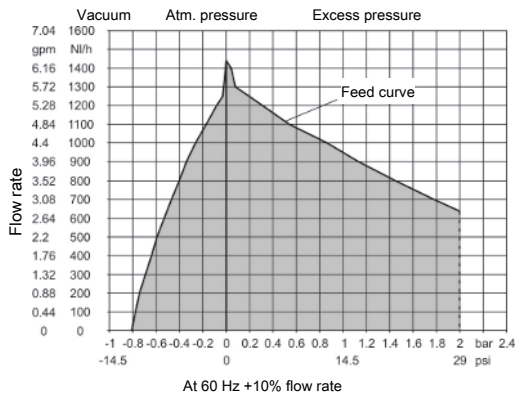
At 60 Hz +10% flow rate

P4.83 (per head)



At 60 Hz +10% flow rate

P4.83 (parallel circuit)



At 60 Hz +10% flow rate

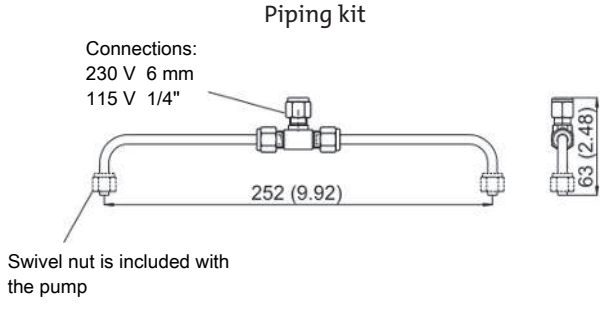
Ordering instructions

42	xx	x	x	x	x	x	9	0	0	0	Product characteristic	
											Base model	
	80										P4.3, 2 x 400 L/h	
	81										P4.83, 2 x 800 L/h	
											Motor voltage	
		1									230 V 50/60 Hz; 1,4/1,2 A	
		2									115 V 50/60 Hz; 2,4/2,2 A	
											Pump head position	
			1								Normal position vertical	
			2								turned by 180°	
											Pump body material	
				1							PTFE	
				2							Stainless steel 1.4571	
				3							PTFE with bypass valve [1]	
				4							Stainless steel 1.4571 with bypass valve [1]	
											Valve material	
					1						up to 100°C; PTFE/PVDF [2]	
					2						up to 160°C; PTFE/PEEK	
											Screw-in connections (for 230 V voltage)	
											PTFE Pump body	**Stainless steel pump body**
						9					DN 4/6 (Standard)	6 mm (Standard)
						1					DN 6/8	8 mm
						2					3/8"-1/4"	3/8"
						3					1/4"-1/8"	
						4					1/4"-1/6"	1/4"
											Screw-in connections (for 115 V voltage)	
											PTFE Pump body	**Stainless steel pump body**
						9					1/4"-1/6" (Standard)	1/4" (Standard)
						1					DN 6/8	8 mm
						2					3/8"-1/4"	3/8"
						3					1/4"-1/8"	
						5					DN 4/6	6 mm
											Mounting accessories	
							9				incl. mounting bracket and bumpers	
											Connection kit for parallel operation	
								0			without	
								1			Tubing kit PVDF/PTFE [3]	
								2			Piping kit 1.4571/1.4401 [3]	

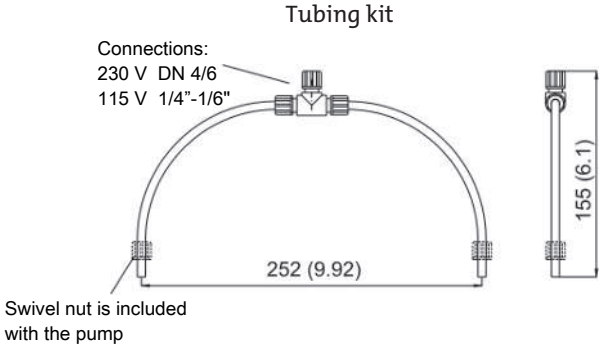
[1] not with parallel operation.
[2] not P4.83.
[3] P4.83 only.

Dimensions piping kit/tubing kit for P4.83 with parallel operation

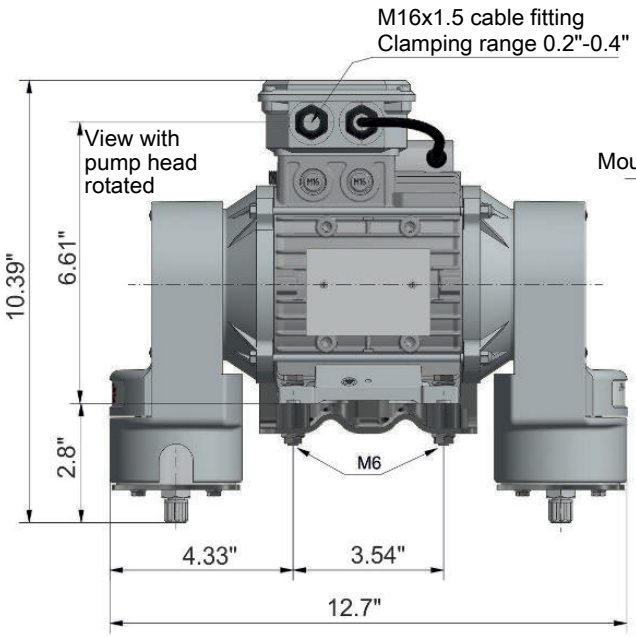
Piping kit

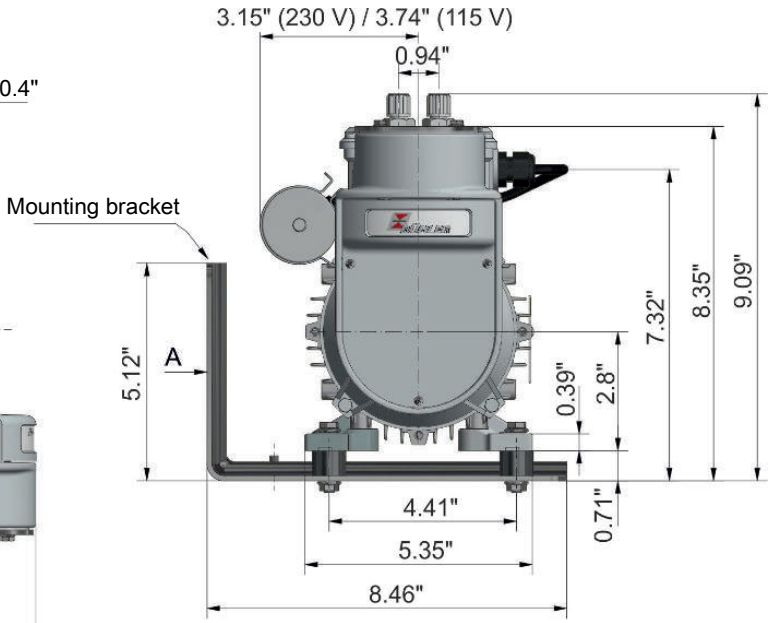


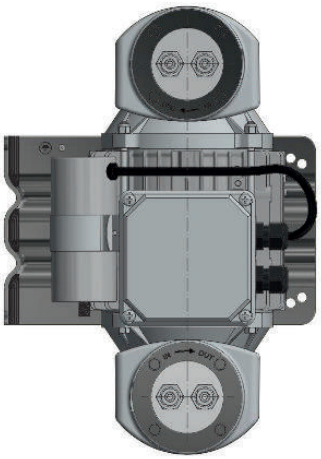
Tubing kit

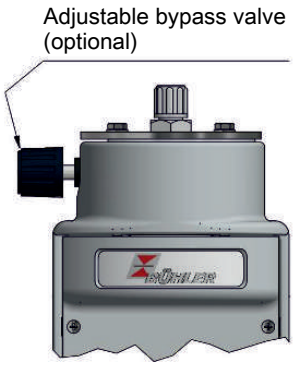


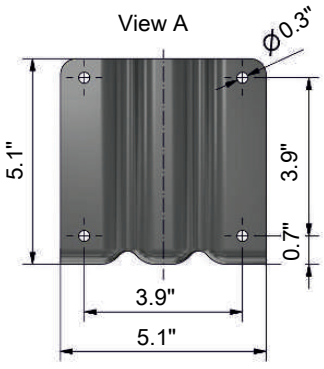
Dimensions











Installation notices:
1) This pump should be installed horizontally
2) If necessary, rotate the pump head during installation. When conveying gasses with condensate content it must be installed valves down.

Sample gas pumps P2.x ATEX

Even in explosive systems in the chemical industry, petrochemistry or biochemistry, gas analysis is key for safe operation. Many of the analysis processes used in these fields require extracting and special conditioning of the sample gas.

Sample gas pumps convey the sample gas from the sampling point to the conditioning system. The main item in these specially designed pumps is the PTFE single-piece bellow. Combined with the pump head, also single-piece, this solution provides high resistance against particularly aggressive sample gas. Turning the pump head allows gas with condensate to be conveyed without a problem.

There are several different models with separate drive, depending on the requirements. These versions allow the installation of a coupling flange to install the pump heads inside heated housings away from the motor whilst the motor remains outside the housing.

The series are available for various EX hazard and classification zones with flow rates up to 700 l/h (11.7 lpm).

- **Easy, sturdy set-up**
- **Easy to replace valves**
- **Single-piece bellows**
- **For aggressive sample gas**
- **Conveys sample gas with condensate**
- **Long life**
- **Pump head with optional adjustable bypass valve**
- **Bypass valve for PTFE and VA pump body**
- **Low noise emission**
- **With mounting bracket**
- **ATEX versions category 2**

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Pump Overview

	Direct-drive pumps		Pumps with intermediate flange	
Flow rate (see flow curve)	**6.7 lpm**	**11.7 lpm**	**6.7 lpm**	**11.7 lpm**
ATEX models II 2G Ex h IIC T3/T4 Gb X	P2.2 ATEX		P2.4 ATEX	
ATEX models II 2G Ex h IIC T3 Gb X		P2.72 ATEX		P2.74 ATEX

P2.2/P2.4 ATEX technical data

Technical data	
Nominal voltage:	see ordering information
Marking:	II 2G Ex h IIC T3/T4 Gb X
IP rating:	electrical IP65 mechanical IP20
Dead volume:	0.5 cu.in.
Weight:	approx. 16.5 lb (P 2.2 ATEX) approx. 18.7 lb (P 2.4 ATEX)
Materials in contact with media varies by configuration:	PTFE, PVDF (standard pump with 212 °F valves) + PEEK (standard pump with 284 °F valves) + FKM (standard pump with 212 °F valves and bypass valve) + PCTFE, FKM (standard pump with 284 °F valves and bypass valve) + 1.4571 (VA pump body) + 1.4401, FKM (VA pipe fittings) + FKM (VA pump body with bypass valve)

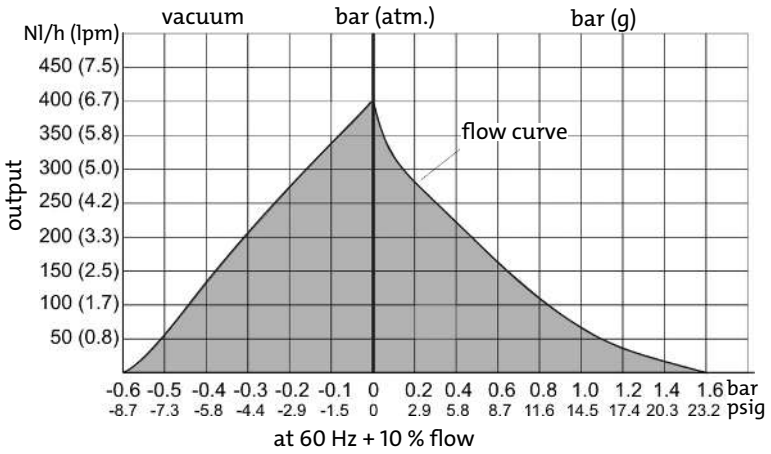
The following table describes the temperature characteristics and the resulting limits for the permissible operation of the sample gas pumps. The temperature classes apply both to the gas in the installation area (zone) and to the explosive pumped medium in the gas path:

		P2.2			**P2.4**	
Temperature class	Motor ambient temperature	Pump head ambient temperature	Media temperature [1]		Pump head ambient temperature [1]	Media temperature [1]
			without bypass valve	with bypass valve		
T3	-4 °F to 122 °F	max. 122 °F	max. 284 °F	max. 275 °F [2]	max. 212 °F	max. 284 °F
T4			max. 194 °F	max. 185 °F	max. 194 °F	max. 194 °F

[1] Due to the maximum continuous operating temperature of the factory-installed plastic screw-in fittings, the maximum permitted media and ambient temperature for these versions is limited to ≤ 176 °F for pumps without a bypass valve and ≤ 167 °F for pumps with a bypass valve.

[2] At a media temperature of > 185 °F, operation with a bypass valve is only permitted in the stainless steel version.

Feed curve 6.7 lpm



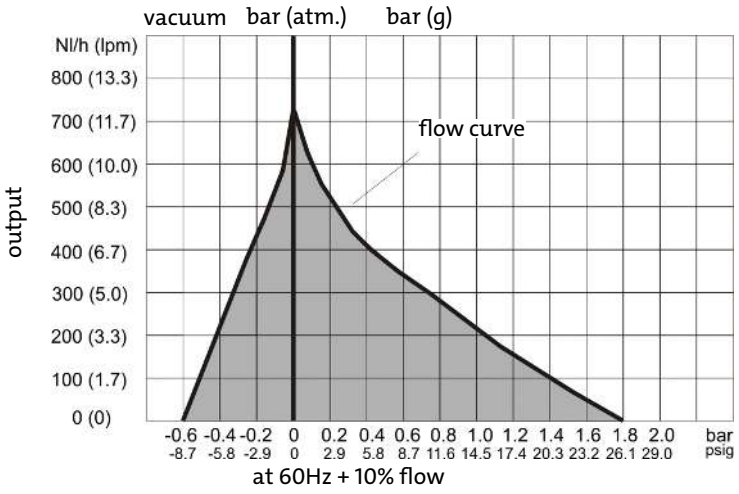
Technical Data P2.72/P2.74 ATEX

Technical data	
Nominal voltage:	see ordering information
Marking:	II 2G Ex h IIC T3 Gb X
IP rating:	electrical IP65 mechanical IP20
Dead volume:	0.5 cu.in.
Weight:	approx. 16.5 lb (P 2.72 ATEX) approx. 18.7 lb (P 2.74 ATEX)
Materials in contact with media:	PTFE, PEEK, 1.4571 (used in all models) + FKM (bypass valve) + 1.4401, FKM (VA pipe fitting)

The following table describes the temperature characteristics and the resulting limits for the permissible operation of the sample gas pumps. The temperature class applies both to the gas in the installation area (zone) and to the explosive pumped medium in the gas path:

		P2.72			P2.74	
Temperature class	Motor ambient temperature	Pump head ambient temperature	Media temperature		Pump head ambient temperature	Media temperature
			without bypass valve	with bypass valve		
T3	-4 °F to 122 °F	max. 122 °F	max. 221 °F	max. 221 °F	max. 212 °F	max. 221 °F

Flow curve 11.7 lpm



Important motor notices

Motors used in EX areas require a protection device!

Installing the motor protection switch outside the EX area

Motor voltage		Item no.
7 = 230 V 50/60 Hz	0,7 - 1 A	9132020041
8 = 115 V 50/60 Hz	1,4 - 2 A	9132020057
9 = 380-420 V 50 Hz	0.45 – 0.63 A	9132020055
0 = 500 V 50 Hz	0.35 – 0.5 A	9132020071

Installing the motor protection switch inside the EX area Zone 1 or 2 (ATEX only)

Motor voltage		Item no.
7 = 230 V 50/60 Hz	0,63 - 1 A	9132020036
8 = 115 V 50/60 Hz	1.6 - 2.5 A	9132020033
9 = 380-420 V 50 Hz	0.4 – 0.63 A	9132020073
0 = 500 V 50 Hz	0.25 – 0.4 A	9132020074

Information about the versions

Pump head position (only P2.2 ATEX and P2.72 ATEX):

If the gas contains condensate, the pump head must be installed rotated by 180°. In this case, turn the pump head as described in the operating instructions. Please note the correct pump head position for your application when placing your order to avoid conversion.

Pump head material:

The standard material is PTFE.

The pump head may be fitted with a bypass valve (P 2.2 ATEX and P2.72 ATEX only) to reach all the values in the grey area of the flow curve. Depending on the inlet and outlet pipe style, a stainless steel pump body may be ordered.

Valve material (P2.2 ATEX models only):

PTFE/PVDF valves must be used for unheated applications with a medium temperature up to max. 212 °F. For higher temperatures up to 284 °F, use the appropriate PTFE/PEEK valves. Please note, the max. temperatures are limited by the temperature classes (see Technical Data).

Ordering instructions P2.2/P2.4 ATEX

42	xx	x	x	x	x	x	9	0	0	0	Product characteristics	
											Base model	
	61										P2.2 ATEX 6.7 lpm (direct operation without intermediate flange)	
	62										P2.4 ATEX 6.7 lpm (with intermediate flange)	
											Motor voltage	
		7									230 V 50/60 Hz; 0.78/0.86 A	
		8									115 V 50/60 Hz; 1.56/1.72 A	
		9									380–420 V 50 Hz; 0.46 A	
		0									500 V 50 Hz; 0.36 A	
											Pump head position	
			1								Normal position vertical	
			2								turned by 180° [1]	
											Pump body material	
				1							PTFE	
				2							Stainless steel 1.4571	
				3							PTFE with bypass valve [1]	
				4							Stainless steel 1.4571 with bypass valve [1]	
											Valve material	
					1						up to 212 °F; PTFE/PVDF [1]	
					2						up to 284 °F; PTFE/PEEK	
											Screw-in connections (depending on pump body)	
											PTFE pump body	**Stainless steel pump body**
						9					DN 4/6 (standard)	6 mm (standard)
						1					DN 6/8	8 mm
						2					3/8"–1/4"	3/8"
						3					1/4"–1/8"	
						4					1/4"–1/6"	1/4"
											Mounting accessories	
							9				incl. mounting bracket and bumpers [1]	

[1] not possible with P2.4 ATEX.

Ordering instructions P2.72/P2.74 ATEX

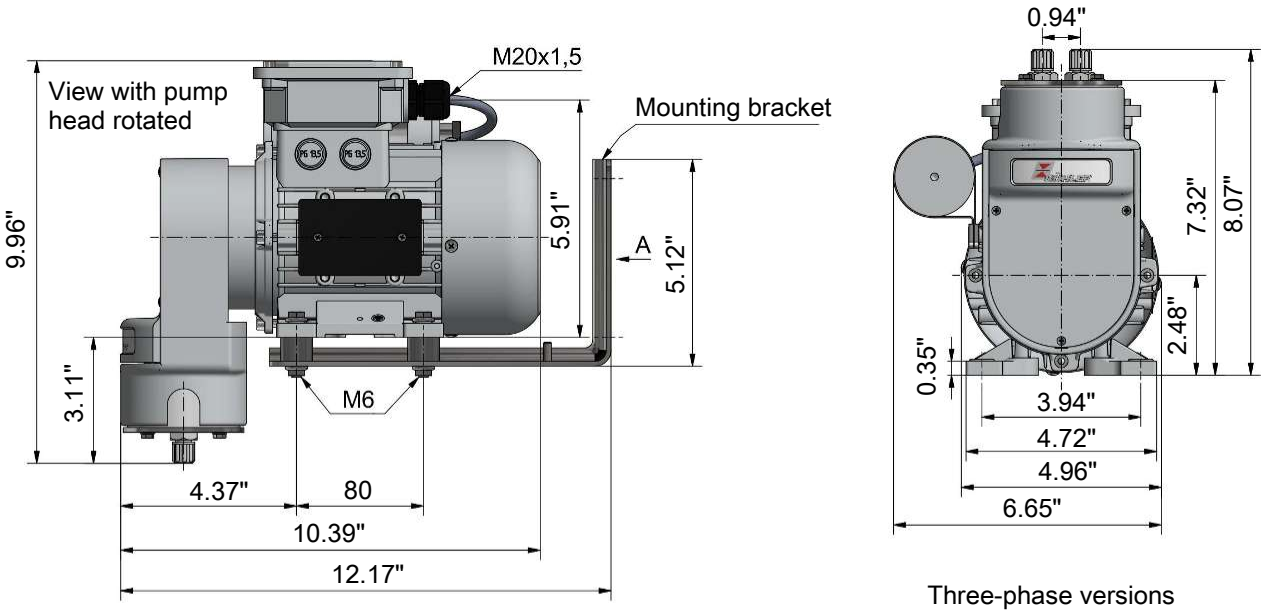
42	xx	x	x	x	x	x	9	0	0	0	Product characteristics
											Base model
	65										P2.72 ATEX 11.7 lpm (direct operation without intermediate flange)
	66										P2.74 ATEX 11.7 lpm (with intermediate flange)
											Motor voltage
		7									230 V 50/60 Hz; 0.78/0.86 A
		8									115 V 50/60 Hz; 1.56/1.72 A
		9									380–420 V 50 Hz; 0.46 A
		0									500 V 50 Hz; 0.36 A
											Pump head position
			1								Normal position vertical
			2								turned by 180° [1]
											Pump body material
				2							Stainless steel 1.4571
				4							Stainless steel 1.4571 with bypass valve [1]
											Valve material
					2						up to 284 °F; PTFE/PEEK
											Screw-in connections
						9					6 mm (standard)
						1					8 mm
						2					3/8"
						4					1/4"
											Mounting accessories
							9				incl. mounting bracket and bumpers [1]

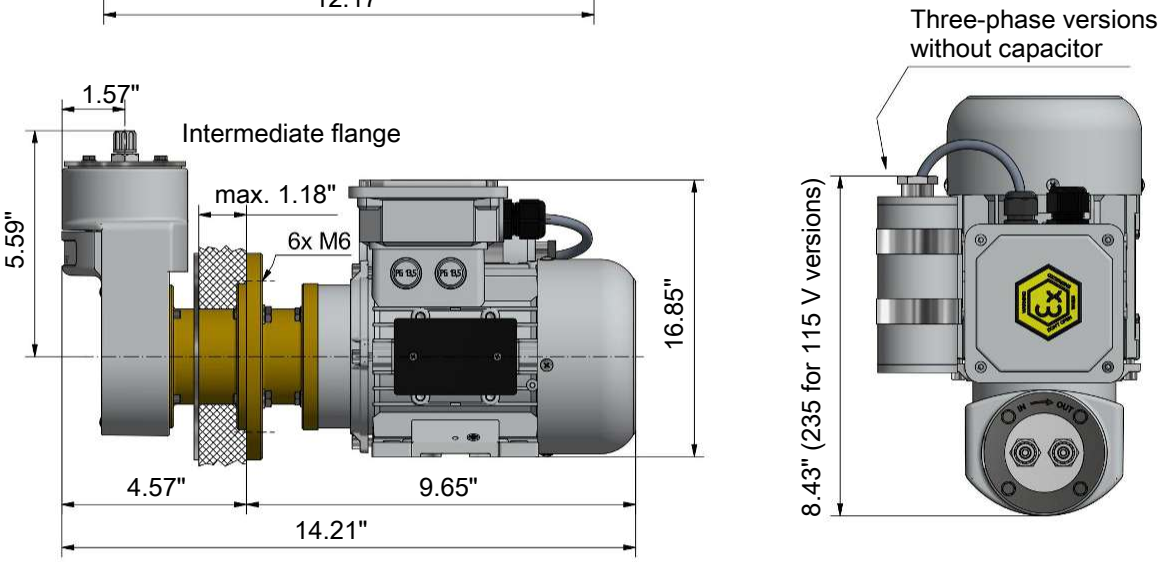
[1] not possible with P2.74 ATEX.

Dimensions

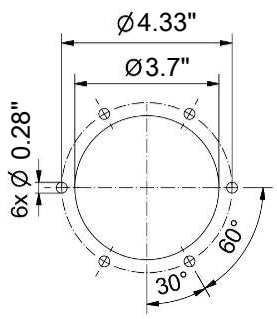
P2.2 ATEX, P2.72 ATEX – standard versions

P2.4 ATEX, P2.74 ATEX – versions with intermediate flange



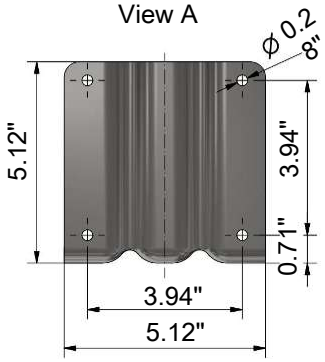


Cabinet cut-out for pumps with intermediate flange



Adjustable bypass valve (optional)

View A



Installation notices:
1) This pump should be installed horizontally
2) If necessary, rotate the pump head during installation. When conveying gasses with condensate content it must be installed valves down.

Sample gas pumps P2.x ATEX-H2/-O2

Green hydrogen produced by electrolysis using renewable energy sources is the key to a sustainable, emission-free future in the energy industry. Our specially developed P2.x ATEX-H2/-O2 sample gas pumps are the ideal solution for reliable gas conditioning in the analysis of hydrogen (H_2) and oxygen (O_2).

In order to ensure safe operation in electrolysis systems, things such as LEL monitoring are of utmost importance. Our sample gas pumps offer reliable, tried-and-tested performance for your process: With high-quality, suitability-tested materials and processing adapted for the needs of either high-purity hydrogen or oxygen, our gas pumps are equipped for the high demands of gas analytics in the electrolyser.

As well as material-refining measures to prevent hydrogen-induced component damage, the products in the H_2 series are subjected to a leak test using helium. Special cleaning processes are used on sample gas pumps for O_2 to remove particles, oils and grease. The contamination limits are based on the internationally used and applicable guideline EIGA Doc 33/18 “Cleaning of Equipment for Oxygen Service”.

For applications with high-purity hydrogen or oxygen
Leak tests using helium are performed on the H_2 variant as standard
Transporting sample gas containing condensate (pump head rotated by 180°)
Cleaning standard complies with EIGA Doc 33/18 as regards the absence of particles, oils and fats (O_2 variant)
Suitability-tested materials for high H_2 and O_2 concentrations
All plastics in contact with media are BAM-tested (O_2 variant)
Produced under controlled cleanliness conditions based on VDA Band 19.1 (O_2 variant)
All of the benefits of the standard sample gas pump P2.x ATEX

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Internet: www.buhlertech.com

Pump Overview

	Direct-drive pumps		Pumps with intermediate flange	
Flow rate (see flow curve)	**6.7 lpm**	**11.7 lpm**	**6.7 lpm**	**11.7 lpm**
ATEX models II 2G Ex h IIC T3/T4 Gb X	P2.2 ATEX		P2.4 ATEX	
ATEX models II 2G Ex h IIC T3 Gb X		P2.72 ATEX		P2.74 ATEX

Technical Data P2.x ATEX-H2/-O2

Nominal voltage:	see ordering information
Marking:	II 2G Ex h IIC T3/T4 Gb X (P2.2/P2.4 ATEX) II 2G Ex h IIC T3 Gb X (P2.72/P2.74 ATEX)
IP rating:	electric IP65 mechanical IP20
Dead volume:	8,5 ml
Weight:	approx. 16.5 lb (P2.2/P2.72 ATEX) approx. 18.7 lb (P2.4/P2.74 ATEX)
Materials in contact with media vary by configuration:	PTFE, PEEK, 1.4571 (contained in all models) + FKM (bypass valve) + 1.4401, FKM (VA pipe fittings for H_2 variant) + 1.4401 (VA RT pipe fittings for O_2 variant, BAM-tested PTFE sealing tape required [see accessories])

The following tables describe the temperature characteristics and the resulting limits for the permissible operation of the sample gas pumps. The temperature classes apply to the gas in the installation area (zone) as well as to the explosive medium in the gas path:

Temperature characteristics P2.x ATEX-H2 variants

		P2.2			P2.4	
Temperature class	Ambient temperature motor	Ambient temperature pump head	Media temperature		Ambient temperature pump head	Media temperature
			without bypass valve	with bypass valve		
T3	-4 °F...122 °F	max. 122 °F	max. 284 °F	max. 275 °F	max. 212 °F	max. 284 °F
T4			max. 194 °F	max. 185 °F	max. 194 °F	max. 194 °F

		P2.72			P2.74	
Temperature class	Ambient temperature motor	Ambient temperature pump head	Media temperature		Ambient temperature pump head	Media temperature
			without bypass valve	with bypass valve		
T3	-4 °F...122 °F	max. 122 °F	max. 239 °F	max. 221 °F	max. 212 °F	max. 239 °F

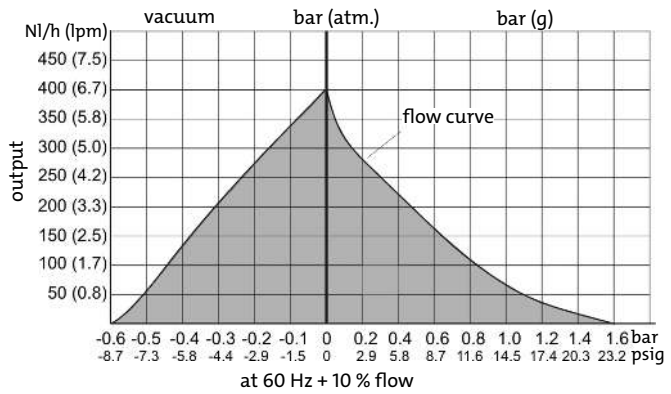
Temperature characteristics P2.x ATEX-O2 variants

		P2.2		P2.4	
Temperature class	Ambient temperature motor	Ambient temperature pump head	Media temperature	Ambient temperature pump head	Media temperature
T3	-4 °F...122 °F	max. 122 °F	max. 167 °F	max. 167 °F	max. 167 °F
T4					

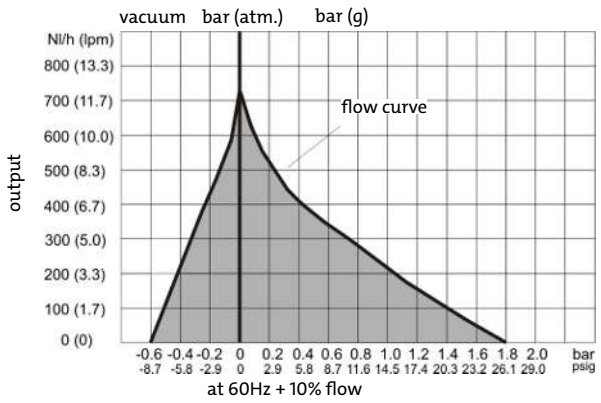
		P2.72/P2.74	
Temperature class	Ambient temperature motor	Ambient temperature pump head	Media temperature
T3	-4 °F...113 °F	max. 113 °F	max. 113 °F

Flow curves

6.7 lpm



11.7 lpm



Important motor notices

Motors used in EX areas require a protection device!

Installing the protective motor switch outside the EX area

Motor voltage		Item no.
7 = 230 V 50/60 Hz	0.7 - 1 A	9132020041
8 = 115 V 50/60 Hz	1.4 – 2 A	9132020057

Installing the protective motor switch in EX area Zone 1 or 2 (ATEX only)

Motor voltage		Item no.
7 = 230 V 50/60 Hz	0.63 – 1 A	9132020036
8 = 115 V 50/60 Hz	1.6 – 2.5 A	9132020033

Information about the versions

Pump head position (P2.2 ATEX and P2.72 ATEX only):

If the gas contains condensate, the pump head must be installed rotated by 180°. In this case, turn the pump head as described in the operating instructions. Please note the correct pump head position for your application when placing your order to avoid conversion.

Pump head material:

The standard material is stainless steel.

The pump head may be fitted with a bypass valve (P2.2 ATEX and P2.72 ATEX only) to reach all the values in the grey area of the flow curve.

Ordering instructions P2.x ATEX-H2/-O2

42	xx	x	x	x	2	x	9	0	0	0	x	Product characteristics	
												Base model	
	61											P2.2 ATEX 6.7 lpm (direct operation without intermediate flange)	
	62											P2.4 ATEX 6.7 lpm (with intermediate flange)	
	65											P2.72 ATEX 11.7 lpm (direct operation without intermediate flange)	
	66											P2.74 ATEX 11.7 lpm (with intermediate flange)	
												Motor voltage	
		7										230 V 50/60 Hz; 0.78/0.86 A	
		8										115 V 50/60 Hz; 1.56/1.72 A	
												Pump head position	
			1									Normal position vertical	
			2									turned by 180° [1]	
												Pump body material	
				2								Stainless steel 1.4571	
				4								Stainless steel 1.4571 with bypass valve [1] [2]	
												Valve material	
					2							PTFE/PEEK [2]	
												Screw-in connections (varies by application)	
												For -H_2 (stainless steel)	**For -O_2 (stainless steel)** [3]
						0						N/A	no screw-in connection
						9						6 mm	6 mm
						1						8 mm	8 mm
						4						1/4"	1/4"
												Mounting accessories	
							9					incl. mounting bracket and bumpers [1]	
												Area of application	
											-H2	optimised for high-purity hydrogen	
											-O2	optimised for high-purity oxygen	

[1] not possible with P2.4 ATEX or P2.74 ATEX.

[2] For O_2version: BAM-tested materials.

[3] With the O_2version, cleaned fittings are enclosed in a separate bag. BAM-tested PTFE sealing tape required [see accessories].

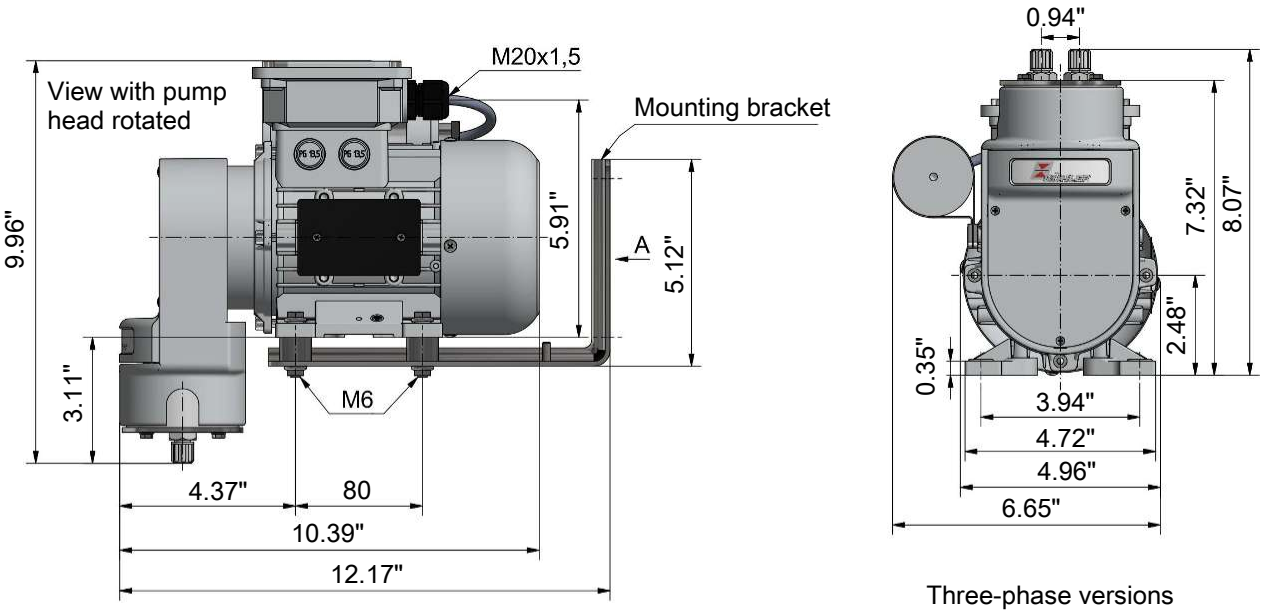
Spare parts and accessories

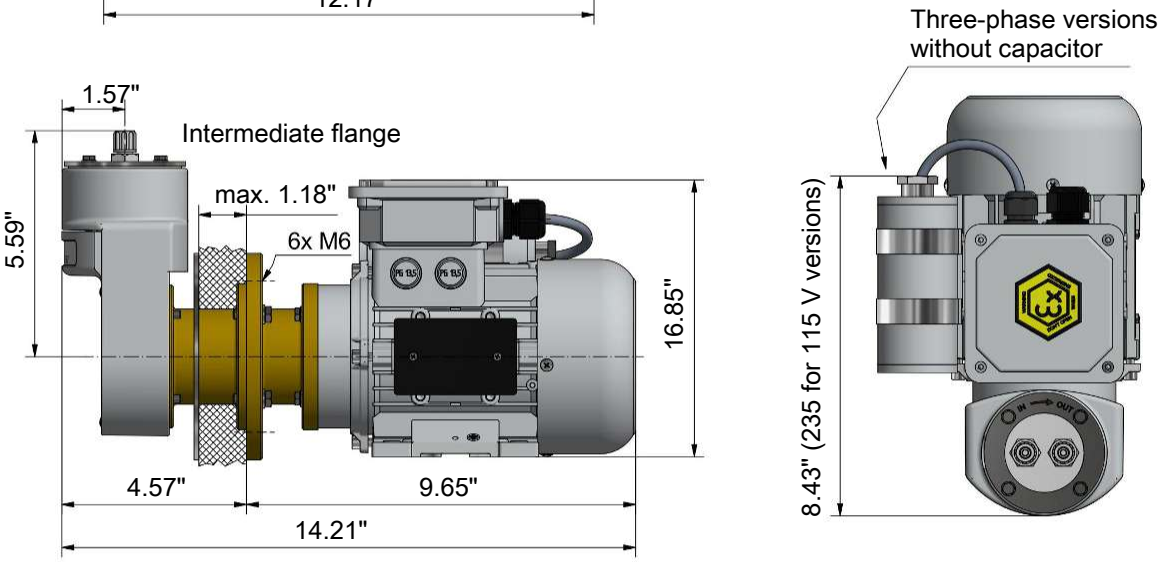
Item no.	Description
9022325	BAM-approved PTFE sealing tape (Roll of 14,8 ft)

Dimensions

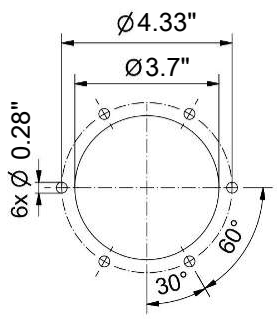
P2.2 ATEX, P2.72 ATEX – standard versions

P2.4 ATEX, P2.74 ATEX – versions with intermediate flange



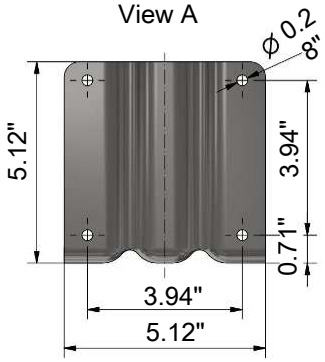


Cabinet cut-out for pumps with intermediate flange



Adjustable bypass valve (optional)

View A



Installation notices:
1) This pump should be installed horizontally
2) If necessary, rotate the pump head during installation. When conveying gasses with condensate content it must be installed valves down.

Sample gas pumps P2.x AMEX

Even in explosive systems in the chemical industry, petrochemistry or biochemistry, gas analysis is key for safe operation. Many of the analysis processes used in these fields require extracting and special conditioning of the sample gas.

Sample gas pumps convey the sample gas from the sampling point to the conditioning system. The main item in these specially designed pumps is the PTFE single-piece bellow. Combined with the pump head, also single-piece, this solution provides high resistance against particularly aggressive sample gas. Turning the pump head allows gas with condensate to be conveyed without a problem.

There are several different models with separate drive, depending on the requirements. These versions allow the installation of a coupling flange to install the pump heads inside heated housings away from the motor whilst the motor remains outside the housing.

The series are available for various EX hazard and classification zones with flow rates up to 800 L/h (13.3 lpm).

- Simple, sturdy construction
- Easy-to-replace valves
- Single-piece bellows
- For aggressive sample gases
- Conveys sample gas with condensate
- Long life
- Pump head with optional adjustable bypass valve
- Bypass valve for PTFE and VA pump body
- Low noise emission
- With mounting bracket
- FM C-US - approval for Class I Div. 2

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e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Pump overview

	Direct-drive pumps		Pumps with intermediate flange	
Flow rate (see flow curve)	**6.7 lpm**	**13.3 lpm**	**6.7 lpm**	**13.3 lpm**
AMEX models (America) NI / I / 2 / BCD / T3, T3C CL.I Div.2 Gr BCD T3, T3C FM C-US approval no.: 3038101 / 3038101C	P 2.2 AMEX	P 2.82 AMEX	P 2.4 AMEX	P 2.84 AMEX

Technical data P2.x AMEX

Nominal voltage:	see ordering information
Marking:	NI / I / 2 / BCD / T3, T3C CL.I Div.2 Gr BCD T3, T3C
IP rating:	electrical IP44 mechanical IP 20
Dead volume:	0.5 cu.in.
Weight:	approx. 16.5 lb (P 2.2 / P 2.82 AMEX) approx. 18.7 lb (P 2.4 / P 2.84 AMEX)
Materials in contact with media varies by configuration:	PTFE, PVDF (standard pump with 212 °F valves) + PEEK (standard pump with 284 °F valves) + FKM (standard pump with 212 °F valves and bypass valve) + PCTFE, FKM (standard pump with 284 °F valves and bypass valve) + 1.4571 (VA pump body) + 1.4401, FKM (VA pipe fittings) + FKM (VA pump body with bypass valve)

The following tables describe the temperature characteristics and the resulting limits for the permissible operation of the sample gas pumps. The temperature classes apply both to the gas in the installation area (zone) and to the explosive pumped medium in the gas path:

		P2.2			P2.4	
Temperature class	Motor ambient temperature	Pump head ambient temperature	Medium temperature [1]		Pump head ambient temperature [1]	Medium temperature [1]
			without bypass valve	with bypass valve		
T3	-4 °F...104 °F	max. 104 °F	max. 284 °F	max. 275 °F [2]	max. 212 °F	max. 284 °F
T3C			max. 194 °F	max. 185 °F	max. 194 °F	max. 194 °F

[1] Particularly in applications with increased ambient or medium temperatures, the corresponding thermal endurance properties of these components must be taken into account when using plastic screw-in fittings. The compression processes inside the pump cause additional temperature increases. The plastic screw-in fittings (PVDF) installed at the factory have a maximum continuous operating temperature of 284 °F.

[2] At a medium temperature of > 185 °F, operation with a bypass valve is only permitted in the stainless steel version.

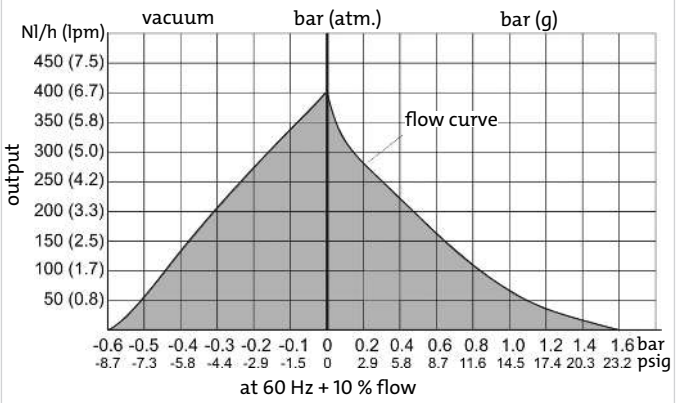
		P2.82			P2.84	
Temperature class	Motor ambient temperature	Pump head ambient temperature	Medium temperature [1]		Pump head ambient temperature [1]	Medium temperature [1]
			without bypass valve	with bypass valve		
T3	-4 °F...104 °F	max. 104 °F	max. 194 °F	max. 158 °F [2]	max. 194 °F	max. 194 °F

[1] Particularly in applications with increased ambient or medium temperatures, the corresponding thermal endurance properties of these components must be taken into account when using plastic screw-in fittings. The compression processes inside the pump cause additional temperature increases. The plastic screw-in fittings (PVDF) installed at the factory have a maximum continuous operating temperature of 284 °F.

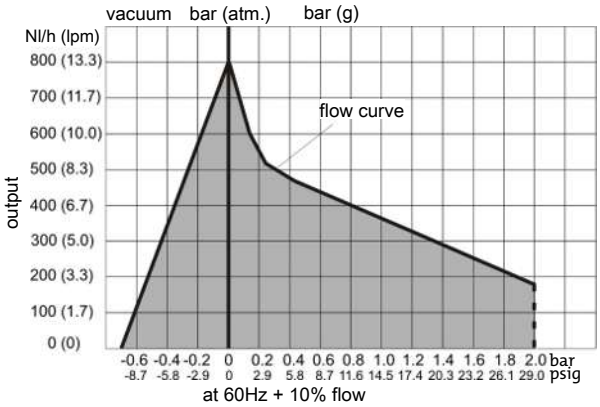
[2] At a media temperature of > 68 °F, operation with a bypass valve is only permitted in the stainless steel version.

Feed curves

6.7 lpm



13.3 lpm



Important motor notices

Motors used in EX areas require a protection device!

Installing the motor protection switch outside the EX area

Motor voltage		Item no.
7 = 230 V 50/60 Hz	0.7 - 1 A	9132020041
8 = 115 V 50/60 Hz	1.4 - 2 A	9132020057

Installing the motor protection switch inside the EX area Zone 1 or 2 (ATEX only)

Motor voltage		Item no.
7 = 230 V 50/60 Hz	0.63 - 1 A	9132020036
8 = 115 V 50/60 Hz	1 – 1.6 A	9132020032

Information about the various designs

Pump head position (P2.2 AMEX and P2.82 AMEX only):

If the gas contains condensate, the pump head must be installed rotated by 180°. In this case, turn the pump head as described in the operating instructions. Please note the correct pump head position for your application when placing your order to avoid conversion.

Pump head material:

The standard material is PTFE.

The pump head may be fitted with a bypass valve (P 2.2 AMEX and P2.82 AMEX only) to reach all the values in the grey area of the flow curve. Depending on the inlet and outlet pipe style, a stainless steel pump body may be ordered.

Valve material (models P2.2 AMEX and P2.82 AMEX only):

PTFE/PVDF valves must be used for unheated applications with a media temperature up to 212 °F. For higher temperatures up to 284 °F, use the respective PTFE/PEEK valves. Please note, the max. temperatures are limited by the temperature classes (see Technical Data).

Ordering instructions

42	xx	x	x	x	x	x	9	0	0	0	Product characteristics	
											Base model	
	71										P2.2 AMEX 6.7 lpm (direct operation without intermediate flange)	
	72										P2.4 AMEX 6.7 lpm (with intermediate flange)	
	73										P2.82 AMEX 13.3 lpm (direct operation without intermediate flange)	
	74										P2.84 AMEX 13.3 lpm (with intermediate flange)	
											Motor voltage	
		7									230 V 50/60 Hz 0.8/0.7 A	
		8									115 V 50/60 Hz 1.6/1.5 A	
											Pump head position	
			1								Normal position vertical	
			2								turned by 180° [1]	
											Pump head material	
				1							PTFE	
				2							Stainless steel 1.4571	
				3							PTFE with bypass valve [1]	
				4							Stainless steel 1.4571 with bypass valve [1]	
											Valve material	
					1						up to 212 °F; PTFE/PVDF [2]	
					2						up to 284 °F; PTFE/PEEK	
											Screw-in connections (depending on pump body)	
											PTFE pump body	**Stainless steel pump body**
						9					1/4"–1/6" (standard)	1/4" (standard)
						1					DN 6/8	8 mm
						2					3/8"–1/4"	3/8"
						3					1/4"–1/8"	
						5					DN 4/6	6 mm
											Mounting accessories	
							9				incl. mounting bracket and bumpers [1]	

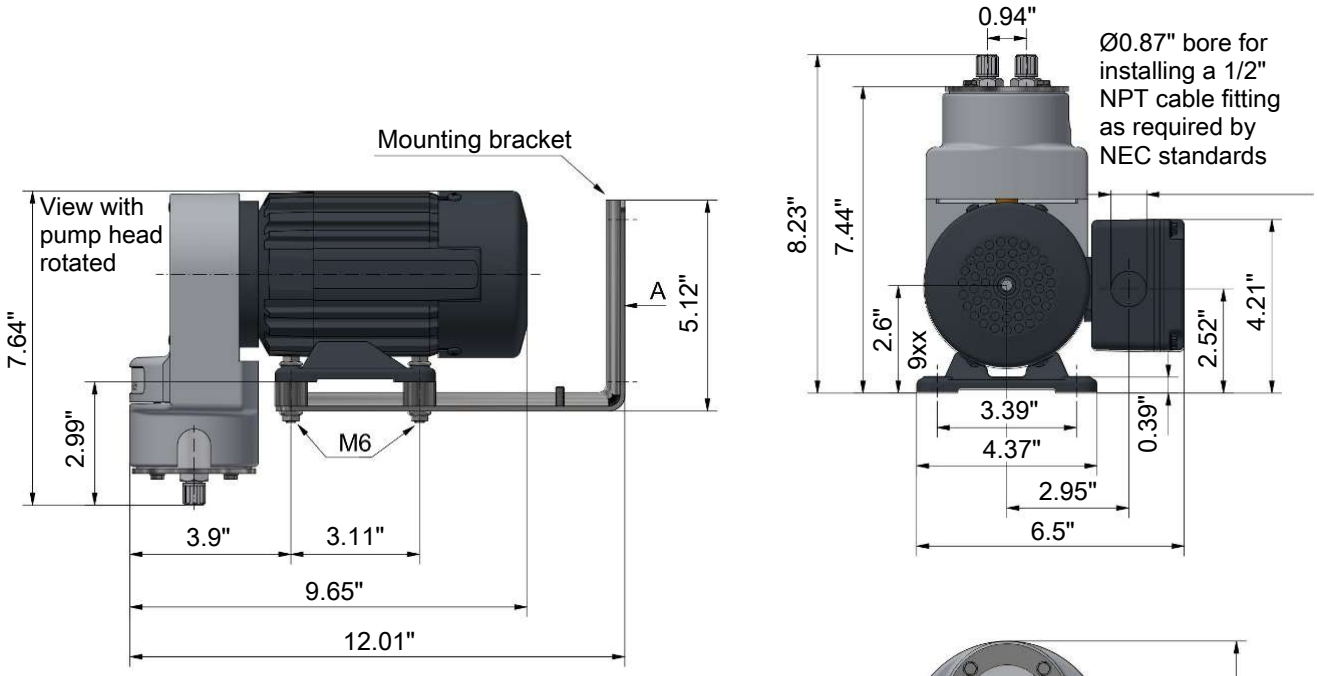
[1] not possible with P2.4 AMEX or P2.84 AMEX.

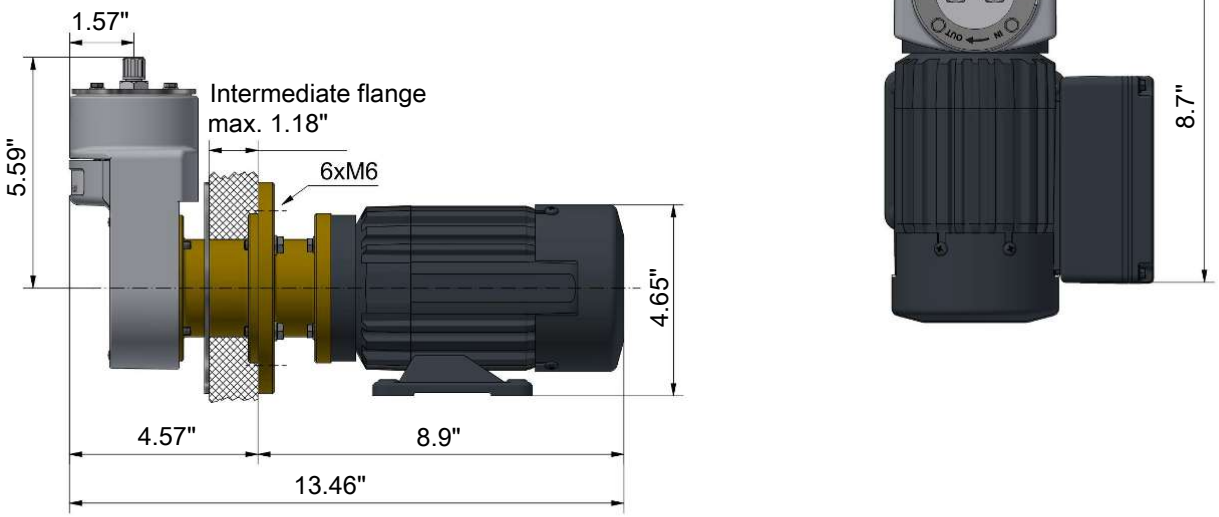
[2] not possible with P2.4 AMEX, P2.82 AMEX, or P2.84 AMEX.

Dimensions

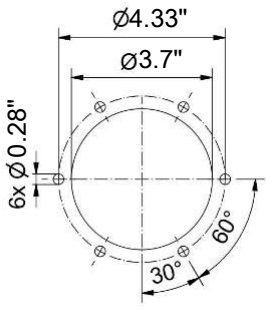
P2.2 AMEX, P2.82 AMEX – standard versions

P2.4 AMEX, P2.84 AMEX – versions with intermediate flange



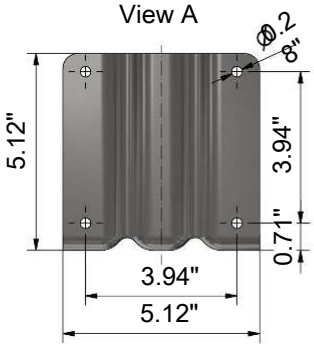


Cabinet cut-out for pumps with intermediate flange



Adjustable bypass valve (optional)

View A



Installation notices:
1) This pump should be installed horizontally
2) If necessary, rotate the pump head during installation. When conveying gasses with condensate content it must be installed valves down.

Sample gas pumps P2.x AMEX-H2/-O2

Green hydrogen produced by electrolysis using renewable energy sources is the key to a sustainable, emission-free future in the energy industry. Our specially developed P2.x AMEX-H2/-O2 sample gas pumps are the ideal solution for reliable gas conditioning in the analysis of hydrogen (H_2) and oxygen (O_2).

In order to ensure safe operation in electrolysis systems, things such as LEL monitoring are of utmost importance. Our sample gas pumps offer reliable, tried-and-tested performance for your process: With high-quality, suitability-tested materials and processing adapted for the needs of either high-purity hydrogen or oxygen, our gas pumps are equipped for the high demands of gas analytics in the electrolyser.

As well as material-refining measures to prevent hydrogen-induced component damage, the products in the H2 product series are subjected to a leak test using helium. Sample gas pumps for O_2 are subject to special cleaning processes to remove particles, oils and grease. The contamination limits are based on the internationally used and applicable guideline EIGA Doc 33/18 “Cleaning of Equipment for Oxygen Service”.

- For applications with high-purity hydrogen or oxygen
- Leak tests using helium are performed on the H_2 version as standard
- Transporting sample gas containing condensate (pump head rotated by 180°)
- Cleaning standard complies with EIGA Doc 33/18 as regards the absence of particles, oils and fats (O_2 variant)
- Suitability-tested materials for high H_2 and O_2 concentrations
- All plastics in contact with media are BAM-tested (O_2 variant)
- Produced under controlled cleanliness conditions based on VDA Band 19.1 (O_2 variant)
- All of the benefits of the standard sample gas pump P2.x AMEX
- FM C-US - approval for Class I Div. 2

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Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Pump overview

	Direct-drive pumps	Pumps with intermediate flange
Flow rate (see flow curve)	**6.7 lpm**	**6.7 lpm**
AMEX Types (Amerika) NI / I / 2 / BCD / T3, T3C CL.I Div.2 Gr BCD T3, T3C FM C-US approval Nr.: 3038101 / 3038101C	P 2.2 AMEX	P 2.4 AMEX

Technical Data P2.x AMEX-H2/-O2

Nominal voltage:	see ordering information
Marking:	NI / I / 2 / BCD / T3, T3C CL.I Div.2 Gr BCD T3, T3C
IP rating:	electric IP44 mechanical IP 20
Dead volume:	0.5 cu.in.
Weight:	approx. 16.5 lb (P 2.2 AMEX) approx. 18.7 lb (P 2.4 AMEX)
Materials in contact with media vary by configuration:	PTFE, PEEK, 1.4571 (contained in all models) + FKM (bypass valve) + 1.4401, FKM (VA pipe fittings for H_2 variant) + 1.4401 (VA RT pipe fittings for O_2 variant, BAM-tested PTFE sealing tape required [see accessories])

The following tables describe the temperature characteristics and the resulting limits for the permissible operation of the sample gas pumps. The temperature classes apply to the gas in the installation area (zone) as well as to the explosive medium in the gas path:

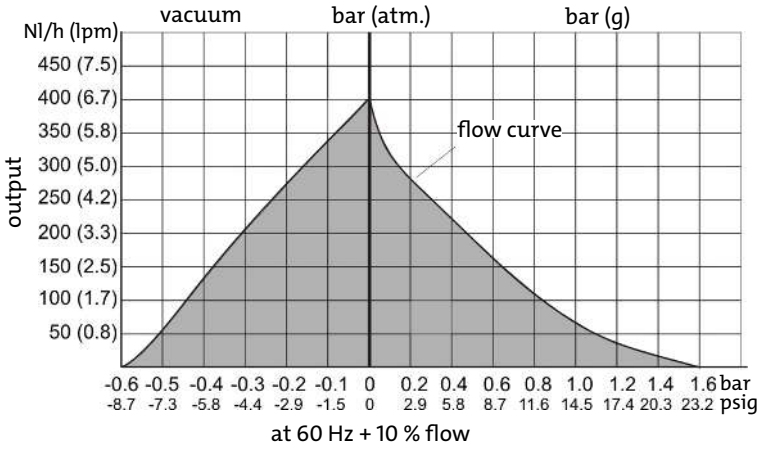
Temperature characteristics P2.x AMEX-H2 variants

		P2.2			P2.4	
Temperature class	Ambient temperature motor	Ambient temperature pump head	Media temperature		Ambient temperature pump head	Media temperature
			without bypass valve	with bypass valve		
T3	-4 °F...104 °F	max. 104 °F	max. 284 °F	max. 275 °F	max. 212 °F	max. 284 °F
T3C			max. 194 °F	max. 185 °F	max. 194 °F	max. 194 °F

Temperature characteristics P2.x AMEX-O2 variants

		P2.2		P2.4	
Temperature class	Ambient temperature motor	Ambient temperature pump head	Media temperature	Ambient temperature pump head	Media temperature
T3	-4 °F...104 °F	max. 104 °F	max. 167 °F	max. 167 °F	max. 167 °F
T3C					

Flow curve 6.7 lpm



Important motor notices

Motors used in EX areas require a protection device!

Installing the motor protection switch outside the EX area

Motor voltage		Item no.
7 = 230 V 50/60 Hz	0.7 - 1 A	9132020041
8 = 115 V 50/60 Hz	1.4 - 2 A	9132020057

Installing the motor protection switch inside the EX area Zone 1 or 2 (ATEX only)

Motor voltage		Item no.
7 = 230 V 50/60 Hz	0.63 - 1 A	9132020036
8 = 115 V 50/60 Hz	1 – 1.6 A	9132020032

Information about the versions

Pump head position (P2.2 AMEX only):

If the gas contains condensate, the pump head must be installed rotated by 180°. In this case, turn the pump head as described in the operating instructions. Please note the correct pump head position for your application when placing your order to avoid conversion.

Pump head material:

The standard material is stainless steel.

The pump head may be fitted with a bypass valve (P2.2 AMEX only) to reach all the values in the grey area of the flow curve.

Ordering instructions for P2.x AMEX-H2/-O2

42	xx	x	x	x	x	x	9	0	0	0	x	Product characteristics	
												Base model	
	71											P2.2 AMEX 6.7 lpm (direct operation without intermediate flange)	
	72											P2.4 AMEX 6.7 lpm (with intermediate flange)	
												Motor voltage	
		7										230 V 50/60 Hz 0.8/0.7 A	
		8										115 V 50/60 Hz 1.6/1.5 A	
												Pump head position	
			1									Normal position vertical	
			2									turned by 180° [1]	
												Pump head material	
				2								Stainless steel 1.4571	
				4								Stainless steel 1.4571 with bypass valve [1] [2]	
												Valve material	
					2							PTFE/PEEK [2]	
												Screw-in connections (varies by application)	
												For -H_2 (stainless steel)	**For -O_2 (stainless steel)** [3]
						0						N/A	no screw-in connection
						9						1/4"	1/4"
						1						8 mm	8 mm
						5						6 mm	6 mm
												Mounting accessories	
							9					incl. mounting bracket and bumpers [1]	
												Area of application	
											-H2	optimised for high-purity hydrogen	
											-O2	optimised for high-purity oxygen	

[1] not possible with P2.4 AMEX.

[2] For O_2-BAM-tested materials version.

[3] For O_2version, cleaned fittings are enclosed in a separate bag. BAM-tested PTFE sealing tape required [see accessories].

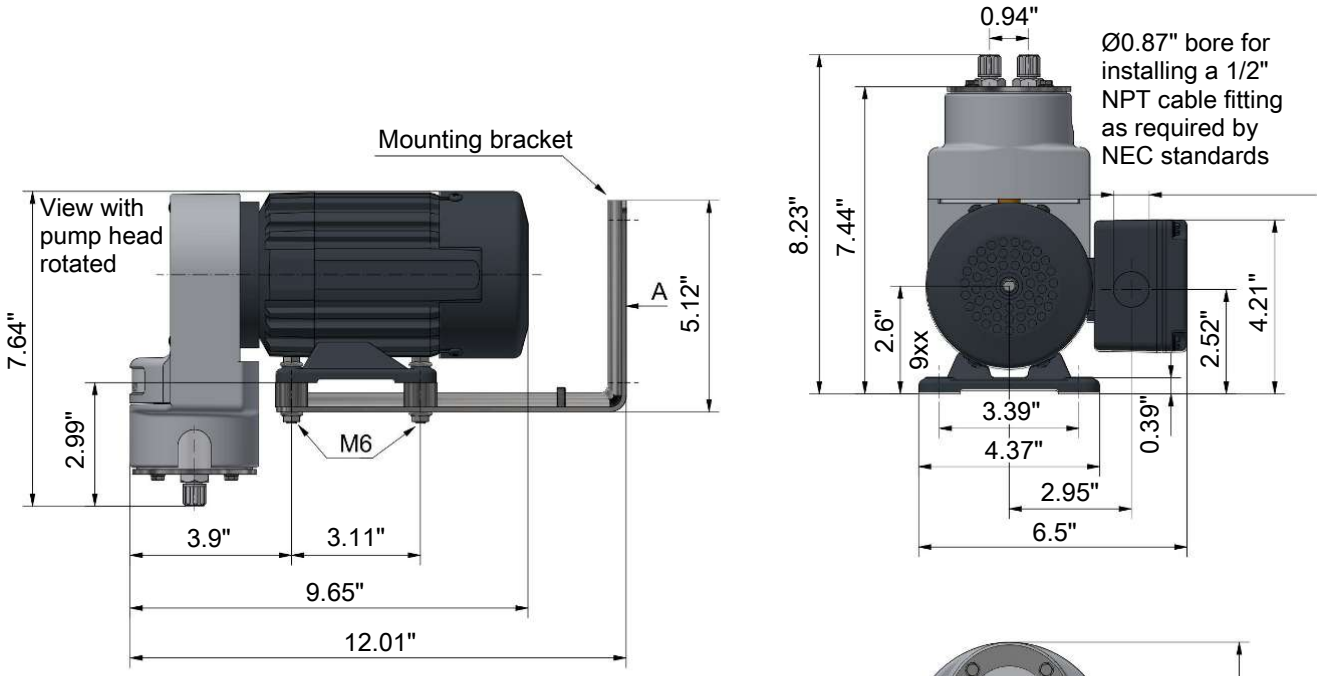
Spare parts and accessories

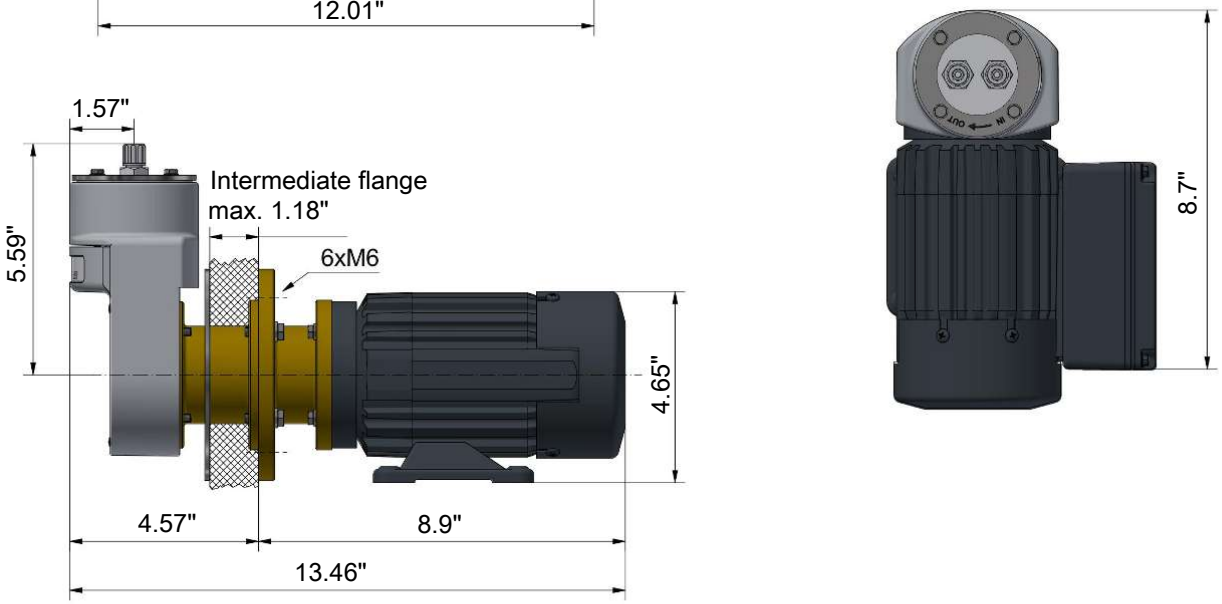
Item no.	Description
9022325	BAM-approved PTFE sealing tape (Roll of 14,8 ft)

Dimensions

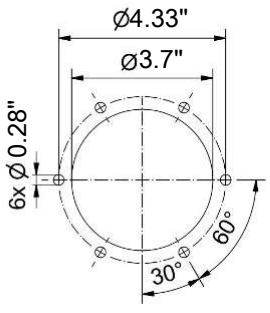
P2.2 AMEX – standard versions

P2.4 AMEX – versions with intermediate flange



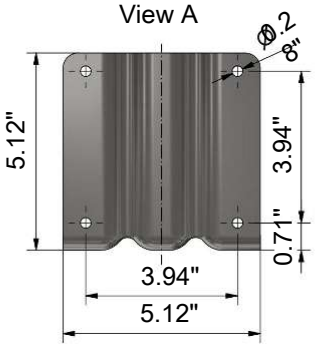


Cabinet cut-out for pumps with intermediate flange



Adjustable bypass valve (optional)

View A



Installation notices:
1) This pump should be installed horizontally
2) If necessary, rotate the pump head during installation. When conveying gasses with condensate content it must be installed valves down.

4 Sample Filters

Sample Gas Filter AGF-PV-30

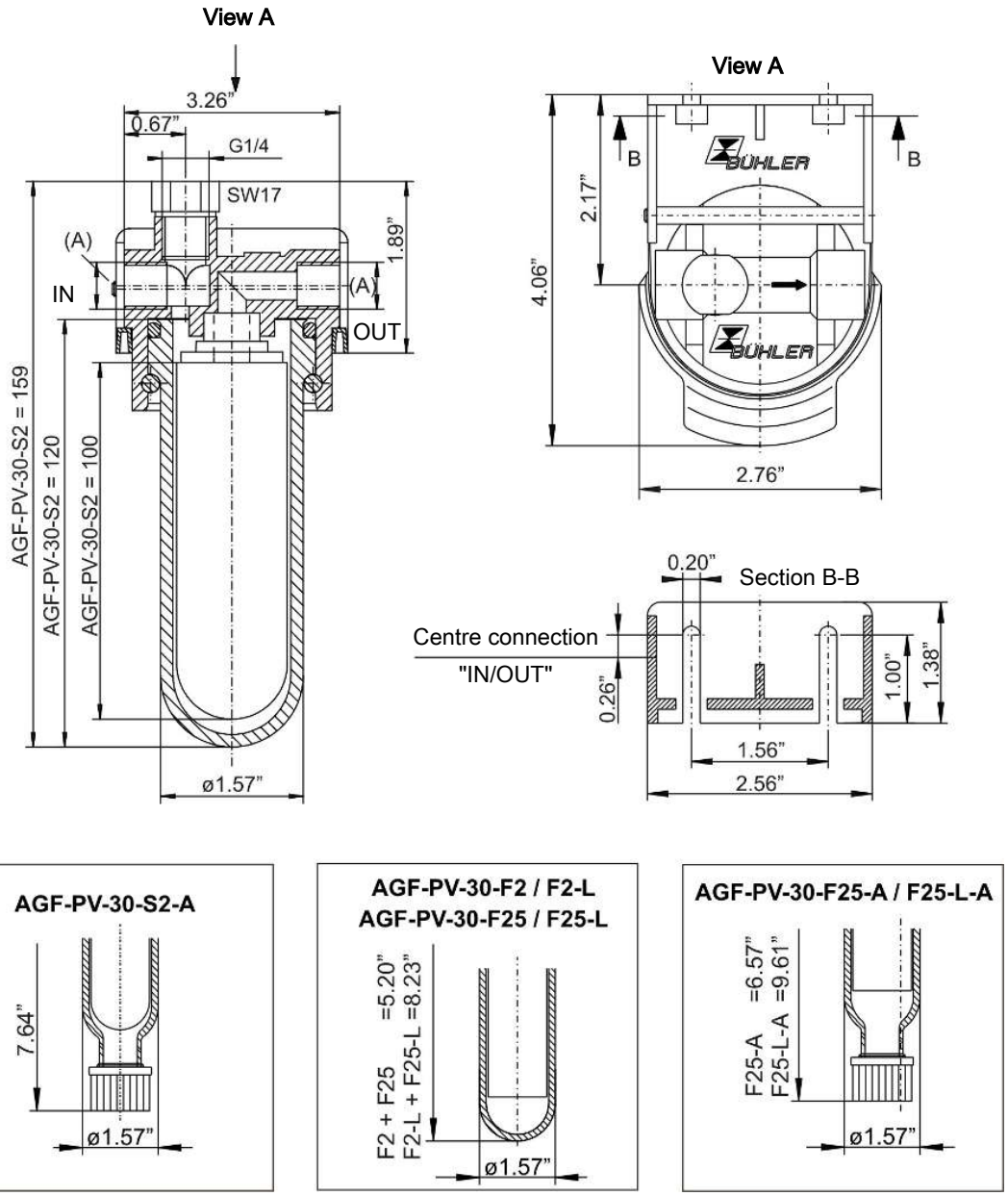
Even if the particular contaminant has already been removed at the extraction point through effective particle filtration inside the gas sampling probe, in long or branched sample gas line there is a risk of secondary contamination. Additional filters are therefore often installed at the point where the sample gas enters the analysis system and also before delicate system components. The filter housings must be made of corrosion-resistant, non-absorbent materials, easy to install and easy to maintain. They should further be compatible with various filter elements.

The AGF-PV-30 series features a PVDF and glass housing and is equipped with the Bühler Unique quick-release fastener. The filter head has an additional connection for installing a moisture detector. A variety of materials is available based on the application.

- Bühler Unique quick-release fastener
- Filter housing material: PVDF, glass
- Various filter elements
- Low dead volumes
- Bypass connection for moisture detector
- Used in **DNV-GL and LR type-tested** conditioning unit
- Compliance with requirements of **MARPOL MEPC.259(68) of IMO** confirmed
- Special design for use in high-vibration environments

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Dimensions



Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in category 2G, explosion group IIC areas. The filter is not marked, as it does not have an innate ignition source, so Directive 2014/34/EU does not apply.

Flammable gases, explosion group IIB or IIC, which could occasionally be explosive during normal operation may be conveyed through the filter.

Be sure to observe the relevant operating instructions!

Ambient temperature range when used in Ex areas: 41 °F ≤ T_{amb} ≤ 140 °F.

Technical Data

Fine mesh filter AGF-PV-30	
Material – Filter head	PVDF
Material – Filter cover	Glass
Material – Gasket	Viton
Thread (A)	G1/4 or NPT 1/4" (see ordering information)
Max. operating pressure	58 psig
Max. operating temperature	212 °F
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) 2 Hz-13.2 Hz Amplitude ± 1.0 mm 13.2 Hz -100 Hz 0.7g acceleration

Ordering instructions

Filter including filter element

AGF-PV- AGF-PV-	30-S2 30-S2-I	30-S2-A 30-S2-A-I	30-F2 30-F2-I	30-F2-A 30-F2-A-I	30-F2-L 30-F2-L-I
Filter fineness:	2 µm	2 µm	2 µm	2 µm	2 µm
Item no. (G1/4):	4150099	4150199	41502999	4151999	4150799
Item no. (NPT 1/4"):	4150099I	4150199I	41502999I	4151999I	4150799I
Element:	S2	S2	F2	F2	F2-L
Dead volume:	3.5 cu. in.	4.2 cu. in.	3.5 cu. in.	3.5 cu. in.	6.6 cu. in.
Weight approx.:	0.62 lb	0.64 lb	0.53 lb	0.64 lb	0.64 lb
permissible explosion group of the external filter area:	IIC	IIC	IIC	IIC *	IIC
permissible explosion group of the internal filter area:	IIC	IIC	IIB	IIB	IIB

AGF-PV- AGF-PV-	30-F25 30-F25-I	30-F25-A 30-F25-A-I	30-F25-L 30-F25-L-I	30-F25-L-A 30-F25-L-A-I	30-AKF 30-AKF-I
Filter fineness:	25 µm	25 µm	25 µm	25 µm	1 µm
Item no. (G1/4):	4150299	4150399	4150499	4150599	4153099
Item no. (NPT 1/4"):	4150299I	4150399I	4150499I	4150599I	4153099I
Element:	F25	F25	F25-L	F25-L	AKF
Dead volume:	3.5 cu. in.	3.8 cu. in.	6.6 cu. in.	7.1 cu. in.	2.7 cu. in.
Weight approx.:	0.51 lb	0.53 lb	0.64 lb	0.66 lb	0.51 lb
permissible explosion group of the external filter area:	IIC	IIC	IIC	IIC *	**
permissible explosion group of the internal filter area:	IIB	IIB	IIB	IIB	**

* only in normal operation with connection (closed condensate outlet).

** not approved for use with flammable gases.

Filter elements

Item no.	Model	Material	Filter fineness	Filter surface	Packaging unit	Permissible explosion group of the internal filter area
41010010	S2	Fibreglass	2 µm	12.4 in²	5 count	IIC
4101002	S2	Fibreglass	2 µm	12.4 in²	25 count	IIC
41030050	F2	PTFE	2 µm	9.3 in²	5 count	IIB
41020050	F2-L	PTFE	2 µm	19.4 in²	2 count	IIB
41020130	F25	PTFE	25 µm	9.3 in²	5 count	IIB
41010120	F25-L	PTFE	25 µm	19.4 in²	2 count	IIB
41010130	AKF	Active carbon	1 µm	6.8 in²	1 count	not approved for use with flammable gases.

Sample Gas Filter AGF-T-30

Even if the particular contaminant has already been removed at the extraction point through effective particle filtration inside the gas sampling probe, in long or branched sample gas line there is a risk of secondary contamination. Additional filters are therefore often installed at the point where the sample gas enters the analysis system and also before delicate system components. The filter housings must be made of corrosion-resistant, non-absorbent materials, easy to install and easy to maintain. They should further be compatible with various filter elements.

The AGF-T- 30 series has a PTFE and glass housing. The filter head has an additional connection for installing a moisture detector. A variety of materials is available based on the application.

- Full PTFE housing top
- Maximum chemical resistance, for use in highly aggressive mediums
- Filter fineness of 2 µm or 25 µm with sintered PTFE elements
- No absorption of trace gasses
- Quick response time in systems due to low dead volume
- Variable wall mount

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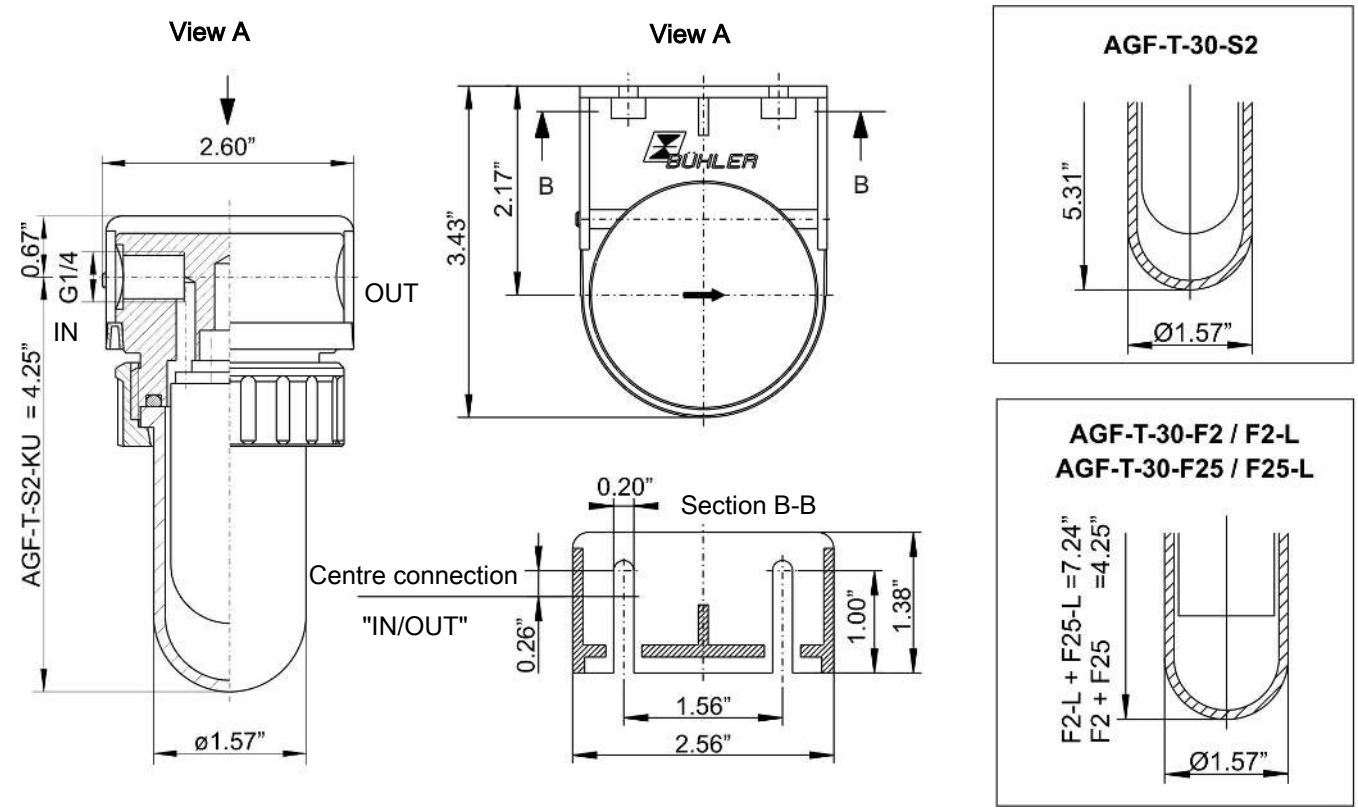
Dimensions



Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in category 2G, explosion group IIC areas. The filter is not marked, as it does not have an innate ignition source, so Directive 2014/34/EU does not apply.

Flammable gases, explosion group IIB or IIC, which could occasionally be explosive during normal operation may be conveyed through the filter.

Be sure to observe the relevant operating instructions!

Ambient temperature range when used in Ex areas: 41 °F ≤ T_{amb} ≤ 140 °F.

Technical Data

AGF-T-30 Fine mesh filter	
Material – Filter head	PTFE
Material – Filter cover	Glass
Material – Gasket	Viton, PTFE shrouded
Operating pressure max.	58 psig
Operating temperature max.	212 °F

Ordering instructions

Filter including filter element

AGF-T-	30-S2	30-S2-KU	30-F2	30-F2-L	30-F25	30-F25-L
Filter fineness:	2 µm	2 µm	2 µm	2 µm	25 µm	25 µm
Item no.:	4151399	4151499	4151799	4151099	4151199	4151299
Element:	S2	S2KU	F2	F2-L	F25	F25-L
Dead volume:	3.5 cu. in.	3.1 cu. in.	3.5 cu. in.	6.6 cu. in.	3.5 cu. in.	6.6 cu. in.
Weight approx.:	0.9 lb	0.77 lb	0.77 lb	0.95 lb	0.77 lb	0.95 lb
permissible explosion group of the external filter area:	IIC	IIC	IIC	IIC	IIC	IIC
permissible explosion group of the internal filter area:	IIC	IIC	IIB	IIB	IIB	IIB

Filter elements

Item no.	Model	Filter element	Material	Filter fineness	Filter surface	Packaging unit	permissible explosion group of the internal filter area
41010010	S2	Sleeve	Fibreglass	2 µm	12.4 in²	5 count	IIC
4101002	S2	Sleeve	Fibreglass	2 µm	12.4 in²	25 count	IIC
41010140	S2KU	Sleeve	Fibreglass	2 µm	9.5 in²	5 count	IIC
41010150	S2KU	Sleeve	Fibreglass	2 µm	9.5 in²	25 count	IIC
41030050	F2	Sintered PTFE	PTFE	2 µm	9.3 in²	5 count	IIB
41020130	F25	Sintered PTFE	PTFE	25 µm	9.3 in²	5 count	IIB
41020050	F2-L	Sintered PTFE	PTFE	2 µm	19.4 in²	2 count	IIB
41010120	F25-L	Sintered PTFE	PTFE	25 µm	19.4 in²	2 count	IIB

Panel-Filter AGF-FE

Especially in emission control via portal analysis systems the sample gas cannot always be extracted without particle contamination. The necessary conditioning systems must be compact and lightweight and therefore require small and light system components.

We offer special filter housings for these applications and for installation into a standard 19” rack.

The AGF-FE filters screw into the front panel with sample gas connections at the back. They are available in a variety of material combinations.

- Front panel installation
- Easy installation
- Large filter surface
- Easy element replacement

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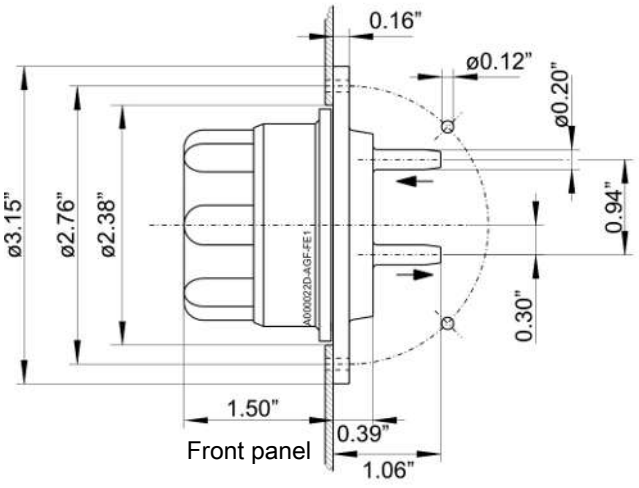
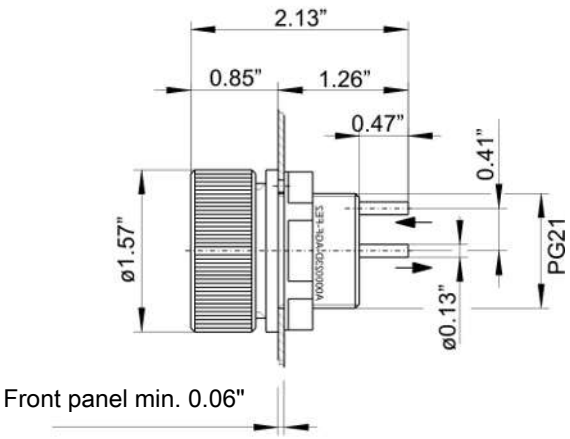
Dimensions

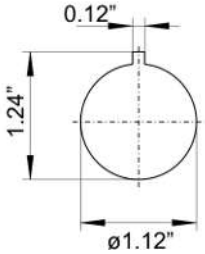
AGF-FE-1 / AGF-FE-1-T



AGF-FE-2



Installation diagram



Technical Data

Built-in filter	AGF-FE-1	AGF-FE-1-T	AGF-FE-2
Filter surface	6.2 in²	6.2 in²	2.0 in²
Filter fineness	2 µm	2 µm	8 µm
Dead volume	1.5 cu. in.	1.5 cu. in.	0.37 cu. in.
Material - filter housing	PC	PC	PVDF / 1.4571
Material - gasket	Viton	Viton	Viton
Material - filter element	Fibreglass / epoxy resin	PTFE	Fibreglass / epoxy resin
Connections	DN 4/6	DN 4/6	DN 2/4
Operating pressure max.	29 psig	29 psig	29 psig
Medium temperature	max. 175 °F	max. 175 °F	max. 175 °F

Ordering instructions

Filter*

Item no.	Model
41 15 9991	AGF-FE-1
41 15 8991	AGF-FE-1-T
41 15 099	AGF-FE-2
90 09 162	O-ring for model FE-E1 / FE-1-T
41 28 011	O-ring for model FE-E2

* one filter element is included with delivery.

Filter elements

Item no.	Model	for filter model	Packing unit
41 15 00 10	FE-E1	AGF-FE-1	5 pieces
41 15 00 90	FE-1-T	AGF-FE-1-T	5 pieces
41 15 09 910	FE-E2	AGF-FE-2	5 pieces

Panel-Filter AGF-FE-4

Especially in emission control via portal analysis systems the sample gas cannot always be extracted without particle contamination. The necessary conditioning systems must be compact and lightweight and therefore require small and light system components.

We offer special filter housings for these applications and for installation into a standard 19” rack.

The AGF-FE-4 filters screw into the front panel and their sample gas connections are located at the back.

- Front panel installation
- Easy installation
- Large filter surface
- Easy element replacement
- Acid-proof materials

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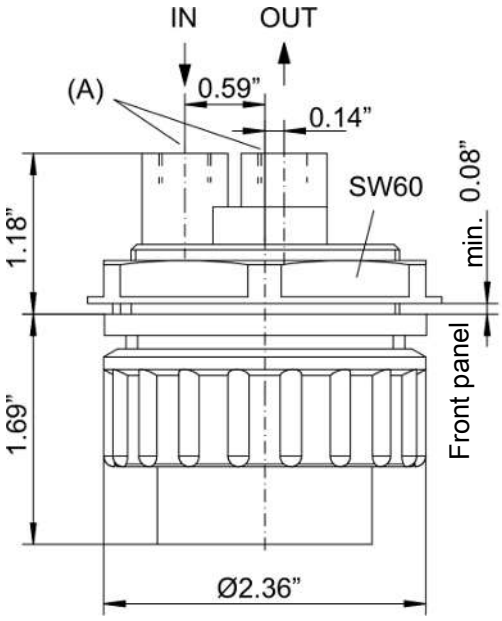
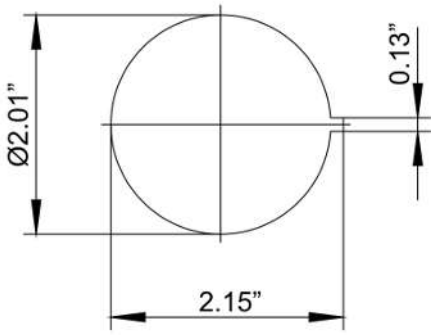
Dimensions



Installation diagram



Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in category 2G, explosion group IIB areas. The filter is not marked, as it does not have an innate ignition source, so Directive 2014/34/EU does not apply.

Flammable gases, explosion group IIB, which could occasionally be explosive during normal operation may be conveyed through the filter.

Be sure to observe the relevant operating instructions!

Ambient temperature range when used in Ex areas: 41 °F ≤ T_{amb} ≤ 140 °F.

Technical Data

AGF-FE-4 Built-In Filter	
Filter surface	6.5 in²
Filter fineness	2 µm
Dead volume	1.74 cu. in.
Material - filter housing	PTFE, PVDF, Duran glass (parts in contact with mediums)
Material - gasket	Viton or PTFE-reinforced Viton
Material - filter element	Sintered PTFE
Connections (A)	G1/8 or NPT 1/8 (see ordering information)
Operating pressure max.	29 psig
Medium temperature	max. 212 °F

Ordering instructions

Filter including filter element

AGF-FE-	4	4-I	4-Vi/PTFE	4-Vi/PTFE-I
Item no.:	4115100	4115100I	4115200	4115200I
Item no. O-ring:	4101003	4101003	4101003	4101003
Element:	FE-4	FE-4	FE-4	FE-4
Connections:	G1/8	NPT 1/8"	G1/8	NPT 1/8"
permissible explosion group of the external filter area:	IIB	IIB	IIB	IIB
permissible explosion group of the internal filter area:	IIB	IIB	IIB	IIB

Filter element

Item no.	Model	Material	Packaging unit	permissible explosion group of the internal filter area
41151050	FE-4	Sintered PTFE	8 count	IIB

Sample Gas Filter AGF-VA-23

Even if the particular contaminant has already been removed at the extraction point through effective particle filtration inside the gas sampling probe, in long or branched sample gas line there is a risk of secondary contamination. Additional filters are therefore often installed at the point where the sample gas enters the analysis system and also before delicate system components. The filter housings must be made of corrosion-resistant, non-absorbent materials, easy to install and easy to maintain. They should further be compatible with various filter elements.

The AGF-VA-23 series is completely made from stainless steel and features the Bühler Unique quick-release fastener. The filter head has an additional connection for installing a moisture detector. A variety of materials is available based on the application.

Bühler Unique quick-release fastener
Very quick and easy filter changes without tools
Low dead volume
Variable wall-mounting via spacer block
(Auto) condensate drain option through the connection thread (G3/8) inside the filter cover
Bypass connection inside the filter head (G1/4), connection option for moisture detector or ventilation

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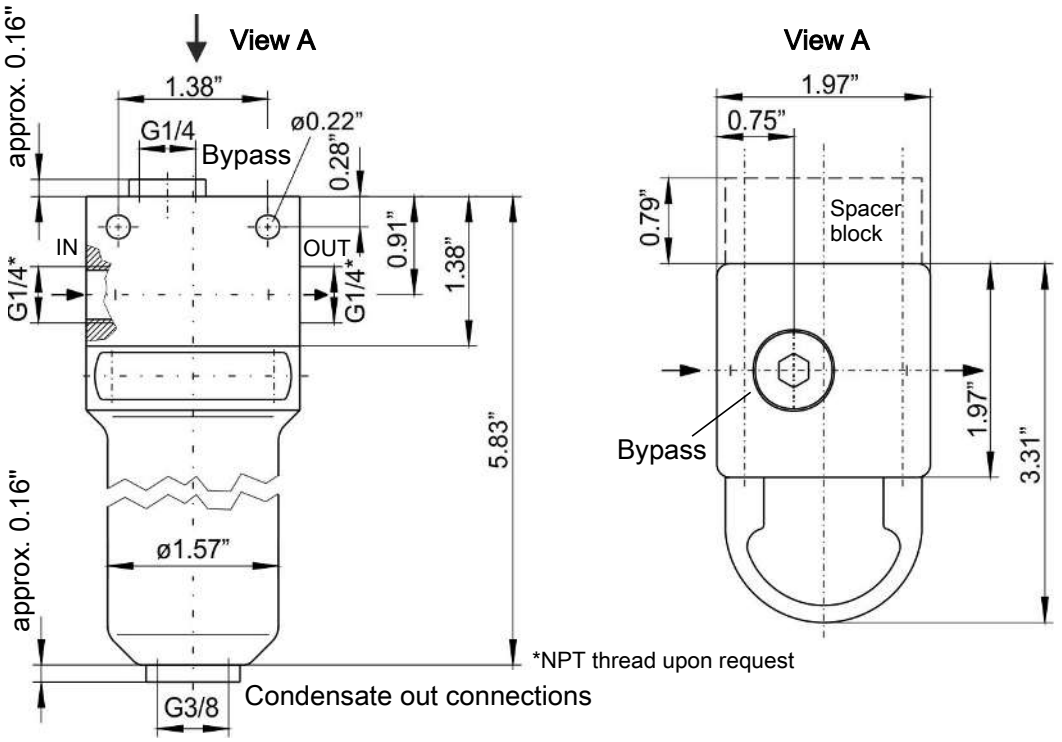
Dimensions



Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in category 2G, explosion group IIC areas. The filter is not marked, as it does not have an innate ignition source, so Directive 2014/34/EU does not apply.

Flammable gases, explosion group IIB or IIC, which could occasionally be explosive during normal operation may be conveyed through the filter.

Be sure to observe the relevant operating instructions!

Ambient temperature range when used in Ex areas: 41 °F ≤ T_{amb} ≤ 140 °F.

Technical Data

AGF-VA-23 Fine Mesh Filter	
Dead volume with filter element	
DRGxxxSO-V/-P	3.1 cu. in.
DRGxxxVA-V	3.4 cu. in.
F2/F25	3.1 cu. in.
Material - filter housing	1.4571/SS 316 Ti
Material - gasket	available in Viton or HiFluor
Material - filter element	see table
Weight	3.7 lb
Operating pressure max.*	2321 psi
Medium temperature max.*	see table

* Pressures and temperatures are greatly reduced when connecting a moisture detector.

Ordering instructions

Filter (empty housing)

AGF-VA-	23-V	23-P	23-V-F2/F25	23-P-F2/F25
Item no.:	4142999	4145999	4142699	4145699
Element:	for installing DRG filter elements	for installing DRG filter elements	for installing F2/F25 filter elements	for installing F2/F25 filter elements
Seal:	Viton	HiFluor	Viton	HiFluor
permissible explosion group of the external filter area:	IIC	IIC	IIC	IIC

Filter elements

Item no.	Model	Seal	Material	Temperature max.	Filter fineness	Filter surface	Packaging unit	permissible explosion group of the internal filter area
4103004	DRG 60 SO-V	Viton	1.4301/1.4401	302 °F	60 µm	10.8 in²	1 count	IIC
4103009	DRG 60 SO-P	Perfluoroelastomer	1.4301/1.4401	482 °F **	60 µm	10.8 in²	1 count	IIC
41030050	F2	--	Sintered PTFE	212 °F	2 µm	9.3 in²	5 count	IIB
41020130	F25	--	Sintered PTFE	212 °F	25 µm	9.3 in²	5 count	IIB
4128008	Viton O-ring (for filter...-V)							
4126004	HiFluor O-ring (for filter...-P)							

Other filter elements available upon request.

** at reduced maximum pressure.

Self-cleaning filter BF2-S

Using so-called "self-cleaning" gas filters is worth considering for sample gas systems where secondary contamination primarily consisting of larger particles are to be expected.

The functional principle of these filters is that of the 'Cross Flow' process. Here a partial stream is continuously adequate for analysis is continuously extracted from the main sample gas flow. Inside the housing, the main stream is forced along the filter element in a spiral. The dirt particles from the partial stream deposited on the surface of the element are carried along by the main stream and discharged. The continuous discharge of dirt deposit results in a very long filter element life, thus low maintenance.

The BF2-S was developed specifically for these applications.

- For fluids and gasses
- Long filter life
- Low maintenance
- Compact installation
- Pipe fitting included

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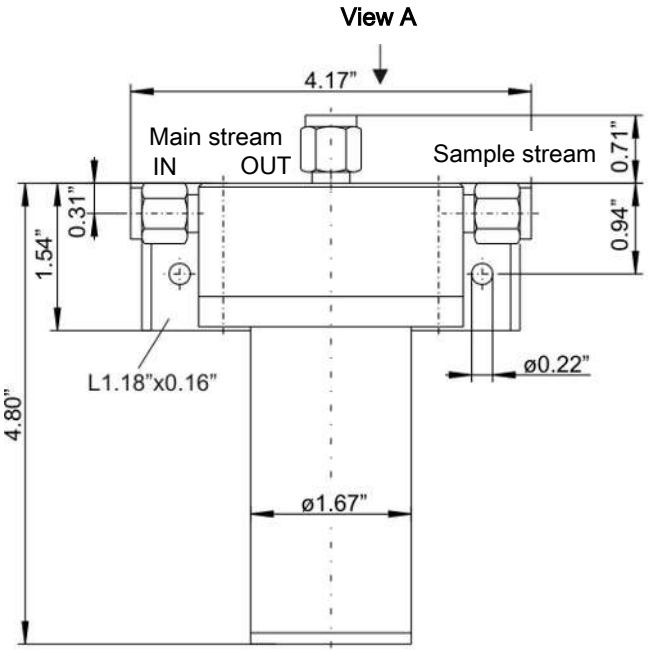
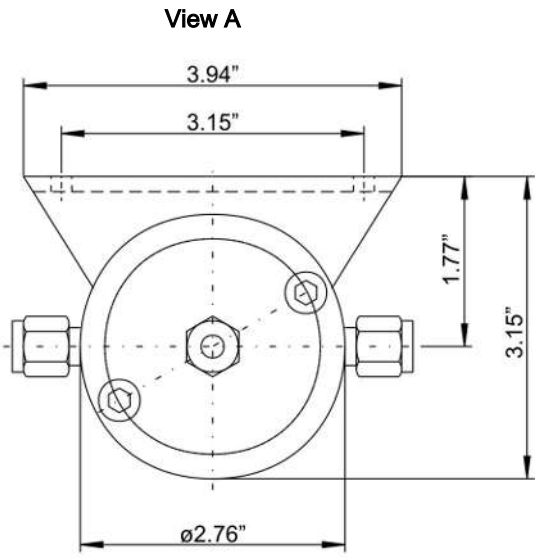
Dimensions



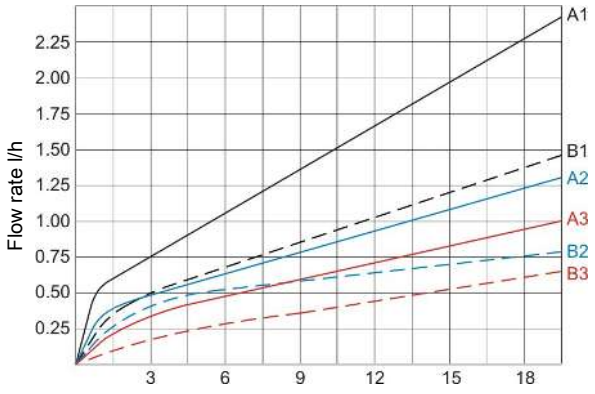


Flow characteristics

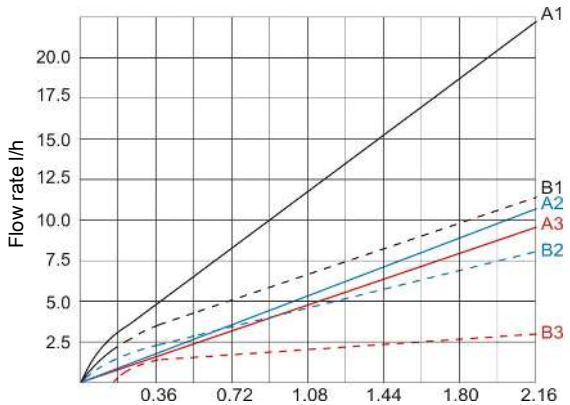
The flow rates indicated automatically arise when the main and sample stream discharge to outside.

		Total	Main stream	Sample stream
———	Element 5 M - 29 - 100 Filter fineness 5 micron	A1	A2	A3
– – – – –	Element 0.5 M - 29 - 100 Filter fineness 0.5 micron	B1	B2	B3

Flow medium water 55 °F



Flow medium nitrogen 68 °F



Technical Data

Fine mesh filter BF2-S	
Material – Housing	1.4571
Material – Arbor	PTFE
Material – Filter element	1.4404
Material – Gasket	Viton
Connections	fitting for Ø 6 mm (0.24 in) pipe
Weight	approx. 3.3 lb
Filter surface	19.4 in²
Filter fineness	0.5 or 5 µm
Operating pressure max.	362 psig
Operating temperature max.	248 °F

Ordering instructions

Filter*

Item no.	Model	Filter fineness
41 09 999	BF2-S-0.5	0.5 µm
41 08 999	BF2-S-5	5 µm

* one filter element is included with delivery.

Filter elements

Item no.	Model	Packing unit
41 09 001	0.5M - 29 - 100	1 pieces
41 08 001	5M - 29 - 100	1 pieces

Ad-/Absorption Filter ADF-PV-30-L

Gas analysis is a complex field. The sample gas to be analysed must be extracted and handled under quite diverse conditions to yield representative and reliable analysis results.

There frequently is a need to remove gaseous components from the sample gas through adsorption/absorption.

The ADF-PV-30 is a housing suitable for this application. Made from PVDF and glass and equipped with Unique quick-release fastener, it can be filled with various adsorbents/absorbents. The bottom gas inlet ensures sufficient contact times.

- Bühler Unique quick-release fastener
- Quick and easy filter material changes without tools
- Variable wall mount

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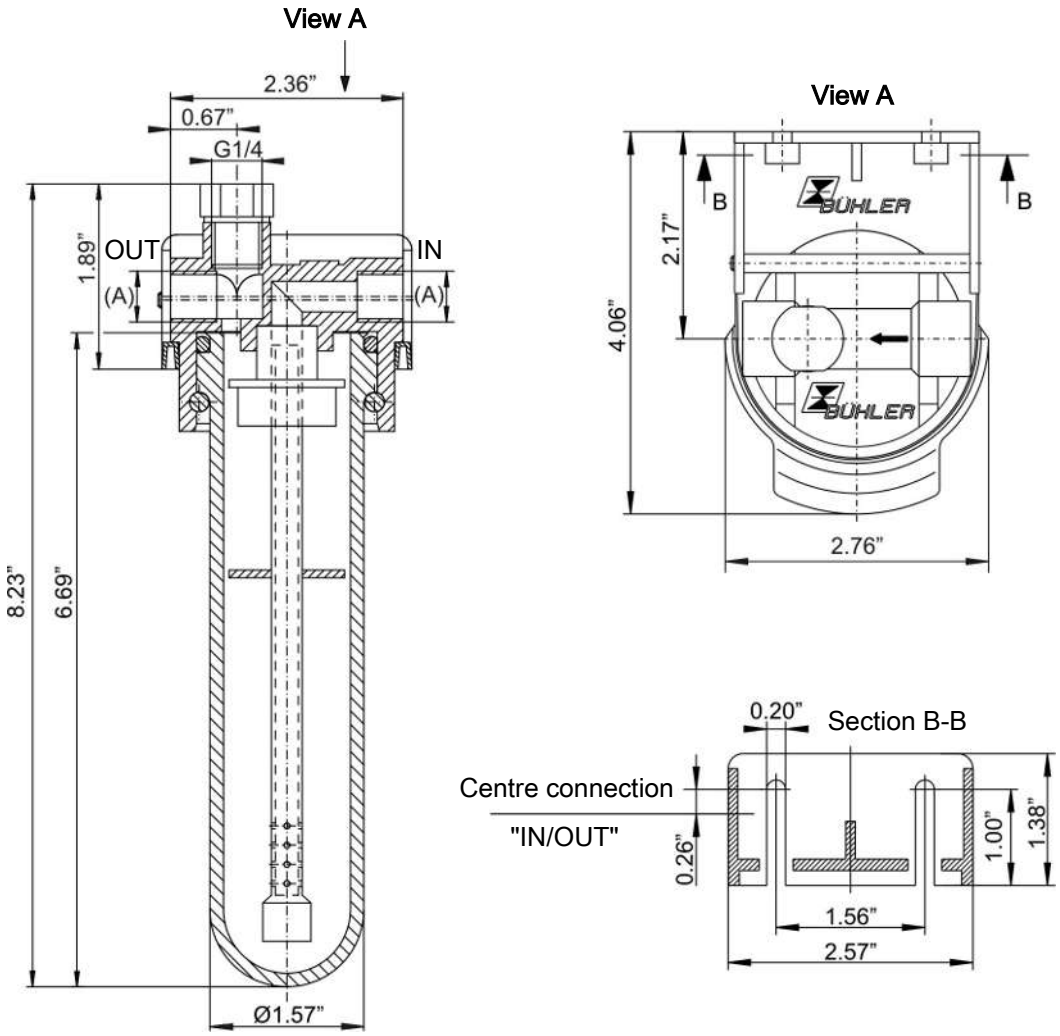
Dimensions



Technical Data

ADF-PV-30-L Ad-/Absorption Filter	
Material – Filter head	PVDF
Material – Filter cover	Glass
Material – Gasket	Viton
Thread	G1/4 or NPT 1/4" (see ordering information)
Weight	approx. 0.66 lb
Fill volume	7.3 cu. in.
Operating pressure max.	58 psig
Operating temperature max.	212 °F (without adsorbent/absorbent)

Ordering instructions

Filter*

Item no.	Model	Connections
41 52 099	ADF-PV-30-L	G1/4
41 52 099I	ADF-PV-30-L-I	NPT 1/4"

* without adsorbent/absorbent.

Ambient Air Filter RAF-PV-30

The AGF-PV-30 series features a PVDF and glass housing and is equipped with the Bühler Unique quick-release fastener. The filter head has an additional connection for installing a moisture detector. A variety of materials is available based on the application.

Warehouse technology and other areas in food technology frequently require monitoring the composition of the ambient atmosphere. Ensuring reliable analysis results requires conditioning the sample gas. This also includes filtering out any particular matter in the sample gas.

- Bühler Unique quick-release fastener
- Very quick and easy filter changes without tools
- Variable wall mount

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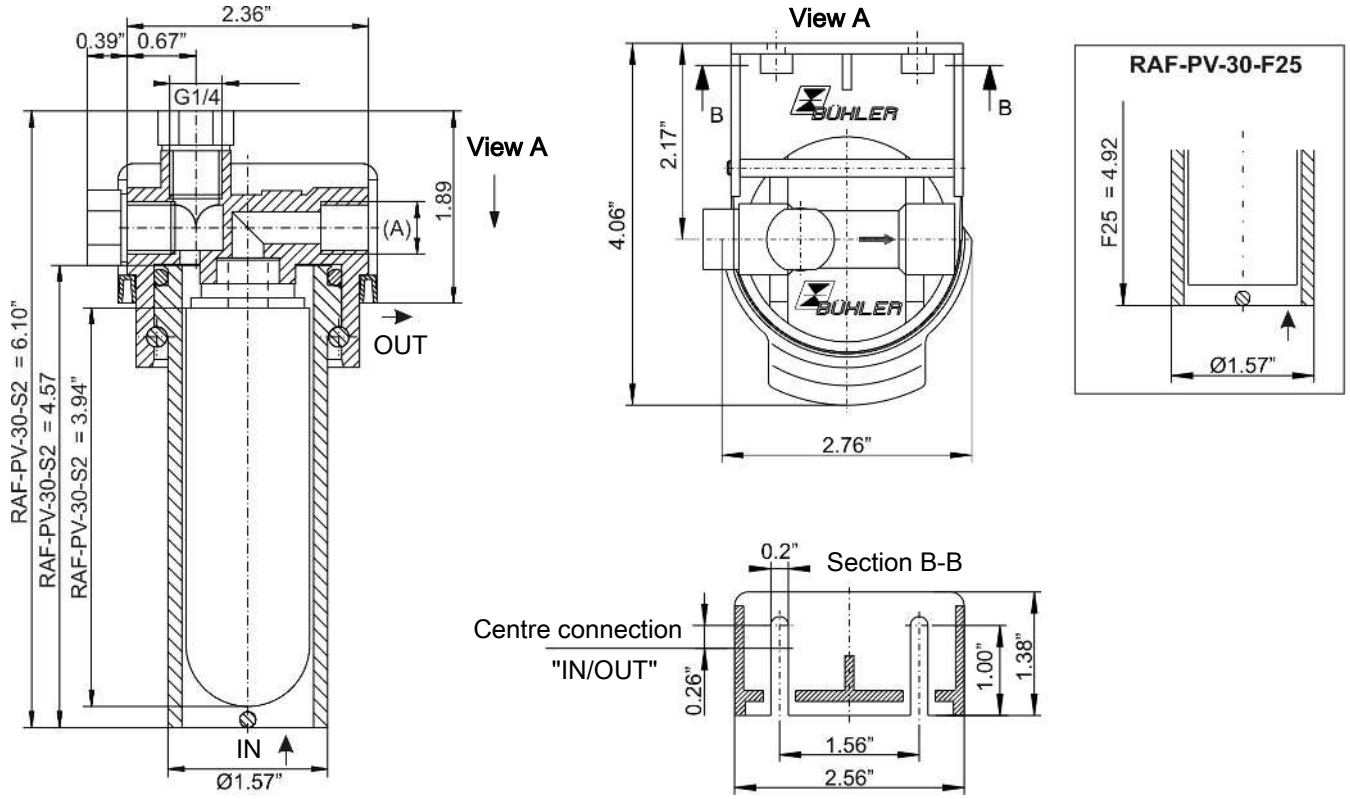
Dimensions



Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in category 2G, explosion group IIC areas. The filter is not marked, as it does not have an innate ignition source, so Directive 2014/34/EU does not apply.

Flammable gases, explosion group IIB or IIC, which could occasionally be explosive during normal operation may be conveyed through the filter.

Be sure to observe the relevant operating instructions!

Ambient temperature range when used in Ex areas: 41 °F ≤ T_{amb} ≤ 140 °F.

Technical Data

RAF-PV-30 Ambient air filter	
Material – Filter head	PVDF
Material – Filter cover	Glass
Material – Gasket	Viton
Thread (A)	G1/4 or NPT 1/4" (see ordering information)
Weight	approx. 0.62 lb
Operating temperature max.	212 °F

Ordering instructions

Filter including filter element

RAF-PV-	30-S2	30-S2-I	30-F25	30-F25-I
Filter fineness:	2 µm	2 µm	25 µm	25 µm
Item no.:	4152199	41521991	4152299	41522991
Element:	S2	S2	F25	F25
Connections:	G1/4	NPT 1/4"	G1/4	NPT 1/4"
permissible explosion group of the external filter area:	IIC	IIC	IIB	IIB
permissible explosion group of the internal filter area:	IIC	IIC	IIB	IIB

Filter elements

Item no.	Model	Filter element	Material	Filter fineness	Filter surface	Packaging unit	permissible explosion group of the internal filter area
4101001	S2	Sleeve	Fibreglass	2 µm	12.4 in²	5 count	IIC
4101002	S2	Sleeve	Fibreglass	2 µm	12.4 in²	25 count	IIC
4102013	F25	PTFE	Sintered PTFE	25 µm	9.3 in²	5 count	IIB

Sample Gas Coalescing Filter K-AGF-PV-30-A

Gas analysis is a complex field. The sample gas to be analysed must be extracted and handled under quite diverse conditions to yield representative and reliable analysis results. One disturbance variable which must also be eliminated is aerosols.

The aqueous suspended particles can easily be removed from the gas by coagulation using special filter matrices. During this process, the tiny aerosols accumulate on the fibres of the filter matrix through collision, forming drops increasing in size. Once large enough, the condensate which forms drains into the filter bowl and is then removed.

Model K-AGF-PV-30-A uses the AGF-PV filter series housing made from PVDF and glass and has the respective fittings to adapt it to the coagulation function.

The easy installation and the Unique quick-release fastener are additional advantages of this model.

Bühler Unique quick-release fastener
Very quick and easy filter changes without tools
Variable wall mount
Additional connection inside the filter head (G1/4) for moisture detector or bypass
Allows the connection of automatic condensate drains

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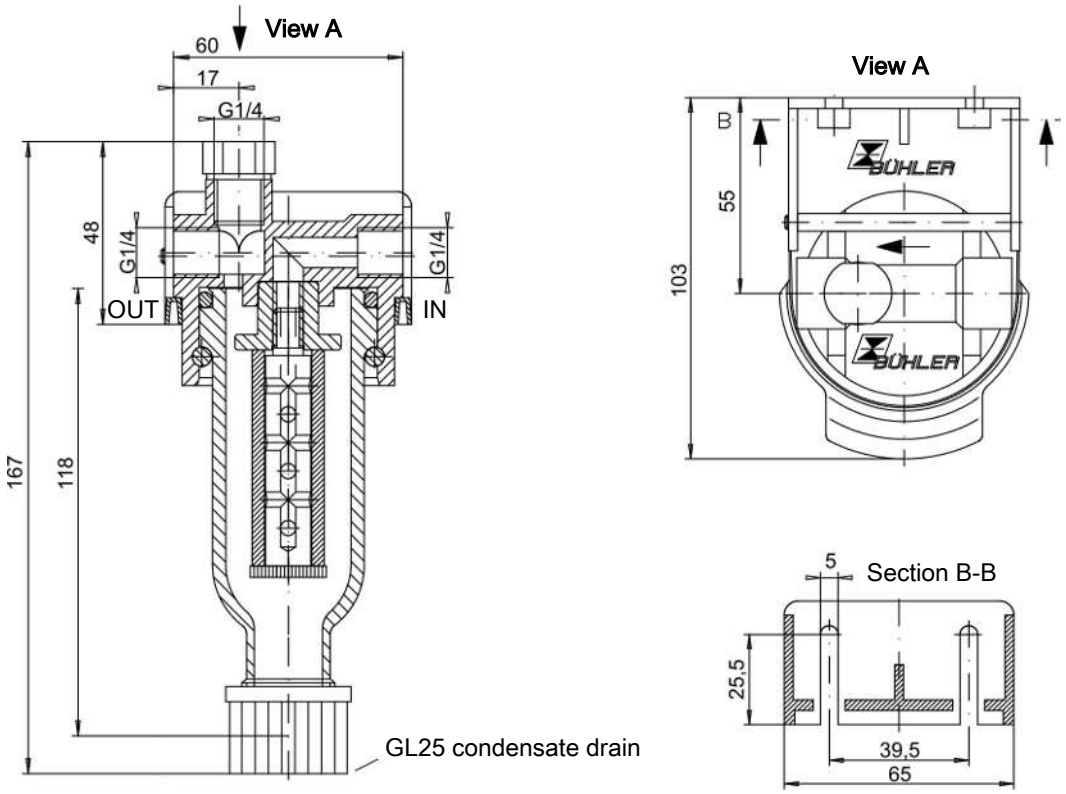
Dimensions



Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in category 2G, explosion group IIC areas. The filter is not marked, as it does not have an innate ignition source, so Directive 2014/34/EU does not apply.

Flammable gases, explosion group IIB or IIC, which could occasionally be explosive during normal operation may be conveyed through the filter.

Be sure to observe the relevant operating instructions!

Ambient temperature range when used in Ex areas: 41 °F ≤ T_{amb} ≤ 140 °F.

Technical Data

K-AGF-PV-30-A Coalescence Filter	
Dead volume	4.5 cu. in.
Material – Filter head	PVDF
Material – Filter cover	Glass
Material – Gasket	Viton
Thread	G1/4 or NPT 1/4" (see ordering information)
Weight	0.53 lb
Operating pressure max.	58 psig
Operating temperature max.	212 °F

Ordering instructions

Filter including filter element

K-AGF-PV-	30-A	30-A-I
Item no.:	4150699	4150699I
Element:	12-57-C	12-57-C
Connections:	G1/4 outlet and inlet	NPT 1/4" outlet and inlet
Seal:	Viton	Viton
permissible explosion group of the external filter area:	IIC	IIC
permissible explosion group of the internal filter area:	IIC	IIC

Filter element

Item no.	Type	Filter element	Material	Filter surface	Packaging unit	permissible explosion group of the internal filter area
4932002	12-57-C	Screw-in sleeve	Borosilicate fibre	4.3 in^2	1 count	IIC

Sample Gas Coalescing Filter K-AGF-VA-23

Gas analysis is a complex field. The sample gas to be analysed must be extracted and handled under quite diverse conditions to yield representative and reliable analysis results. One disturbance variable which must also be eliminated is aerosols.

The aqueous suspended particles can easily be removed from the gas by coagulation using special filter matrices. During this process, the tiny aerosols accumulate on the fibres of the filter matrix through collision, forming drops increasing in size. Once large enough, the condensate which forms drains into the filter bowl and is then removed.

Model K-AGF-VA-23 has the housing from the AGF-VA filter series made from stainless steel and with the respective fittings to adapt it for the coagulation function.

The easy installation and the Unique quick-release fastener are additional features of this model.

Bühler Unique quick-release fastener
Very quick and easy filter changes without tools
Low dead volume
Variable wall-mounting via spacer block
Condensate drain through connection thread (G3/8) inside the filter cover
Bypass connection inside the filter head (G1/4)

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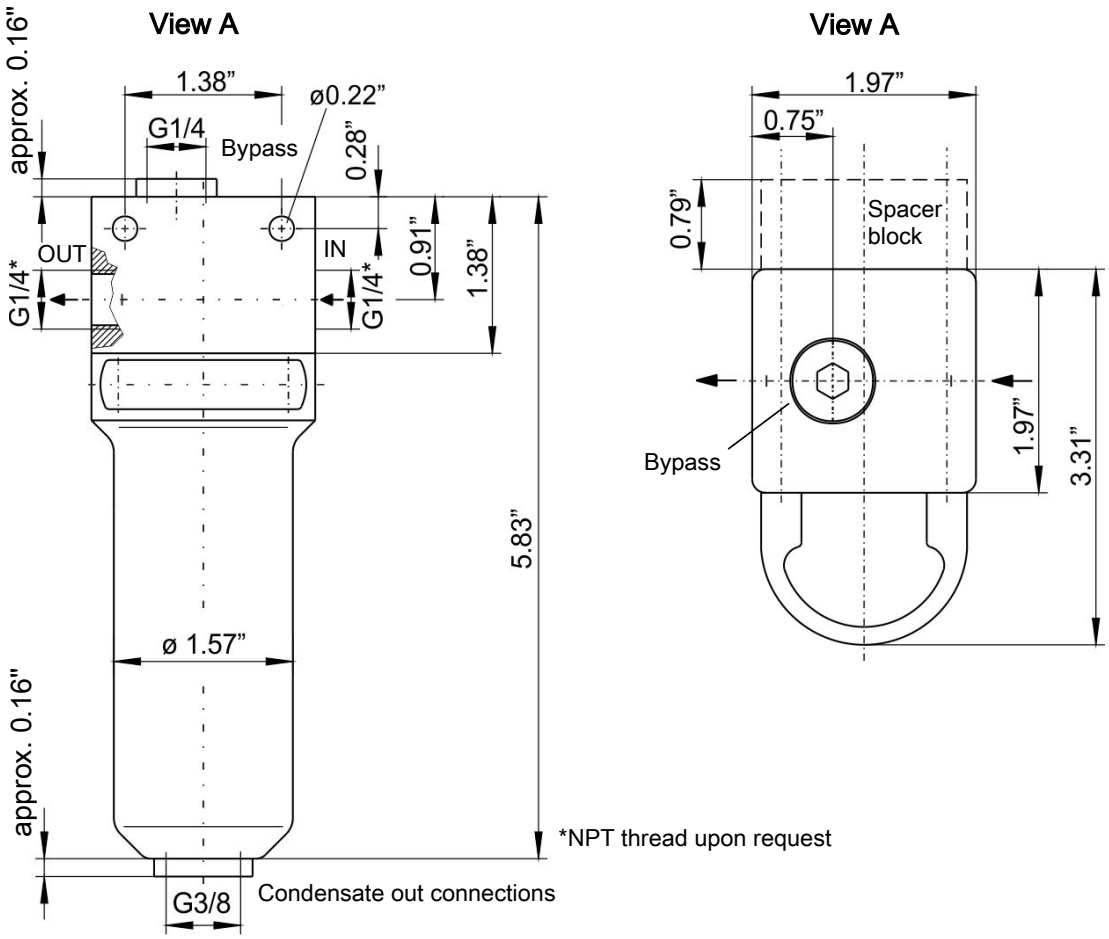
Dimensions



Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in category 2G, explosion group IIC areas. The filter is not marked, as it does not have an innate ignition source, so Directive 2014/34/EU does not apply.

Flammable gases, explosion group IIB or IIC, which could occasionally be explosive during normal operation may be conveyed through the filter.

Be sure to observe the relevant operating instructions!

Ambient temperature range when used in Ex areas: 41 °F ≤ T_{amb} ≤ 140 °F.

Technical Data

K-AGF-VA-23 Coalescence Filter	
Dead volume with filter element	55 ml
Material - filter housing	1.4571/SS 316 Ti
Material - gasket	available in Viton or HiFluor
Material - filter element	see table
Weight	1.7 kg
Operating pressure max.	160 bar
Medium temperature max.	140 °C

Ordering instructions

The filter includes a spacer block, 2 fixing bolts DN 912 M5 x 80, as well as sealing plugs inside the bypass and condensate out connection.

Filter including filter element

K-AGF-VA-	23-V	23-P
Item no.:	4142799	4142899
Element:	12-57-C	12-57-C
Seal:	Viton	HiFluor
permissible explosion group of the external filter area:	IIC	IIC
permissible explosion group of the internal filter area:	IIC	IIC

Filter element

Item no.	Model	Filter element	Material	Filter surface	Packaging unit	permissible explosion group of the internal filter area
4932001	12-57-C	Sleeve	Borosilicate fibre	4.3 in^2	1 count	IIC

Heated Sample Gas Filter AHF-22

Gas analysis is a complex field. The sample gas to be analysed must be extracted and handled under quite diverse conditions to yield representative and reliable analysis results.

One requirement may be that the sample gas be particle-free and extracted and transported hot.

The AHF-22 heated particle filter is particularly suited for this type of application. The filter element can quickly be changed without interruption and without tools.

- Simple, sturdy construction
- Easy installation
- Tool-less filter element change
- No disassembly required to replace filter
- Controlled or self-regulating heater
- Calibrating gas connection optional
- No cold spots

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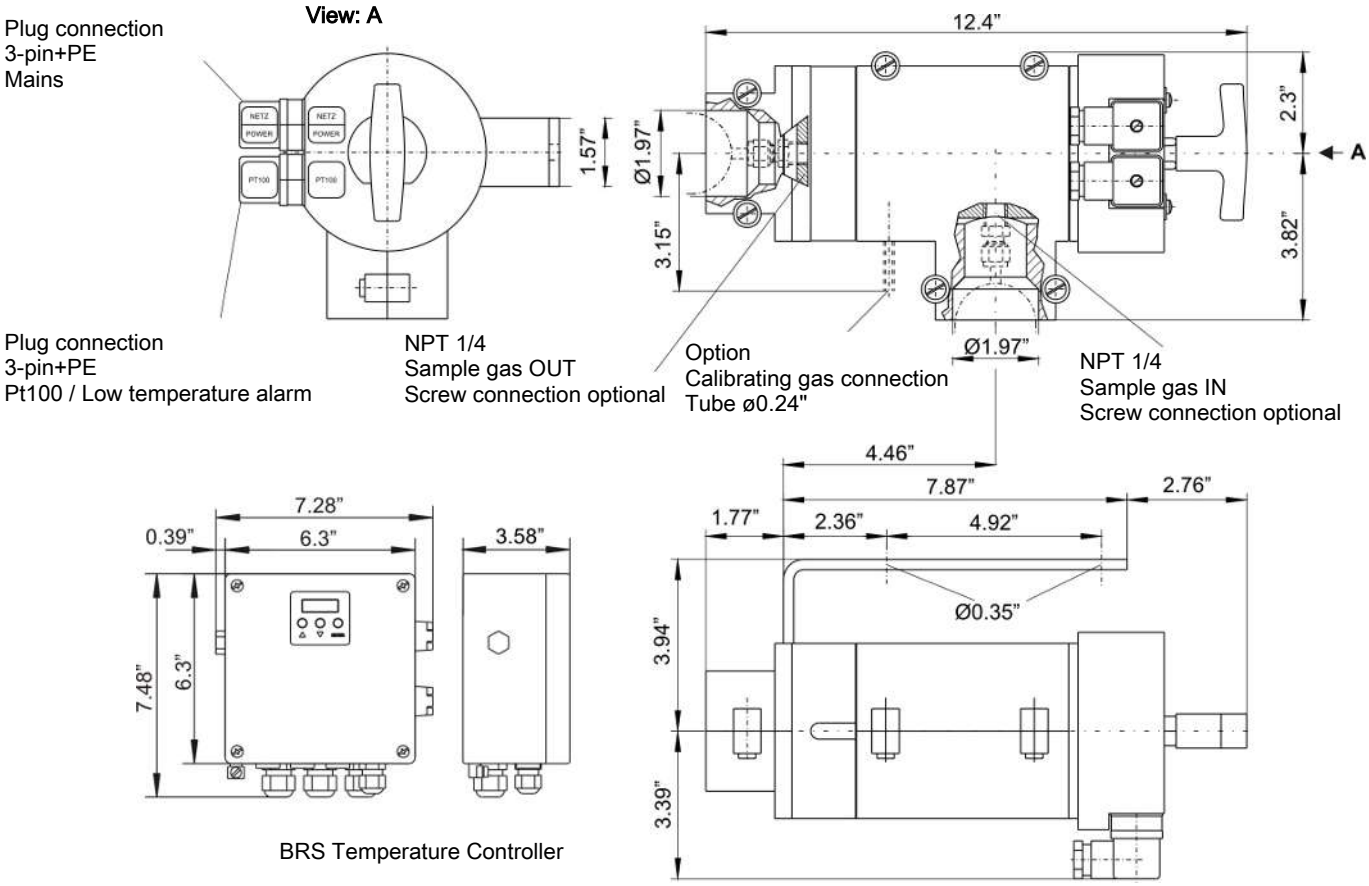
Dimensions



Technical Data

AHF-22 Heated Analysis Filter	
Dead volume	4.9 - 6.1 cu. in
Material - filter housing	1.4571
Material - gasket	Viton (perfluorelastomer upon request)
Insulation	filled resin
Heat output	400 W
Protection rating	IP 40
Weight	14.1 lb
Operating pressure max.*	230 psig
Temperatures	self-regulating heater: approx. 356°F adjustable heater: max. 392°F
Temperature sensor	self-regulating heater: contact 284 °F adjustable heater: Pt100
Ambient temperature	32...158°F

Ordering instructions

Filter*

Item no.	Model	Description	Voltage
41222294	AHF-22-S	self-regulating	115-230 V A, 50/60 Hz
41222295	AHF-22-S-K	self-regulating, calibrating gas connection	115-230 V A, 50/60 H
41222296	AHF-22-115-R	adjustable**	115 V AC, 50/60 Hz
41222299	AHF-22-230-R	adjustable**	230 V AC, 50/60 Hz
41222297	AHF-22-115-R-K	adjustable, calibrating gas connection**	115 V AC, 50/60 Hz
41222298	AHF-22-230-R-K	adjustable, calibrating gas connection**	230 V AC, 50/60 Hz
41222092	BRS	Temperature controller	230 V AC, 50/60 Hz
41222192	BRS	Temperature controller	115 V AC, 50/60 Hz

* no filter element

** no temperature controller

Filter elements

Item no.	Material	Filter fineness	Packing unit
46222010	Sintered metal incl. gaskets (Viton)	5 µm	1 pieces
46222011	Stainless steel mesh star-pleated incl. gaskets (Viton)	10 µm	1 pieces
46222026	Ceramic incl. gaskets (Viton)	3 µm	1 pieces
46222012	Set of gaskets for filter element and filter (Viton)		1 pieces
46222024	Set of gaskets for filter element and filter (perfluorelastomer)		1 pieces

Sample Gas Filter AGF-VA-350

Even if the particular contaminant has already been removed at the extraction point through effective particle filtration inside the gas sampling probe, in long or branched sample gas line there is a risk of secondary contamination. Additional filters are therefore often installed at the point where the sample gas enters the analysis system and also before delicate system components. The filter housings must be made of corrosion-resistant, non-absorbent materials, easy to install and easy to maintain. They should further be compatible with various filter elements.

Model AGF-VA-350 has a small stainless steel housing and is suitable for operating pressures up to 5076 psi.

- Very quick and easy filter changes without tools
- Low dead volume
- Variable wall mounting via mounting bracket
- (Auto-) condensate drain option through connection thread (NPT 1/4”) inside the filter cover

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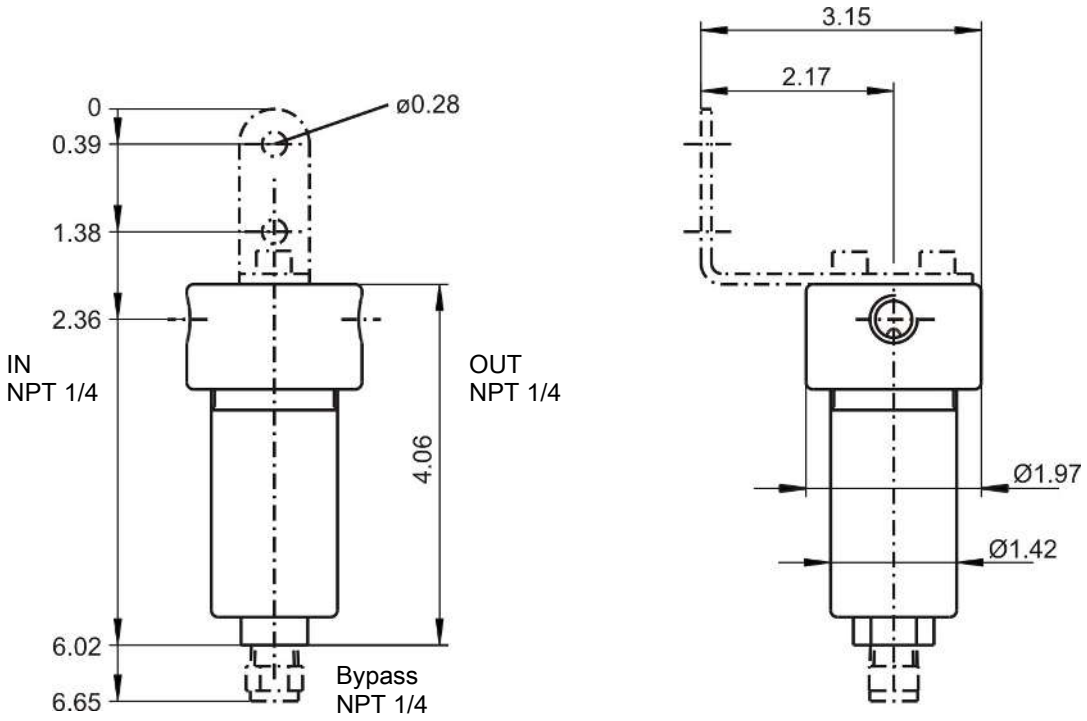
Dimensions



Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in category 2G, explosion group IIC areas. The filter is not marked, as it does not have an innate ignition source, so Directive 2014/34/EU does not apply.

Flammable gases, explosion group IIC, which could occasionally be explosive during normal operation may be conveyed through the filter.

Be sure to observe the relevant operating instructions!

Ambient temperature range when used in Ex areas: 41 °F ≤ T_{amb} ≤ 140 °F.

Technical Data

Filter	
Dead volume with filter element	1.1 cu. in.
Material - filter housing	1.4404 (SS 316L)
Material - gasket	Viton FEP shrouded
Material - filter element	see table
Weight	approx. 1.76 lb
Operating pressure max.	5076 psi
Medium temperature max.	302 °F

Ordering instructions

Filter (empty housing)

Item no.	Model	Material	permissible explosion group of the external filter area
4135999	AGF-VA-350-T for installing GF filter elements	1.4404 (SS316L), Viton gasket, FEP shrouded	IIC
41359993	Mounting bracket	1.4301 (SS 304)	
9008802	Plug NPT 1/4	1.4401 (SS 316)	
9009297	O-ring	Viton/FEP shrouded	

Filter elements

Item no.	Model	Material	Filter fineness	max. temperature	Packaging unit	permissible explosion group of the internal filter area
4135G002	GF2	Fibreglass / epoxy resin	2 µm	302 °F	1 count	IIC
4135G005	GF5	Fibreglass / epoxy resin	5 µm	302 °F	1 count	IIC
4135G010	GF10	Fibreglass / epoxy resin	10 µm	302 °F	1 count	IIC

Sample Gas Coalescing Filter K-AGF-VA-350

In specific gas technology applications, high pressure keeps the gas inside the systems. The undesirable disturbance variables also include aerosols in the gas in these types of systems. The aqueous suspended particles can easily be removed from the gas by coagulation using special filter matrices. During this process, the tiny aerosols accumulate on the fibres of the filter matrix through collision, forming drops increasing in size. Once large enough, the condensate which forms drains into the filter bowl and is then removed.

Model K-AGF-VA-350 has a stainless steel housing for operating pressures up to 5076 psi.

- Very quick and easy filter changes without tools
- Low dead volume
- Variable wall mounting via mounting bracket
- (Auto-) condensate drain option through connection thread (NPT 1/4”) inside the filter cover

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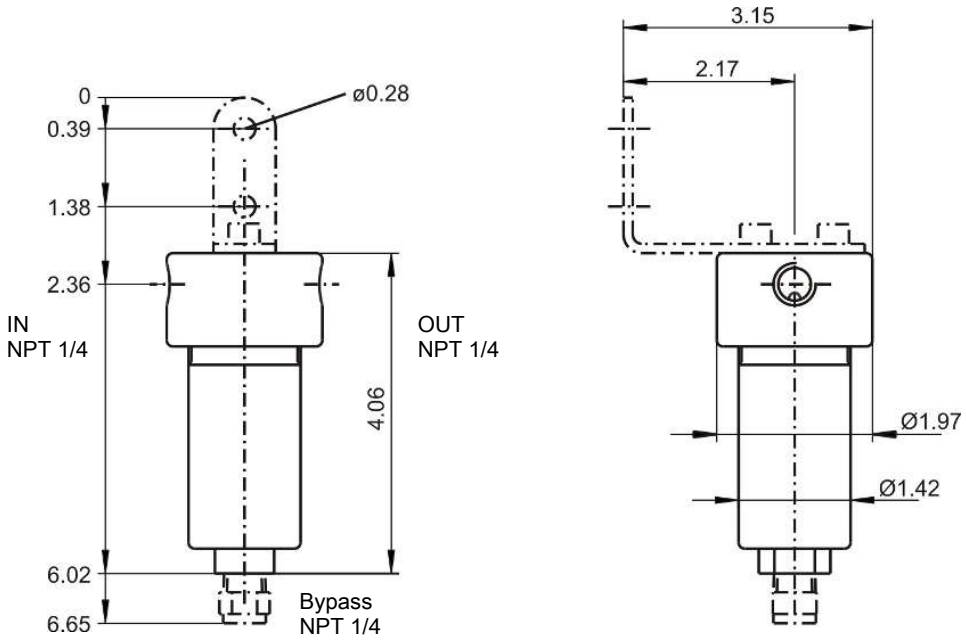
Dimensions



Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in category 2G, explosion group IIC areas. The filter is not marked, as it does not have an innate ignition source, so Directive 2014/34/EU does not apply.

Flammable gases, explosion group IIC, which could occasionally be explosive during normal operation may be conveyed through the filter.

Be sure to observe the relevant operating instructions!

Ambient temperature range when used in Ex areas: 41 °F ≤ T_{amb} ≤ 140 °F.

Technical Data

Filter	
Dead volume with filter element	1.1 cu. in.
Material - filter housing	1.4404 (SS 316L)
Material - gasket	Viton FEP shrouded
Material - filter element	see table
Weight	approx. 1.76 lb
Operating pressure max.	5076 psi
Medium temperature max.	302 °F

Ordering instructions

Filter (empty housing)

Item no.	Model	Material	permissible explosion group of the external filter area
4135099	K-AGF-VA-350-T, for installation of filter element 12-57-C	1.4404 (SS 316L), Viton gasket, FEP shrouded	IIC
41359993	Mounting bracket	1.4301 (SS 304)	
9008802	Plug NPT 1/4	1.4401 (SS 316)	
9009297	O-ring	Viton/FEP shrouded	

Filter element

Item no.	Model	Filter element	Material	Filter surface	Packaging unit	permissible explosion group of the internal filter area
4932002	12-57-C	Sleeve	Borosilicate fibre	4.3 in²	1 count	IIC

Panel-Filter AGF-FA-5

Especially in emission control via portal analysis systems the sample gas cannot always be extracted without particle contamination. The necessary conditioning systems must be compact and lightweight and therefore require small and light system components.

We offer special filter housings for these applications and for installation into a standard 19” rack.

AGF-FA-5 filters are screwed onto the front panel. The sample gas connections and an additional connection for the moisture detector can be accessed from the front panel.

Front panel
Easy installation
Large filter surface
Easy element replacement
Acid-proof materials
Bypass connection in the filter head (G1/4), connection options for bypass, moisture detector or ventilation

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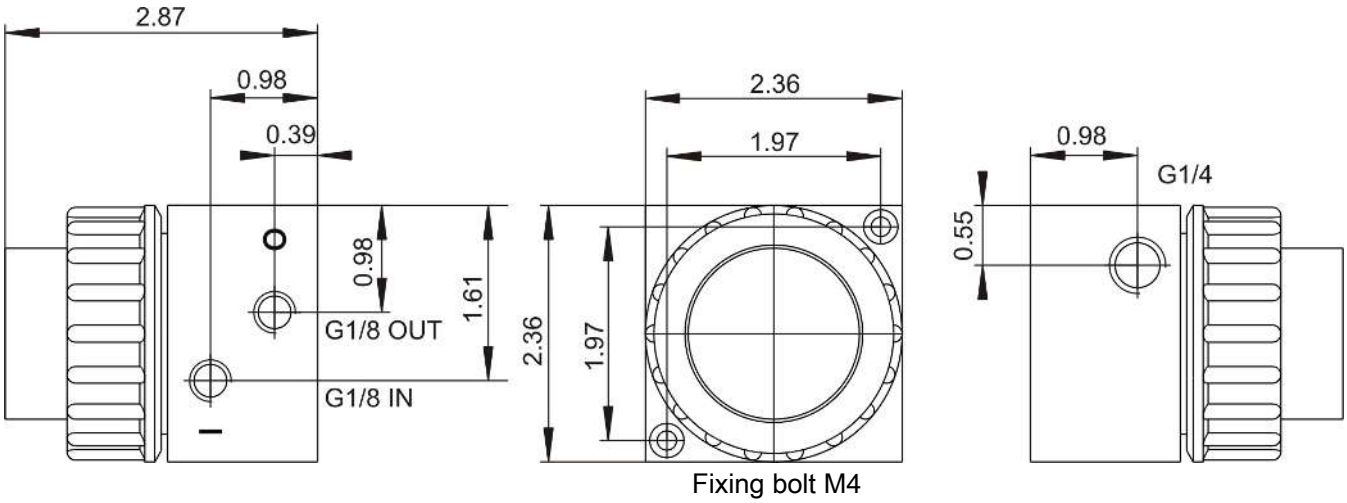
Dimensions



Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in category 2G, explosion group IIB areas. The filter is not marked, as it does not have an innate ignition source, so Directive 2014/34/EU does not apply.

Flammable gases, explosion group IIB, which could occasionally be explosive during normal operation may be conveyed through the filter.

Be sure to observe the relevant operating instructions!

Ambient temperature range when used in Ex areas: 41 °F ≤ T_{amb} ≤ 140 °F.

Technical Data

Panel filter AGF-FA-5	
Filter surface	6.5 in²
Filter fineness	2 µm
Dead volume	1.74 cu. in. (without filter element)
Material - filter housing	PTFE, PVDF, Duran glass (parts in contact with mediums)
Material - gasket	Viton
Material - filter element	Sintered PTFE
Connections	G1/8 (gas IN / OUT) or G1/4 (bypass)
Operating pressure max.	29 psig
Medium temperature	max. 212 °F
Option	Moisture detector (see Data Sheet 41 0011)

Ordering instructions

Filter including filter element

AGF-FA-	5
Item no.:	4115300
Item no. O-ring:	4101003
Element:	FE-4
permissible explosion group of the external filter area:	IIB
permissible explosion group of the internal filter area:	IIB

Filter element

Item no.	Model	Material	Packaging unit	permissible explosion group of the internal filter area
41151050	FE-4	Sintered PTFE	8 count	IIB

Membrane filter water stop

The Water Stop fine mesh filter protects the gas analyser from liquids, aerosols and particles. The filter installs in the tubing (plastic version) or piping (stainless steel version) directly before the gas analyser.

- Reliable gas analyser protection from condensate and dust
- Compact size
- Oil repellent membranes (stainless steel version)
- Bypass function ready (stainless steel version)
- Easy membrane replacement (stainless steel version)

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Description

The Water Stop fine mesh filter protects the gas analyser from liquids, aerosols and particles. The filter installs in the tubing (plastic version) or piping (stainless steel version) directly before the gas analyser.

The Water Stop fine mesh filter protects the analyser in the event the upstream gas conditioner (e.g. cooler, peristaltic pump or gas filter) fails or is overloaded. Protection is implemented through a built-in semipermeable membrane, which separates the gas from condensation and dust. If this membrane is full, the gas flow is interrupted. Our upstream flow meters can be used to electrically output an alarm indicating the interruption.

The membranes in the plastic version are not replaceable due to the economic design; on the stainless steel version they can be replaced in just a few simple steps. Simply remove the cover screws – the filter or the piping do not need to be removed. The membrane on the stainless steel version also has an oil repelling coating so it can be used for oily applications. The stainless steel filter is further designed as a bypass filter. The main gas flow and the condensate or oil it carries can therefore be discharged via the bypass. Targeted flow to the membranes yields a self-cleaning effect.

The filters are suitable for the following applications:

- Emission measurement with sulphuric fuels,
- Aerosols arising in waste incineration,
- Moist gasses, e.g. biogasses,
- Fine particle separation during processes, e.g. cement, glass, steel, paper industries,

Stainless steel version:

- Condensates containing hydrocarbons, e.g. oils and petrols in refinery process plants, engine test beds.

Technical Data

Water Stop fine mesh filter:	Plastic	Stainless steel
Max. Membrane water pressure:	0 - 29 psi	0 - 29 psi
Max. Operating pressure gas/oil:	0 - 29 psi (gas)	0 - 4 psi (oil) 0 - 725 psi (gas)
Recommended max gas glow:	0 - 6.6 lpm (air)	3 lpm (air)
Pressure drop:	1.6 lpm: approx. 0.15 psi 6.6 lpm: approx. 0.58 psi	1 lpm: approx. 0.29 psi 2 lpm: approx. 0.58 psi 3 lpm: approx. 0.87 psi
Membrane pore size:	< 0.1 µm	< 0.1 µm
Operating temperature:	32 °F...194 °F	-4 °F...374°F
Effective filter area:	3.9 inch²	4.7 inch²
Housing volume:	0.30 cu. in.	0.92 cu. in.
Materials used:	PP, PVDF, PTFE	1.4571, FKM (Viton), PTFE
Dimensions Diameter: Length/height: Depth:	 Ø2.8" 4.7"	 Ø3.9" 1.2" 6.3" (incl. mounting bracket)
Installation:	Tubing	Wall mounted
Gas connections:	DN4/6 DN1/6"/1/4" Ø6 mm	Gas inlet 1/4" NPT Gas outlet 1/8" NPT Bypass 1/4" NPT

Use in explosive areas (additional notices):

The membrane filter meet the fundamental safety requirements of Directive 2014/34/EU and are suitable for use in the areas specified below (see table). The membrane filters are not marked, as they do not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Version		Explosion classes		Operating temperature
		Internal	External	
Plastic	Zone 1	IIB	IIB	194 °F
	Zone 2	IIB	IIB	
Stainless steel	Zone 1	IIB	IIC	374 °F
	Zone 2	IIB	IIC	

Tab. 1: Provisions and limitations when used in Ex areas

DANGER

Impact

Strong blows to the housing can produce sparks, which can ignite an EX atmosphere.
Protect the equipment from external impact. Damaged housing parts must be replaced immediately.

DANGER

Dangerous electrostatic charge (explosion hazard)

Incendive electrostatic charges may occur when cleaning housing parts and decals (e.g. with a dry cloth or compressed air). The sparks this produces could ignite flammable, explosive atmospheres.
Always clean housing parts and decals **with a damp cloth**!
Metal housing parts must be earthed.

Ordering instructions

Item no.	Model
65709753	Water Stop fine mesh filter PP/PVDF/PTFE connections DN4/6
6570977	Water Stop fine mesh filter PP/PVDF/PTFE connections DN1/6"/1/4"
6570976	Water Stop fine mesh filter PP/PTFE connections Ø6 mm
65709754	Water Stop fine mesh filter 1.4571/FKM/PTFE connections internal thread 1/8" and 1/4" NPT
65709755	Replacement membranes for 1.4571 versions

Housing for Absorption Filters ADF-170 / ADF-300 (Ammonia Filter)

Gas analysis is a complex field. The sample gas to be analysed must be extracted and handled under quite diverse conditions to yield representative and reliable analysis results.

There frequently is a need to remove gaseous components from the sample gas through ad-/absorption.

For applications where the incidence of interfering components may fluctuate or the materials must have a long lifetime, the ADF-170/300 model housings are the top choice.

- All-purpose, in various sizes
- Available with high-efficiency NH_3 absorber filling
- Up to 38.000 hours life time for NH_3 absorber
- Quick and easy maintenance (tool-less)
- Chemical and temperature-resistant materials
- Condensate output optional

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Absorbent granules

NH_3 absorber

The residual ammonia slip primarily causes problems in flue gas analysis when removing nitrogen from flue gas in DeNOx systems (catalytic reduction of nitric oxides; SCR). Ammonium chlorides may particularly form in temperatures below 230 °C, which frequently cause irreversible deposits along the sample gas path or analyser. In addition, ammonia generally promotes the formation of acidic aerosols. The processes may permanently damage both the components in the gas conditioning system as well as the gas analyser. Only selective removal of ammonia parts from the sample gas can ensure a long measurement system life along and low maintenance costs.

The NH_3 absorber is the very easy and cost-effective option to selectively and reliably remove traces of ammonia from the sample gas. Of course they do not affect the gas components to be monitored, such as SO_2, NO, NO_2, CO_2, CO.

- Reliable, selective NH_3 removal from the sample gas
- Long life of up to 38.000 h
- NH_3 absorber refill pack

Filter material life in hours (h) per ppm NH_3 per volume flow (l/min):

$$\text{ADF 170 life} = \frac{20.000\ \text{h}}{1\ \text{ppm} * 1\ \text{l/min}} \quad \text{for the filter with 170 mm filter length}$$

$$\text{ADF 300 life} = \frac{38.000\ \text{h}}{1\ \text{ppm} * 1\ \text{l/min}} \quad \text{for the filter with 300 mm filter length}$$

The housing size and volume flow can be selected so as to control maintenance intervals.

Example: Sample gas contains 2 ppm NH_3 at a flow rate of 2 l/min. For the 300 mm long filter, for example, this means:

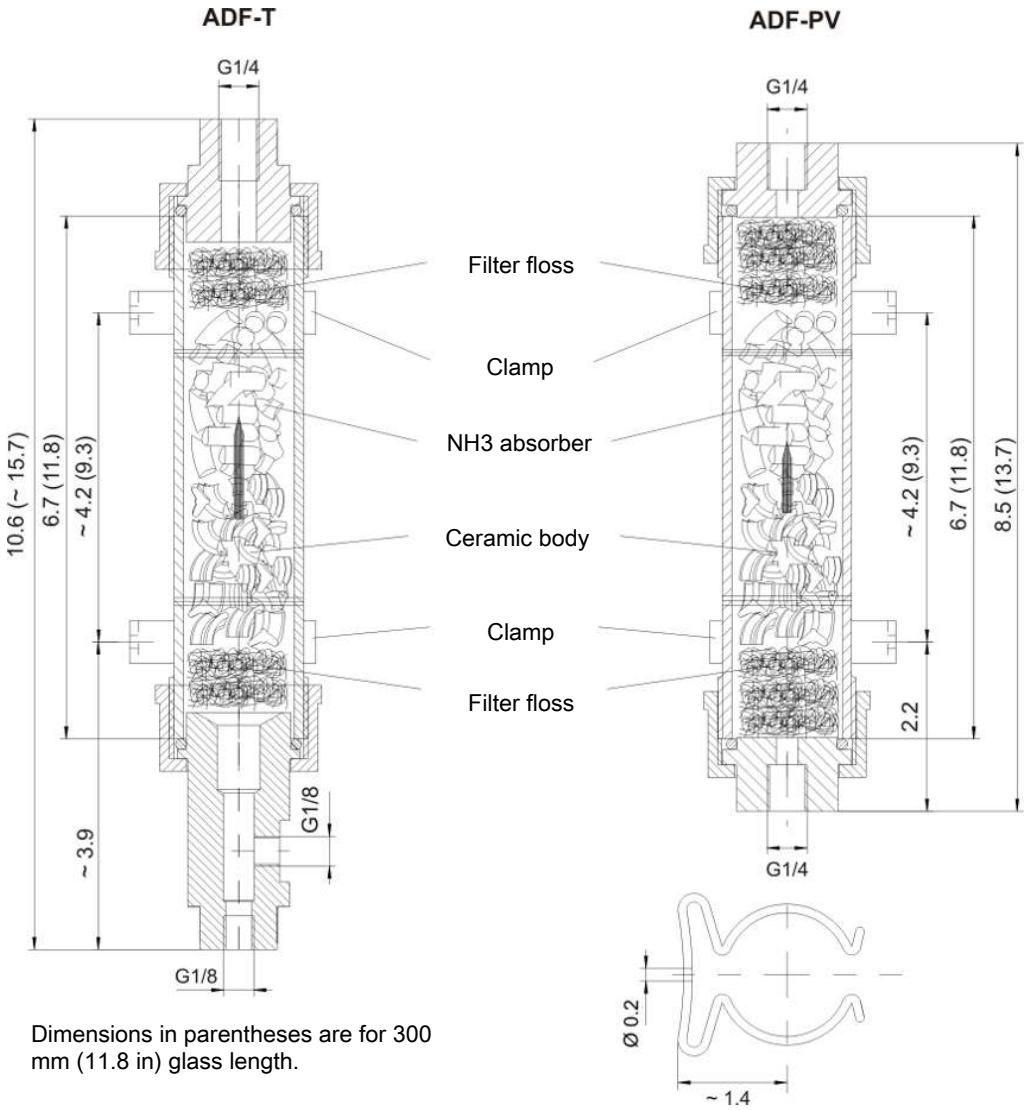
$$\text{ADF 300 life} = \frac{38.000\ \text{h}}{2\ \text{ppm} * 2\ \text{l/min}} = 9.500\ \text{h}$$

So the lives are then:

- 9.500 hours (approx. 13 months) for the ADF 300
- 5.000 hours (approx. 7 months) for the ADF 170

NOTICE! Other absorbent materials available upon request!

Dimensions



Dimensions in parentheses are for 300 mm (11.8 in) glass length.

Technical Data

ADF-170 / ADF-300	
Filter gas connections	PTFE - body (ADF-T-...), gas inlet: G1/8, gas outlet G1/4, condensate out connection G1/8 PVDF body (ADF-PV-...), gas inlet and outlet G1/4
Filter glass	Duran glass
Gasket material	Viton
Temperature max.	300 °F (gas) / 212 °F (ambient)
Pressure max.	2 bar abs. at 300 °F
Fill volume	approx. 7.6 in³ for ADF-...-170 approx. 15.3 in³ for ADF-...-300
Weight (without fill)	approx. 0.7 lb for ADF-...-170 approx. 0.9 lb for ADF-...-300
Weight (ceramic fill)	approx. 0.1 lb for ADF-...-170 approx. 0.2 lb for ADF-...-300
Weight (NH_3 absorbent material)	approx. 0.1 lb for ADF-...-170 approx. 0.2 lb for ADF-...-300

Ordering instructions

Absorption filter with NH_3 absorbent material

(The filter housings are filled with absorbent material)

Item no.	Model	Length	Material	Miscellaneous
41 57 599 KG	ADF-PV-170 KG	170 mm (6.7 in)	PVDF	
41 57 699 KG	ADF-PV-300 KG	300 mm (11.8 in)	PVDF	
41 57 799 KG	ADF-T-170-A KG	170 mm (6.7 in)	Teflon	
41 57 899 KG	ADF-T-300-A KG	300 mm (11.8 in)	Teflon	
46 222 167	Glass fibre filter floss			Package containing 0.2 lb
41 57 299 12	NH_3 ceramic granule refill pack			1 pack required for 170 mm (6.7 in) filter length 2 pack required for 300 mm (11.8 in) filter length

Absorption filter without absorbent material

Item no.	Model	Length	Material	Miscellaneous
41 57 599	ADF-PV-170	170 mm (6.7 in)	PVDF	
41 57 699	ADF-PV-300	300 mm (11.8 in)	PVDF	
41 57 799	ADF-T-170-A	170 mm (6.7 in)	Teflon	with condensate output
41 57 899	ADF-T-300-A	300 mm (11.8 in)	Teflon	with condensate output
46 222 167	Glass fibre filter floss			Package containing 0.2 lb

NOTICE! Other absorbent materials available upon request!

5 Coolers / Condensate Removal

Sample gas coolers overview

System description

The proper function and service life of an analyser is significantly influenced by the quality of the preparation of the analysis gas. One key component of this process is the sample gas cooler, which lowers the dew point so moisture in the sample gas cannot condense in the analyser. As a result, the moisture contained in the sample gas condenses out and is fed dry into the analyser. A constant outlet dew point is particularly important for uniform water extraction.

Bühler Technologies GmbH has developed **sample gas coolers** based on the **Peltier effect** and **compressor** systems. The two cooler designs differ in construction volume, and the performance based on system and environment.

Both technologies cool an aluminium block into which, depending on the cooler, one or multiple high-efficiency heat exchangers in stainless steel, Duran glass or PVDF with **1 or 2 gas paths** can be inserted. This special cooling block design and the sophisticated **Bühler consistent control system** ensure even heat dissipation. For the detection of low concentrations of water-soluble substances (e.g. SO_2) in the sample gas, a stationary dosing unit can be connected upstream, which minimises the wash-out effects in accordance with EN 15267.

A **display shows the cooling block temperature in °C or °F**. The **adjustable output dew point** is factory-configured to 41 °F and can be set to 37-68 °F as necessary. The **display** also shows **status messages** which may also be queried with the guidance of a menu. These **status outputs** mark a range of ±3 K (factory setting/adjustable) of the output dew point setting. This status is also output via potential-free relay in fail-safe control. The status output can be used, for example, to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached. The TC cooler series further allows for a **ΔT control range**, extending the available cooling capacity to the limits of the heat exchanger.

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Sample gas cooler for standard applications in gas analysis

Cooling capacity at 77 °F [1]	Cooling capacity at 104 °F [2]	max. $T_{Environment}$	Number of gas paths		Version for Ex zones[3]	Modbus RTU	Type	Data sheet no.
			1	2				
47 Btu/hr	16 Btu/hr	104 °F	TC-MINI 6111			x	Peltier	440014
52 Btu/hr	30 Btu/hr	122 °F	TC-MINI 6112			x	Peltier	440014
85 Btu/hr	52 Btu/hr	122 °F	TC-Standard 6112 (X2)		Zone 2	x	Peltier	440015 (440022)
95 Btu/hr	42 Btu/hr	104 °F	TC-Standard 6111 (X2)		Zone 2	x	Peltier	440015 (440022)
104 Btu/hr	70 Btu/hr	131 °F	TC-Kit: 63X2				Peltier	440028
166 Btu/hr	104 Btu/hr	140 °F	TC-MIDI 6112 (X2)		Zone 2	x	Peltier	440016 (440023)
185 Btu/hr	85 Btu/hr	104 °F	TC-MIDI 6111 (X2)		Zone 2	x	Peltier	440016 (440023)
256 Btu/hr	90 Btu/hr	104 °F	TC-Double 6111 (X2)		Zone 2	x	Peltier	440018 (440024)
294 Btu/hr	180 Btu/hr	140 °F	TC-Double 6112 (X2)		Zone 2	x	Peltier	440018 (440024)
303 Btu/hr	209 Btu/hr	122 °F	EGK 1 Ex2		Zone 2		Compressor	450024
303 Btu/hr	209 Btu/hr	122 °F	EGK 2-19				Compressor	450013
341 Btu/hr	261 Btu/hr	122 °F	RC 1.1			x	Compressor	450028
583 Btu/hr	341 Btu/hr	113 °F	EGK 2A Ex [4]		Zone 1		Compressor	450019
758 Btu/hr	569 Btu/hr	122 °F	EGK 4S [4]				Compressor	450006
1374 Btu/hr	1043 Btu/hr	122 °F	EGK 10				Compressor	450007

Tab. 1: Sample gas cooler for standard application in gas analysis

[1] $T_{Environment}$ 77 °F and outlet dew point 41 °F.

[2] $T_{Environment}$ 104 °F and outlet dew point 41 °F.

[3] Please refer to the data sheet for the corresponding approval.

[4] Up to 4 or 8 gas paths upon request.

Sample gas cooler optimised for emission measurement

There is a product portfolio on **emissions monitoring of air contaminants** in line with DIN EN 15267, which has been optimised with regard to the **wash-out effects** of water-soluble components. These include, for example, SO_2, NO_2, H_2S and HCl. Condensate precipitates during gas conditioning – along with some of the analytes dissolved in the water. With limit values of, for example, 12 ppm for sulphur dioxide (EN 15267-3), even the smallest losses distort the measured value significantly.

In order to minimise the wash-out effects, the coolers from Bühler have **optimised temperature control,** which guarantees an ultra-precise dew point of +/- 0.1 K. In addition, the geometries of the heat exchangers have been modified with regard to condensate discharge so that as little as possible is discharged from the gas phase.

If emissions in the low two-digit ppm range are to be detected, then **an additional stationary dosing unit (EMIDos)** with H_3PO_4 can be connected upstream, which is used with the PC 1 precooler. By adding the phosphoric acid, other acids dissolve less or not at all in the condensate, so that the analytes are retained quantitatively. To evaluate our advice for the requirements of your individual gas matrix and analysis technology, please contact our field sales force.

Cooling capacity at 77 °F [1]	Cooling capacity at 104 °F [2]	max. $T_{Environment}$	Sample gas cooler name	Version for Ex zones [3]	Modbus RTU	Type	Data sheet no.
85 Btu/hr	52 Btu/hr	122 °F	TC-Standard+ 6122 (X2)	Zone 2	x	Peltier	440020 (440025)
95 Btu/hr	42 Btu/hr	104 °F	TC-Standard+ 6121 (X2)	Zone 2	x	Peltier	440020 (440025)
104 Btu/hr	70 Btu/hr	122 °F	CU-EMA+			Peltier	440030
104 Btu/hr	70 Btu/hr	131 °F	TC-Kit+ 6322			Peltier	440029
166 Btu/hr	104 Btu/hr	140 °F	TC-MIDI+ 6122 (X2)	Zone 2	x	Peltier	440021 (440026)
185 Btu/hr	85 Btu/hr	104 °F	TC-MIDI+ 6121 (X2)	Zone 2	x	Peltier	440021 (440026)
256 Btu/hr	90 Btu/hr	104 °F	TC-Double+ 6111 (X2)	Zone 2	x	Peltier	440019 (440027)
294 Btu/hr	180 Btu/hr	140 °F	TC-Double+ 6112 (X2)	Zone 2	x	Peltier	440019 (440027)
303 Btu/hr	209 Btu/hr	122 °F	EGK 2-19+			Compressor	450026
370 Btu/hr	265 Btu/hr	122 °F	RC 1.2+		x	Compressor	450029

Tab. 2: Sample gas cooler optimised for emission measurement

[1] $T_{Environment}$ 77 °F and outlet dew point 41 °F.

[2] $T_{Environment}$ 104 °F and outlet dew point 41 °F.

[3] Please refer to the data sheet for the corresponding approval.

Sample gas cooler with heat exchangers optimised for H2 or O2 applications (e.g. electrolysis)

For use in the field of electrolysis, a **product series** has been developed which **is suitable** for high-purity gas flows of oxygen and hydrogen. In water electrolysis, water is split into its two components and these are separated from each other via a membrane. As a flammable gas mixture is produced from as little as 4% hydrogen in oxygen, permanent monitoring of the gas flows is a safety-relevant measure.

Both gases have specific characteristics: Hydrogen is very volatile and leads to hydrogen embrittlement in its elemental form. Special care must therefore be taken when selecting materials. The heat exchangers are also subjected to a helium leak test. Oxygen, on the other hand, is highly reactive and oxidising. For this reason, all parts are cleaned and installed in special clean rooms to ensure that there is no dust/grease/oil in the system.

Cooling capacity at 77 °F [1]	Cooling capacity at 104 °F [2]	max. $T_{Environment}$	Sample gas cooler name	Version for Ex zones [3]	Modbus RTU	Type	Data sheet no.
85 Btu/hr	52 Btu/hr	122 °F	TC-Standard (X2) with heat exchanger -H_2/-O_2	Zone 2	x	Peltier	440031 (440032)
95 Btu/hr	42 Btu/hr	104 °F	TC-Standard (X2) with heat exchanger -H_2/-O_2	Zone 2	x	Peltier	440031 (440032)
166 Btu/hr	104 Btu/hr	140 °F	TC-MIDI (X2) with heat exchanger -H_2/-O_2	Zone 2	x	Peltier	440033 (440034)
185 Btu/hr	85 Btu/hr	104 °F	TC-MIDI (X2) with heat exchanger -H_2/-O_2	Zone 2	x	Peltier	440033 (440034)
341 Btu/hr	261 Btu/hr	122 °F	RC1.1 with heat exchanger -H_2/-O_2		x	Compressor	450033

Tab. 3: Sample gas cooler with heat exchangers optimised for H2 or O2 applications

[1] $T_{Environment}$ 77 °F and outlet dew point 41 °F.

[2] $T_{Environment}$ 104 °F and outlet dew point 41 °F.

[3] Please refer to the data sheet for the corresponding approval.

Selection guide

1. Determine the application area: Is it a **standard preparation** for the gas analysis (table 1)? Is this to be **washout-optimised** for safe and reliable detection even of small concentrations of water-soluble substances (table 2)? Or is an application **with high-purity H_2 or O_2** planned (table 3)?
2. Determine the application area: is it explosive?
3. Determine the control options: Should this be possible via Modbus RTU?
4. If you still have several models to choose from, consider the required **cooling capacity** next. For reliable results, use our **cooler configuration program** on our website www.buehler-technologies.com. After entering the key parameters, it will provide you with the suitable, and thus most effective coolers for the cooling task.

You may also use the following rough estimate:

a) Determine the output per 1.7 lpm gas flow from the gas inlet parameters of a gas path (that with the highest cooling performance requirements) using the following table.

Gas inlet dew point:	86	104	122	140	158	°F
approx. capacity per 1.7 lpm	10	21	33	57	100	Btu/hr

Example: *A two-line gas cooler (non-Ex/non-washout-optimised) is needed. The line with the higher loading has a gas inlet dew point of 122 °F at about normal pressure (1 bar). In this case the table shows a capacity of 33 Btu/hr per 1.7 lpm.*

b) Multiply the value by the actual gas flow in lpm divided by 1.7 and by the number of gas paths.
From the example: *Each gas flow has 1 lpm and there are 2 gas flows: 33 Btu/hr per 1.7 lpm from a) x 1.7 lpm/1.7 * 2 paths = 40 Btu/hr.*

c) Compare this value with the cooling capacity of the cooler at an ambient temperature of 104 °F.
Example: *Table 1 shows: The coolers TC-Standard, TC-MIDI and various compressor coolers are still suitable. Wit the first estimate the TC-Standard 6112 with 52 Btu/hr at 104 °F still offers sufficient reserve.*

Accessories

These and other components/accessories can be attached to or installed in some coolers.

Condensate drain

Float traps are suitable for a sample gas conditioning system in pressure mode and peristaltic pumps in suction mode.

Precoolers

In applications with a high moisture content in the sample gas, a combination of a precooler and a smaller aftercooler can be the more economically efficient solution.

EMIDos acid meter

The leaching (or separation) of highly water-soluble gas components, such as SO_2, can be significantly reduced by continuously adding phosphoric acid. The measurement results are therefore more accurate and meet the requirements of decreasing detection limits.

Please note the information in the data sheets for the individual coolers and the accessory data sheets in our catalogue or on our website. www.buehler-technologies.com.

ModbusRTU

Sample gas cooler TC-MINI

Many gas analysis processes require extracting sample gas from the process. This also extracts process-related contamination such as particles or moisture. These can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser. The sample gas cooler reduces the gas temperature to below the dew point for this purpose, causing moisture to drop out, which is then discharged as condensate.

In addition to the status output to monitor the sample gas cooler function, we offer an optional 4 – 20 mA analog output or digital interface. The process control can access the process and diagnostic data via the Modbus RTU interface as well as configure the device settings.

The small size of the TC-MINI sample gas cooler is particularly suited for installation in portable or compact gas conditioning systems. Despite the small size, it has a high nominal rating and is therefore also suitable for use in warm climates.

- Peltier cooler with 1 heat exchanger
- Version for ambient temperatures up to 122 °F
- Nominal capacity 52 Btu/h (at 41 °F output dew point)
- Power supply 24 V DC
- Heat exchanger made from stainless steel, Duran glass or PVDF
- Dew point 37/41/50/59 °F or Delta-T control setting
- Signal output 4 - 20 mA or Modbus RTU
- Status display and output
- Optional filter and moisture detector
- Maintenance free
- Low operating noise

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Description and Overview

The TC-MINI series has two standard models which may have additional options added.

Standard	
TC-MINI 6111	moderate ambient temperature (up to approx. 104 °F)
TC-MINI 6112	higher ambient temperature (up to approx. 122 °F)

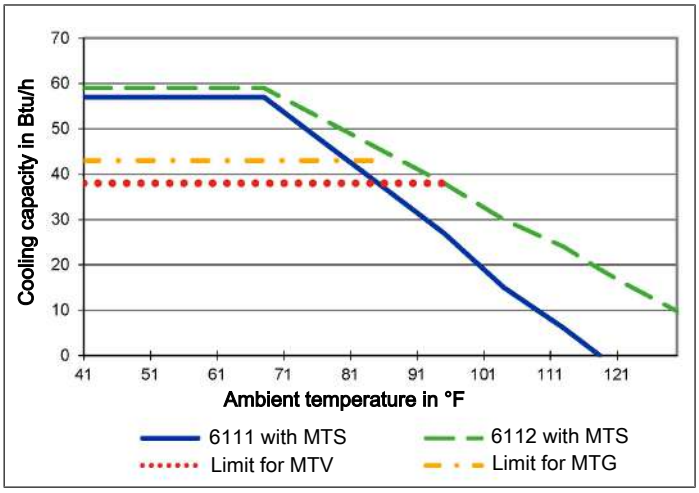
Typically intended for **small systems** designed for sample gas with low dew points and flow rate, providing a **24 V DC power supply**. In this context, typical is sample gas around normal pressure with a dew point of 104 °F, a gas inlet temperature of 158 °F, and an outlet per litre of approx. 1.7 lpm. This more or less corresponds to a cooling capacity of 22 Btu/h. Of course gasses with other parameters can also be cooled.

The cooler is **controlled** by a **microprocessor**. Flashing LEDs and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The **status output** can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached.

Connecting a **moisture detector** allows for the control to be expanded to monitoring condensate penetration.

Performance data



A selected outlet dew point of 50 °F or 59 °F shifts the curves 41 °F or 50 °F to the right.

The MTV and MTG limits apply to a normal operating point of τ_e = 104 °F and ϑ_G = 158 °F.

Outlet dew point

Remarks on outlet dew point

Not all applications require an outlet dew point of 41 °F. In some applications a higher dew point is sufficient. In other applications a stable outlet dew point doesn't matter, it's enough for the gas to be dry, so for the outlet dew point to have an adequate difference in temperature below the ambient temperature.

The advantage of a higher outlet temperature is that at a given ambient temperature the Peltier cooler provides significantly more cooling performance. So on the e.g. TC-MINI version model 6111, at an ambient temperature of 104 °F this means:

Outlet dew point:	41 °F	50 °F	59 °F
Available cooling capacity:	15 Btu/h	27 Btu/h	37 Btu/h

To fully utilize these advantages, the electronics feature several parameter settings:

1. **Adjustable outlet dew point**

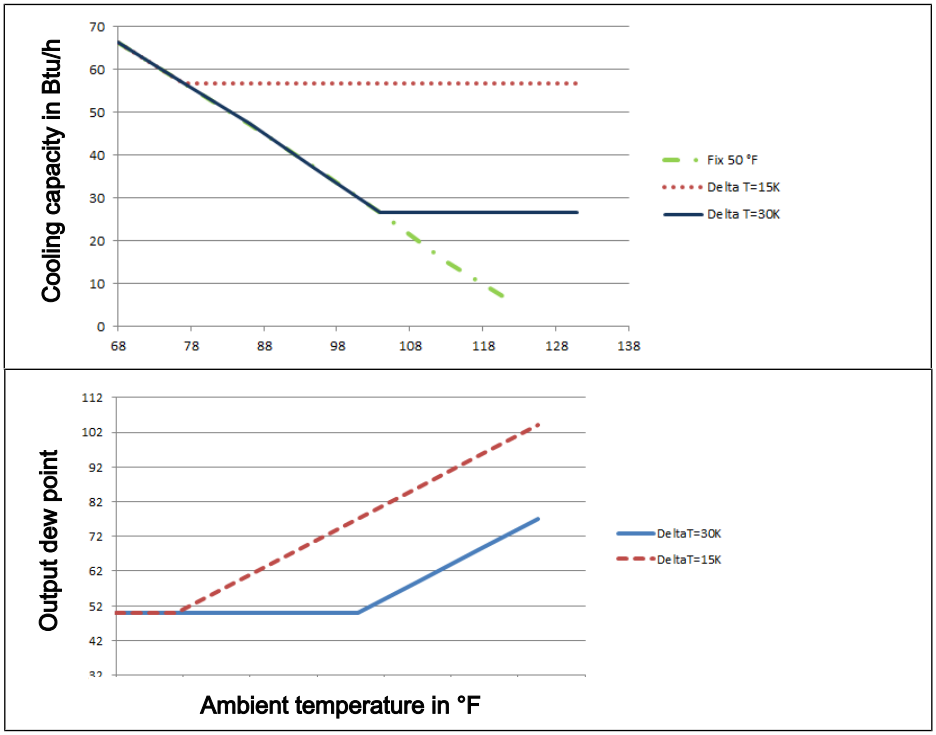
   An outlet dew point of 37, 41, 50 or 59 °F can be set to reach the specified values. Here it's important the ambient temperature is always ABOVE the outlet dew point setting, or condensation may form in the lines after the cooler. So the ambient temperature range is limited.

2. **Delta-T Control**

   Here the electronics measures the ambient temperature an regulates the outlet dew point to a an about 15 K or 30 K lower value, but no less than the dew point set under 1. This extends the potential cooling capacity to the limits of the heat exchanger. Here it's important to note the outlet dew point fluctuates along with the ambient temperature and a stable dew point cannot be a prerequisite for the measurement.

   As seen in the following graphics using the TC-MINI 6111 as an example, a difference of 15 K from the ambient temperature means the focus is on drying the sample gas. The stability of the dew point then takes a backseat to the high performance which can be achieved.

At a difference of 30 K, at a set outlet dew point of 50 °F this means the dew point remains stable up to an ambient temperature of approx. 104 °F, and the safe drop is only preferred over the ambient temperature with ambient temperature peaks over 104 °F.



Gas cooler technical data

Gas Cooler Technical Data	
Ready for operation	after max. 10 minutes
Ambient temperature	41 °F to 131 °F
Gas outlet dew temperature, preset	41 °F
IP rating	IP 20
Housing	Stainless steel, brushed
Packaging dimensions	approx. 9.3 x 8.9 x 11 in (without add-on filter)
Weight incl. heat exchanger	approx. 7.7 lb
Power supply	24 VDC
24 V output	max. 1 A
Power input	max. 70 W (plus max. 25 W at 24 V output)
Status output switching capacity	33 VAC/70 VDC, 1 A
Electrical connections, standard applications	Phoenix plug

Technical Data - Options

A moisture detector may be connected to the control. The moisture detector can be mounted to the cooler using a block or by installing it into the optional filter.

Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

AGF-PV-30-F2 Filter Technical Data	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	58 psi
Filter surface	9.3 in^2
Filter fineness	2 µm
Dead volume	3.47 cu. in.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with media) Viton sintered PTFE

Digital Interface Description

The digital interface on this device is a Modbus RTU protocol, which physically communicates via RS485 (2-wire). The cooler therefore takes on the role of the slave in communication.

The Modbus interface enables direct access to process and diagnostic data and parameters during operation.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

Heat exchanger	MTS [3] MTS-I [2] [3]	MTG [3] MTG [3]	MTV [3] MTV-I [2] [3]
Materials in contact with media	Stainless steel PVDF	Glass PTFE	PVDF
Flow rate v_{max} [1]	5 lpm	3.5 lpm	3.2 lpm
Inlet dew point $\tau_{e\,max}$ [1]	149 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	90 Btu/h	76 Btu/h	62 Btu/h
Gas pressure p_{max}	363 psi	44 psi	29 psi
Pressure drop Δp (v = 2.5 lpm)	0.29 psi	0.28 psi	0.26 psi
Dead volume V_{tot}	1.2 cu. in.	1.1 cu. in.	1 cu. in.
Gas connections (metric)	6 mm tube	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	1/4" tube	GL14 (1/4")[4]	1/4"-1/6"
Condensate out connections (metric)	G1/4	GL18 (8 mm) [4]	G1/4
Condensate out connections (US)	NPT 1/4"	GL18 (5/16)[4]	NPT 1/4"

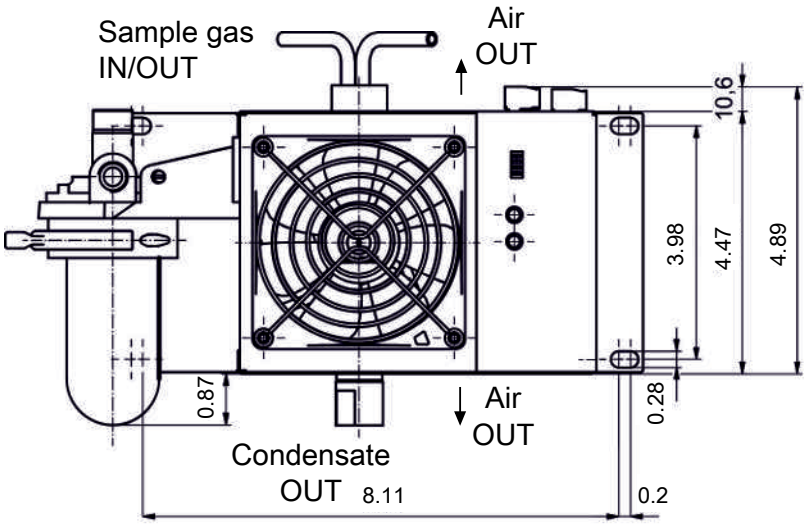
[1] Max. cooling capacity of the cooler must be considered.

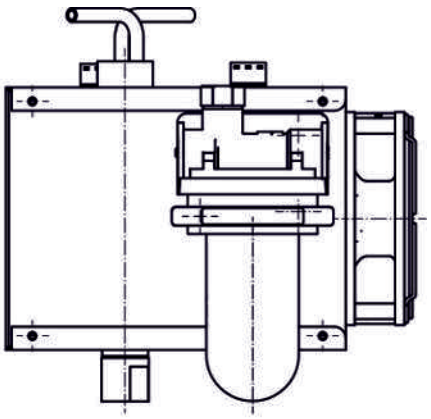
[2] Models marked I have NPT threads or US tubes, respectively.

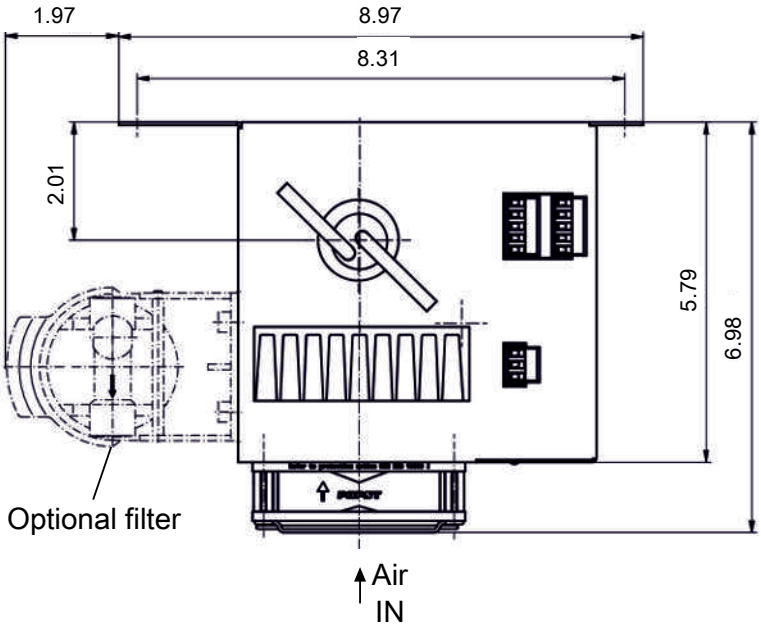
[3] Passive discharge via automatic condensate drains or traps not applicable for MTG heat exchanger. For passive discharge on the MTS and MTV heat exchangers, use a screw connection with a clearance of at least 7 mm (9/32") (see accessories).

[4] Gasket inside diameter

Dimensions (inch)







Ordering instructions

Gas cooler

4496	1	1	1	X	0	4	X	X	X	0	0	X	X	X	0	0	0	0	Product Characteristics
																			Gas cooler models (with 1 heat exchanger)
				1															TC-MINI 6111: moderate ambient temperature 104 °F
				2															TC-MINI 6112: higher ambient temperature 122 °F
																			Certifications
					0														Standard applications – CE
																			Supply voltage
						4													24 V DC
																			Heat exchanger [1]
							1	1	0	0	0								Stainless steel, MTS, metric
							1	1	5	0	0								Stainless steel, MTS-I, US
							1	2	0	0	0								Duran glass, MTG, metric
							1	2	5	0	0								Duran glass, MTG, US
							1	3	0	0	0								PVDF, MTV, metric
							1	3	5	0	0								PVDF, MTV-I, US
							1	6	0	0	0								Stainless steel, angle connector, MTS-WS, metric
							1	6	5	0	0								Stainless steel, angle connector, MTS-I-WS, US
																			Moisture detector/filter
												0	0						without filter, without moisture detector
												0	1						without filter, 1 moisture detector with block
												1	0						1 filter, without moisture detector
												1	1						1 filter with built-in moisture detector
																			Signal outputs
														1	0	0	0	0	Analog output, 4..20 mA, incl. status output
														2	0	0	0	0	Modbus RTU digital output, incl. status output

[1] Moisture detector/filter screw-in fitting and tubes metric or US, accordingly

Consumables and accessories

Item no.	Description
9112000039	24 V top-hat rail power supply
9112000040	24 V top-hat rail power supply for using the 24 V output
4510008	Automatic condensate drain AK 5.2
4510028	Automatic condensate drain AK 5.5
4410004	Automatic condensate drain AK 20
4410001	Automatic condensate drain 11 LD V 38
41030050	Replacement filter element F2; 2 µm, Unit 5 count
4381045	Screw connection G1/4 - DN 8/12 for passive condensate connection MTS and MTV
4381048	Screw connection NPT 1/4" for passive condensate connection MTS and MTV

ModbusRTU

Sample gas cooler TC-Standard

Many analysis processes require extracting sample gas from the process. This also extracts process-related contamination such as particles or moisture. These can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser. The sample gas cooler reduces the gas temperature to below the dew point for this purpose, causing moisture to drop out, which is then discharged as condensate.

In addition to the potential-free status output to monitor the sample gas cooler function, we offer an optional 4 - 20 mA analog output or digital interface. The process control can access the process and diagnostic data via the Modbus RTU communication protocol as well as configure the device settings.

Despite its compact size, the TC-Standard is a powerful sample gas cooler and already covers a large percentage of standard applications in gas analysis. Plug-in heat exchangers are available in a variety of materials and a large range of accessories can be directly built in to adapt the unit to the operating conditions.

- Compact design: Pre-installed and ready to connect
- Low maintenance costs based on easy accessibility
- One or two gas paths
- Heat exchanger made from stainless steel, Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Nominal cooling capacity 95 Btu/h (104 °F version) or 85 Btu/h (122 °F version)
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperature display
- Optional 4 - 20 mA or Modbus RTU signal output
- Optional CE mark or FM approval
- Moisture detector, filter and condensate pump optional

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Overview

The TC-Standard series was designed specifically for high cooling capacities and high ambient temperatures.

The Peltier cooler is distinguished by two types according to cooling capacity or reasonable operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications	
Operating temperature	104 °F	122 °F
1 heat exchanger	TC-Standard 6111	TC-Standard 6112
2 heat exchangers	TC-Standard 6121	TC-Standard 6122

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector

In addition, we offer different signal outputs:

- Status output
- Analog output, 4...20 mA, incl. status output,
- Modbus RTU digital output, incl. status output

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 °F to 68 °F) (factory preset 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C/ 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via connected peristaltic pumps or add-on automatic condensate drains.

Fine mesh filters can also be used, which in turn can be installed in optional moisture detectors.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if a condensate enters the cooler due to a malfunction and the peristaltic pump or the automatic condensate drain is unable to remove it.

Delta T control option

Not all applications require an outlet dew point of 41 °F. In some applications a higher dew point is sufficient. In other applications a stable outlet dew point doesn't matter, it's enough for the gas to be dry, so if the outlet dew point has an adequate difference in temperature below the ambient temperature.

Here the electronics measure the ambient temperature and regulate the outlet dew point to an adjustable value below it. This extends the potential cooling capacity to the limits of the heat exchanger. Here it's important to note the outlet dew point fluctuates along with the ambient temperature and a stable dew point cannot be a prerequisite for the measurement.

The target temperature range is defined by the ambient temperature, the adjustable temperature difference and the alarm limits. If the block temperature is not within the target range with active Delta T-control, the status message "dt" will flash in the display.

Example: At a difference of 30 K/54 °F, at a set outlet dew point of 41 °F this means the dew point remains stable up to an ambient temperature of approx. 95 °F, and the safe drop is only preferred over the ambient temperature with ambient temperature peaks over 95 °F. The cooling capacity specified in the cooling capacity graphs at 95 °F is then available at above 95 °F.

Gas cooler technical data

Gas Cooler Technical Data						
Ready for operation	after max. 10 minutes					
Ambient temperature	41 °F to 122 °F					
Gas output dew temperature preset: adjustable:	 41 °F 36 °F...68 °F or Delta T control					
IP rating	IP 20					
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) 2 Hz-13.2 Hz amplitude ± 1.0 mm 13.2 Hz -100 Hz acceleration					
Housing	Stainless steel, brushed					
Packaging dimensions	approx. 14 x 8.7 x 8.1 in					
Weight incl. heat exchanger	approx. 16.5 lb approx. 13.2 lb (for 24 V DC) approx. 19.8 lb at full expansion stage					
Electrical data	Unit without add-on			Unit with add-on (1 peristaltic pump)		
	24 V DC	**230 V AC**	**115 V AC**	**24 V DC**	**230 V AC**	**115 V AC**
	±10%	+5/-10%	+5/-10%	±10%	+5/-10%	+5/-10%
	-	50/60 Hz	50/60 Hz	-	50/60 Hz	50/60 Hz
	5 A	0.6 A	1.2 A	5.5 A	0.7 A	1.4 A
	120 W	110 W / 140 VA		130 W	130 W / 160 VA	
Recommended fuse (characteristic: delayed action)	6.3 A	1.25 A	2.5 A	6.3 A	1.25 A	2.5 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free					
Electrical Connections	Plug per EN 175301-803					
Gas connections and condensate outlet	Heat exchanger see table "Heat Exchanger Overview" Filter, moisture detector adapter G1/4 or NPT 1/4"					
Parts in contact with media Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton					
FM no.:	3062014					

Technical Data - Options

Analogue Output Cooler Temperature Technical Data

Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Digital interface technical data

Signal	Modbus RTU (RS-485)
Connection	M12x1 connector, DIN EN 61076-2-101

Technical Data FF-3-N Moisture Detector

Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Technical Data Peristaltic Pumps CPsingle / CPdouble

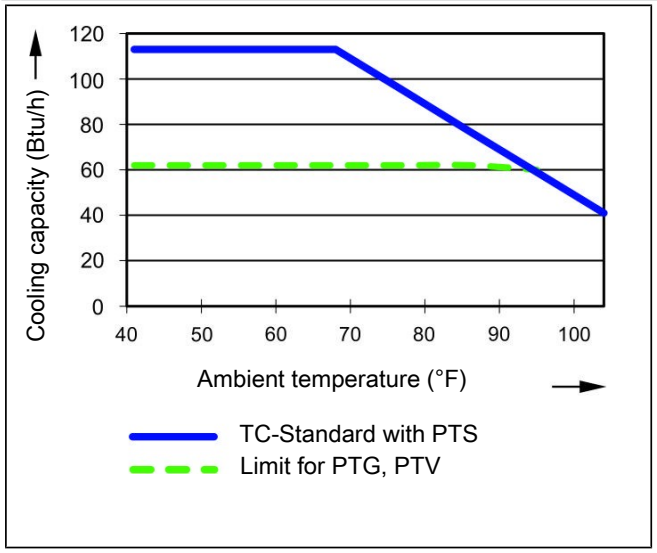
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Condensate outlet	Hose nipple Ø6 mm (0.24 in) Screw connection 4/6 (metric), 1/6”-1/4” (US)
Protection class	IP 44
Materials	
Hose:	Norprene (Standard), Marprene, Fluran
Connections:	PVDF

AGF-PV-30-F2 Filter Technical Data

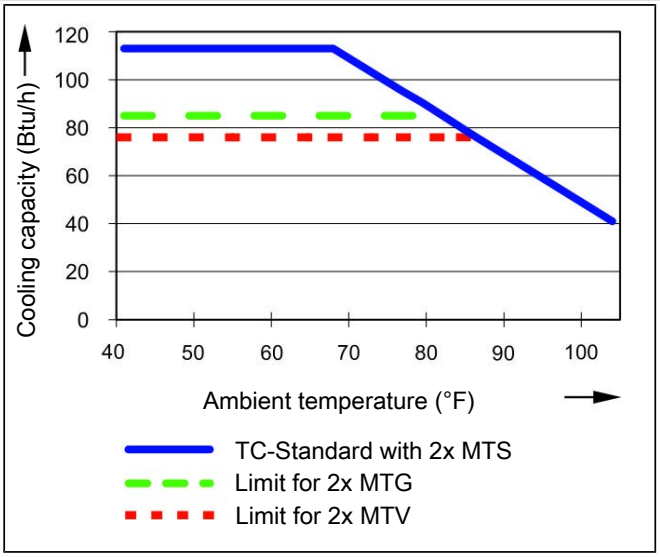
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	58 psi
Filter surface	9.3 in^2
Filter fineness	2 µm
Dead volume	3.47 cu. in.
Materials	
Filter:	PVDF, Duran glass (parts in contact with media)
Seal:	Viton
Filter element:	sintered PTFE

Output

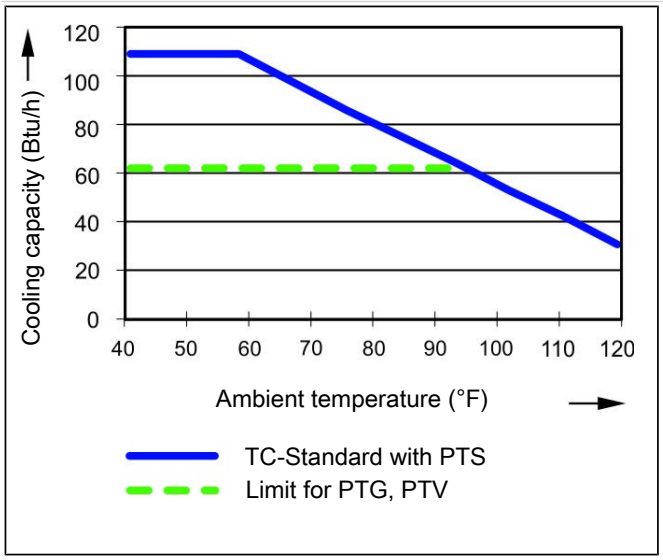
One heat exchanger	
Model TC-Standard 6111	
Rated cooling capacity (at 77 °F)	95 Btu/h
Max. Ambient temperature	104 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K



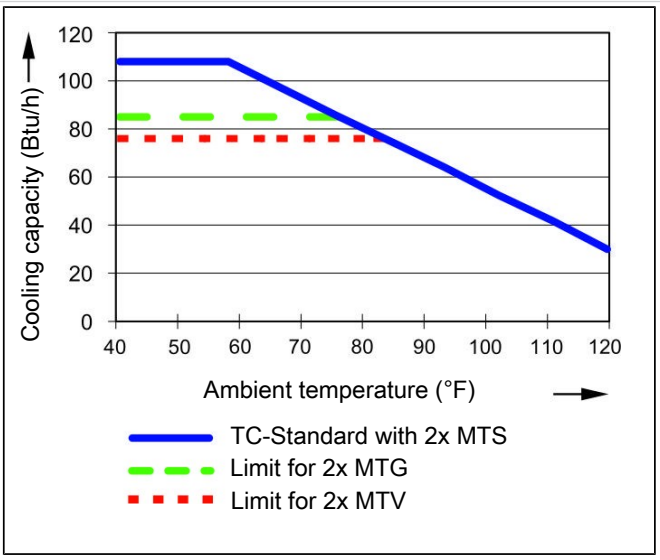
Two heat exchangers	
Model TC-Standard 6121	
Rated cooling capacity (at 77 °F)	95 Btu/h
Max. Ambient temperature	104 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K
Temperature difference between heat exchangers	< 0.5 K



Model TC-Standard 6112	
Rated cooling capacity (at 77 °F)	85 Btu/h
Max. Ambient temperature	122 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K



Model TC-Standard 6122	
Rated cooling capacity (at 77 °F)	85 Btu/h
Max. Ambient temperature	122 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K
Temperature difference between heat exchangers	< 0.5 K



Note: The limit curves for the heat exchangers exchanger PTG, PTV or MTV apply to a dew point of 104 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

Heat exchanger	PTS PTS-I [2]	PTG PTG-I	PTV PTV-I [2]	MTS [3] MTS-I [2] [3]	MTG [3] MTG [3]	MTV [3] MTV-I [2] [3]
Materials in contact with media	Stainless steel	Glass PTFE	PVDF	Stainless steel PVDF	Glass PTFE	PVDF
Flow rate v_{max} [1]	7.5 lpm	4.2 lpm	4.2 lpm	5 lpm	3.5 lpm	3.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	149 °F	149 °F	149 °F	149 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F	284 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	142 Btu/h	85 Btu/h	85 Btu/h	90 Btu/h	76 Btu/h	62 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	29 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.15 psi	0.15 psi	0.15 psi	0.29 psi	0.28 psi	0.26 psi
Dead volume V_{tot}	1.8 cu. in.	1.8 cu. in.	3.48 cu. in.	1.2 cu. in.	1.1 cu. in.	1 cu. in.
Gas connections (metric)	6 mm	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm)	DN 4/6
Gas connections (US)	1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	G1/4	GL18 (8 mm)	G1/4
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	NPT 1/4"	GL18 (8 mm)	NPT 1/4"

[1] Max. cooling capacity of the cooler must be considered.

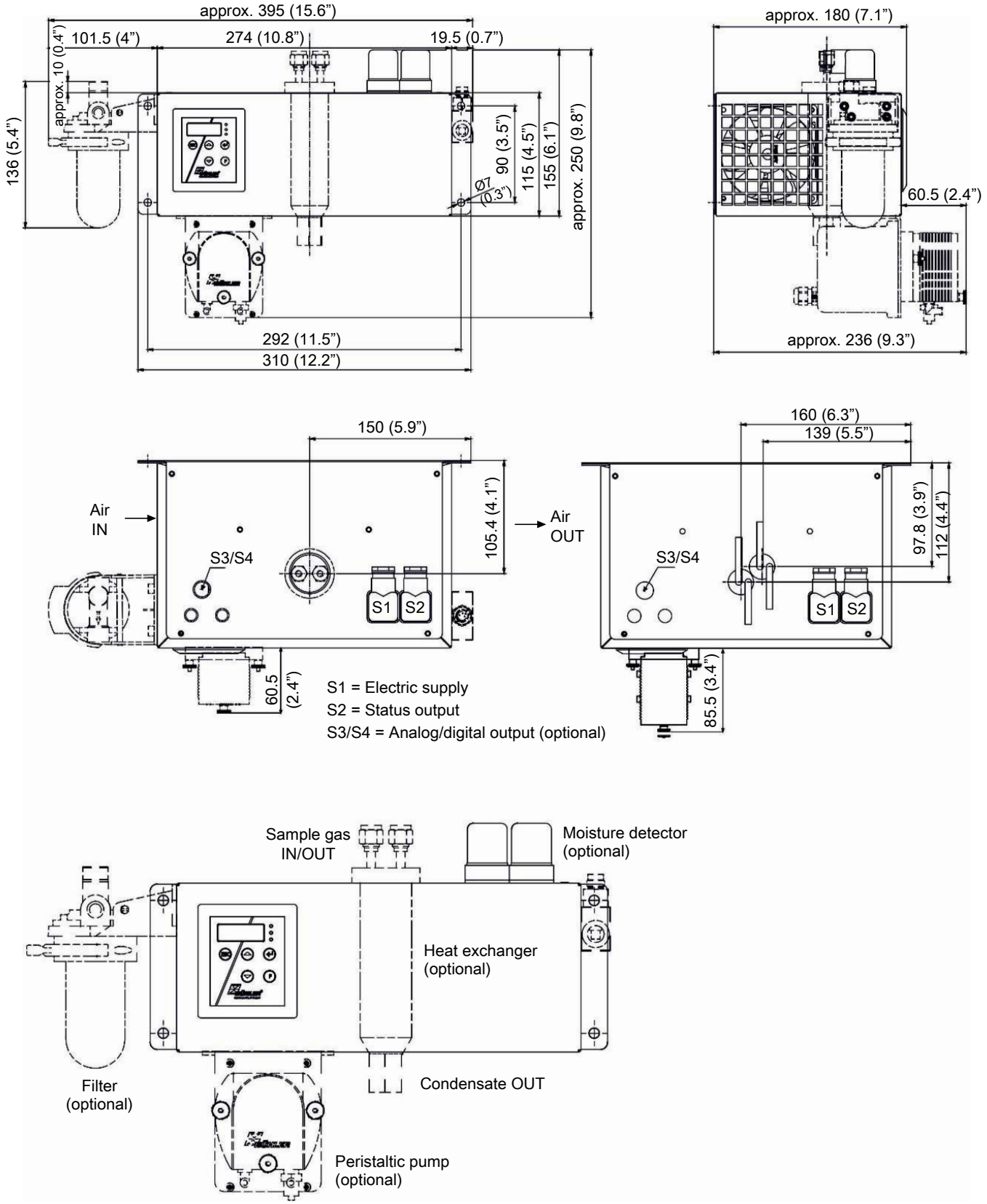
[2] Models marked I have NPT threads or US tubes, respectively.

[3] Passive discharge via automatic condensate drains or traps not applicable for MTG heat exchangers. For passive discharge on the MTS and MTV heat exchangers, use a screw connection with a clearance of at least 7 mm (9/32") (see accessories).

[4] Gasket inside diameter.

Dimensions (inch)

Models for standard applications (TC-Standard 611x and 612x):



Ordering instructions

Gas cooler models with one heat exchanger

The item number is a code for the configuration of your unit. Please use the following model code:

4496	2	1	1	X	X	X	1	X	X	X	0	X	X	X	0	X	0	0	Product Characteristics
																			Gas cooler models (with 1 heat exchanger)
				1															TC-Standard 6111: Ambient temperature 104 °F
				2															TC-Standard 6112: Ambient temperature 122 °F
																			Certifications
					0														Standard applications – CE
					1														for common locations - FM
																			Supply voltage
						1													115 V AC, 50/60 Hz
						2													230 V AC, 50/60 Hz
						4													24 V DC
																			Heat exchanger
							1	1	0										Stainless steel, PTS, metric
							1	1	5										Stainless steel, PTS-I, US
							1	2	0										Duran glass, PTG, metric
							1	2	5										Duran glass, PTG-I, US
							1	3	0										PVDF, PTV, metric
							1	3	5										PVDF, PTV-I, US
																			Condensate drain [1]
										0	0								without condensate drain
										1	0								CPsingle with hose nipple, angled
										3	0								CPsingle with screw connection [3]
																			Moisture detector/filter
												0	0						without filter, without moisture detector
												0	1						without filter, 1 moisture detector with PVDF adapter [2]
												1	0						1 filter, without moisture detector
												1	1						1 filter with built-in moisture detector
																			Signal outputs
														0	0				status output only
														1	0				Analog output, 4...20 mA incl. status output
														2	0				Modbus RTU digital output incl. status output [4]
																			Delta T control
																0	0		without Delta T control
																1	0		Delta T control option

[1] 24 V DC CPsingle not connected electrically.

[2] Also available in stainless steel.

[3] Metric or US connection, per heat exchanger.

[4] Option only available for CE version.

Gas cooler models with two heat exchangers

The item number is a code for the configuration of your unit. Please use the following model code:

4496	2	1	2	X	X	X	2	X	X	X	0	X	X	X	0	X	0	0	Product Characteristics
																			Gas cooler models (with 2 heat exchangers)
				1															TC-Standard 6121: Ambient temperature 104 °F
				2															TC-Standard 6122: Ambient temperature 122 °F
																			Certifications
					0														Standard applications – CE
					1														for common locations - FM
																			Supply voltage
						1													115 V AC, 50/60 Hz
						2													230 V AC, 50/60 Hz
						4													24 V DC
																			Heat exchanger
							2	1	0										Stainless steel, 2 MTS, metric
							2	1	5										Stainless steel, 2 MTS-I, US
							2	2	0										Duran glass, 2 MTG, metric
							2	2	5										Duran glass, 2 MTG-I, US
							2	3	0										PVDF, 2 MTV, metric
							2	3	5										PVDF, 2 MTV-I, US
																			Condensate drain [1]
										0	0								without condensate drain
										2	0								CPdouble with hose nipple, angled
										4	0								CPdouble with screw connection [3]
																			Moisture detector/filter
												0	0						without filter, without moisture detector
												0	1						without filter, 1 moisture detector with PVDF adapter [2]
												0	2						without filter, 2 moisture detectors with PVDF adapter [2]
												1	0						1 filter, without moisture detector
												1	1						1 filter with built-in moisture detector
												2	0						2 filters, without moisture detector
												2	1						2 filters, 1 moisture detector
												2	2						2 filters, 2 moisture detectors
																			Signal outputs
														0	0				status output only
														1	0				Analog output, 4...20 mA incl. status output
														2	0				Modbus RTU digital output incl. status output [4]
																			Delta T control
																0	0		without Delta T control
																1	0		Delta T control option

[1] 24 V DC CPdouble not connected electrically.

[2] Also available in stainless steel.

[3] Metric or US connection, per heat exchanger.

[4] Option only available for CE version.

Consumables and accessories

Item no.	Description
4510008	Automatic condensate drain AK 5.2 (pressure operation only)
4510028	Automatic condensate drain AK 5.5 (pressure operation only)
4410004	Automatic condensate drain AK 20 (pressure operation only)
4410001	Automatic condensate drain 11 LD V 38 (pressure operation only)
41030050	Replacement filter element F2; 5-pack
9144050038	Cable for cooler temperature analog output 4 m
4410005	Condensate trap GL1, 0.4 L
44920035012	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple
44920035016	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (metric)
44920035017	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (US)
4381045	Screw connection G1/4 – DN 8/12 for passive condensate connection MTS or MTV(-2)
4381048	Screw connection NPT 1/4” for passive condensate connection MTS-I or MTV(-2)-I

ModbusRTU

H_2/O_2 ready

Sample gas cooler TC-Standard with -H2/-O2 heat exchanger

When a compact design is required, the TC-Standard sample gas cooler with -H2/-O2 heat exchanger is the ideal solution for reliable cooling of hydrogen (H_2) and oxygen (O_2) in extractive gas analysis. Green hydrogen produced by electrolysis using renewable energy sources is the key to a sustainable, emission-free future in the energy industry.

The safe, reliable cooling of the sample gas is decisive for gas analytics in the electrolyser (e.g. for LEL monitoring), as a higher moisture content is to be expected with some processes. The moisture in the process gas can damage the sensitive measuring cells in the analyser, so the gas temperature is kept below gas dew point at all times, thus causing the moisture to be emitted. The condensate is discharged via an automatic condensate drain.

As well as material-refining measures to prevent hydrogen-induced component damage, the heat exchangers for the H_2 series are subjected to a leak test using helium. For the O_2 version, special cleaning processes are used to remove particles, oils and fats from parts coming into contact with media. The contamination limits are based on the internationally used and applicable guideline EIGA Doc 33/18 “Cleaning of Equipment for Oxygen Service”.

- For applications with high-purity hydrogen or oxygen
- Cleaning standard is based on EIGA Doc 33/18 as regards the absence of particles, oils and fats for heat exchangers with the O_2 version
- Materials in contact with media are suitability-tested for high H_2 and O_2 concentrations
- Heat exchanger leak tests using helium are performed on the H_2 series as standard
- Nominal cooling capacity 95 Btu/h (104 °F version) or 85 Btu/h (122 °F version)
- Constant dew point stability ± 0.2 °F
- Adjustable outlet dew point and alarm thresholds
- Cooling block temperature display
- Optional 4–20 mA or Modbus RTU signal output
- Easy accessibility reduces maintenance costs

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The TC-Standard with -H2/-O2 heat exchanger series was specially developed for use with high-purity hydrogen and oxygen.

The Peltier coolers are distinguished according to cooling capacity / operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the ordering information category.

Application	Standard applications	
Operating temperature	104 °F	122 °F
1 heat exchanger for H_2/O_2 applications	TC-Standard 6111	TC-Standard 6112

We also offer different signal outputs:

- Status output,
- Analog output, 4...20 mA, incl. status output,
- Modbus RTU digital output, incl. status output.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset, the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured using the 5 buttons with the guidance of the menu. This applies to the target outlet dew point, which can be set from 2 to 20 °C (36 to 68 °F) (factory setting 5 °C/41 °F),

as well as the warning thresholds, which can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature, the range is τ_a -1 to - 3 K (at a minimum 1 °C/34 °F cooling block temperature); for the excess temperature, the range is τ_a +1 to +7 K. The factory settings for both values are 3 K.

The flashing display and the status relays indicate that the conditions are below or above the configured warning range (e.g. after switching on).

The separated condensate can be drained via add-on automatic condensate drains.

Delta T control option

Not all applications require an outlet dew point of 41 °F. In some applications a higher dew point is sufficient. In other applications a stable outlet dew point doesn't matter, it's enough for the gas to be dry, so if the outlet dew point has an adequate difference in temperature below the ambient temperature.

Here the electronics measure the ambient temperature and regulate the outlet dew point to an adjustable value below it. This extends the potential cooling capacity to the limits of the heat exchanger. Here it's important to note the outlet dew point fluctuates along with the ambient temperature and a stable dew point cannot be a prerequisite for the measurement.

The target temperature range is defined by the ambient temperature, the adjustable temperature difference and the alarm limits. If the block temperature is not within the target range with active Delta T-control, the status message "dt" will flash in the display.

Example: At a difference of 30 K/54 °F, at a set outlet dew point of 41 °F this means the dew point remains stable up to an ambient temperature of approx. 95 °F, and the safe drop is only preferred over the ambient temperature with ambient temperature peaks over 95 °F. The cooling capacity specified in the cooling capacity graphs at 95 °F is then available at above 95 °F.

Gas cooler technical data

Gas cooler technical data			
Ready for operation	after max. 10 minutes		
ambient temperature	41 °F to 122 °F		
Gas outlet dew point preset: adjustable:	 41 °F 36 °F...68 °F or Delta T control		
IP rating	IP 20		
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7 g) 2 Hz-13.2 Hz amplitude ± 1.0 mm 13.2 Hz -100 Hz acceleration		
Housing	Stainless steel, brushed		
Packaging dimensions	approx. 14 x 8.7 x 8.1 in		
Weight incl. heat exchanger	approx. 16.5 lb approx. 13.2 lb (for 24 V DC)		
Electrical data	Unit without add-on		
	24 V DC	**230 V AC**	**115 V AC**
	±10%	+5/-10%	+5/-10%
	-	50/60 Hz	50/60 Hz
	5 A	0.6 A	1.2 A
	120 W	110 W / 140 VA	
Recommended fuse (characteristic: delayed action)	6.3 A	1.25 A	2.5 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free		
Electrical Connections	Plug per EN 175301-803		
Parts in contact with media Heat exchanger:	 see table "Heat Exchanger Overview"		

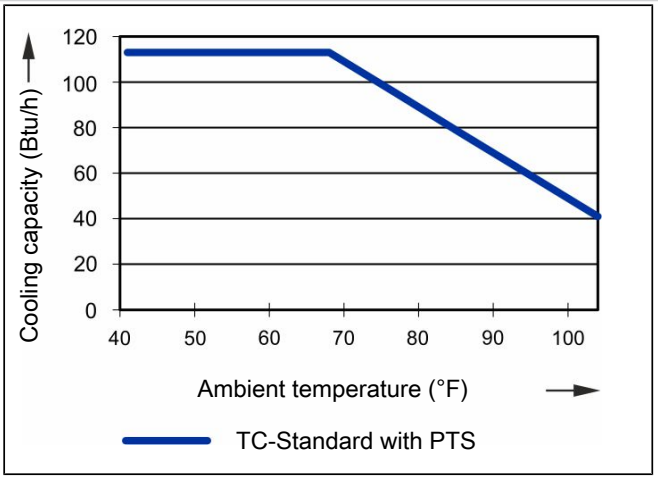
Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

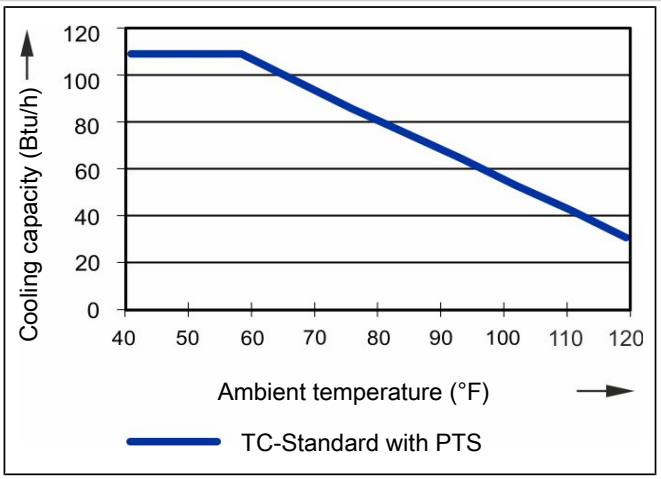
Digital interface technical data	
Signal	Modbus RTU (RS-485)
Connection	M12x1 connector, DIN EN 61076-2-101

Performance curves

Model TC-Standard 6111	
Rated cooling capacity (at 77 °F)	95 Btu/h
Max. ambient temperature	104 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K



Model TC-Standard 6112	
Rated cooling capacity (at 77 °F)	85 Btu/h
Max. ambient temperature	122 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K



Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

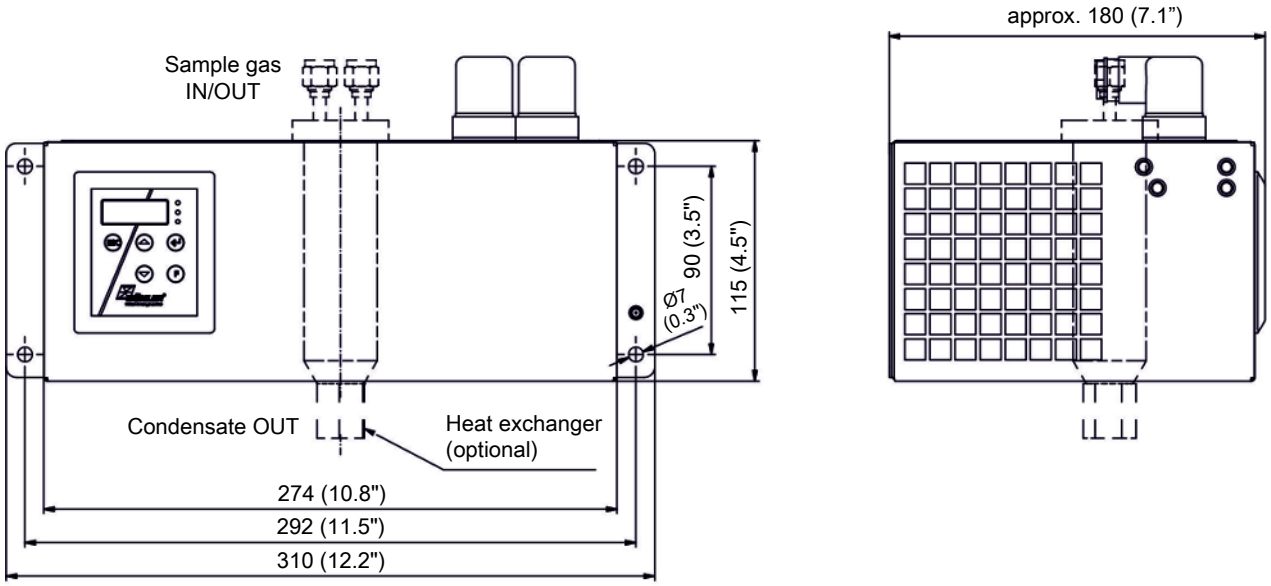
Heat exchanger overview

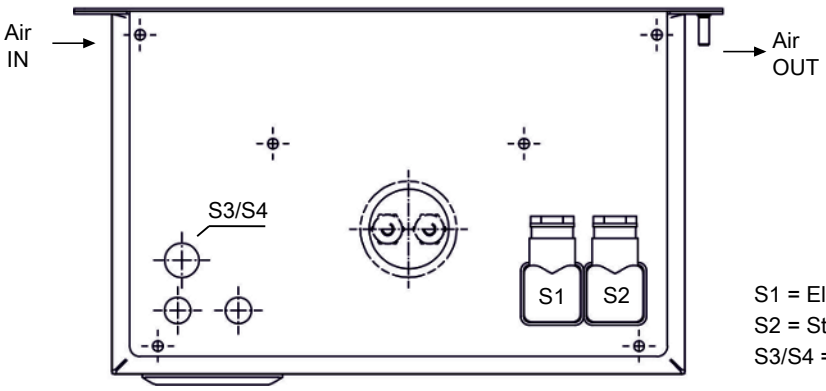
Heat exchanger	PTS-H2/-O2 PTS-I-H2/-O2 [2]
Materials in contact with media	Stainless steel
Flow rate v_{max} [1]	7.5 lpm
Inlet dew point $\tau_{e,max}$ [1]	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F
Max. cooling capacity Q_{max}	142 Btu/h
Gas pressure p_{max}	22 psi
Pressure drop Δp (v=2.5 lpm)	0.15 psi
Dead volume V_{dead}	1.8 cu. in.
Gas connections (metric)	6 mm
Gas connections (US)	1/4"
Condensate out connection (metric)	G3/8
Condensate out connection (US)	NPT 3/8"

[1] Max. cooling capacity of the cooler must be considered.

[2] Models marked I have NPT threads or US tubes.

Dimensions (inch)





S1 = Electric supply
S2 = Status output
S3/S4 = Analog/digital output (optional)

Ordering instructions

Gas cooler models with one heat exchanger for H2/O2 applications

The item number is a code for the configuration of your unit. Please use the following model code:

4496	2	1	1	X	X	X	1	1	X	0	0	0	0	X	0	X	0	X	Product Characteristics
																			Gas cooler models (with 1 heat exchanger)
				1															TC-Standard 6111: Ambient temperature 104 °F
				2															TC-Standard 6112: Ambient temperature 122 °F
																			Certifications
					0														Standard applications – CE
					1														for common locations - FM
																			Supply voltage
						1													115 V AC, 50/60 Hz
						2													230 V AC, 50/60 Hz
																			Heat exchanger
							1	1	0									-O2	Stainless steel, PTS-O2, metric
							1	1	5									-O2	Stainless steel, PTS-I-O2, US
							1	1	0									-H2	Stainless steel, PTS-H2, metric
							1	1	5									-H2	Stainless steel, PTS-I-H2, US
																			Signal outputs
															0	0			status output only
															1	0			Analog output, 4...20 mA, incl. status output
															2	0			Modbus RTU digital output incl. status output [1]
																			Delta T control
																	0	0	without Delta T control
																	1	0	Delta T control option

[1] Option only available for CE version.

Spare parts and accessories for cooler with -H2/-O2 heat exchanger

Item no.	Description
4410001 (see data sheet 450005)	Automatic condensate drain 11 LD V 38 [1]
4410001-O2 (see data sheet 450005)	Automatic condensate drain 11 LD V 38 optimised for oxygen
see data sheet 400016	Stainless steel pipe fittings for high-purity oxygen applications

[1] For use with high hydrogen concentrations max. 22 psi overpressure.

Sample gas cooler TC-Standard X2

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

Many applications require equipment which can be used in explosive areas. This is where the TC-Standard X2 series provides solutions for Zone 2 or Class I, Division 2.

Despite its small size, the TC-Standard X2 sample gas cooler already covers a large percentage of standard applications in gas analysis.

- ATEX and IECEx Zone 2 approval
- FM C-US approval for Class I, Division 2
- Compact design: Pre-installed and ready to connect
- Low maintenance costs based on easy accessibility
- One or two gas paths
- Heat exchanger made from stainless steel, Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Low operating noise
- Rated capacity 95/85 Btu/h, 104 °F/122 °F - Version
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperature display
- Moisture detector connection, analog output, filter, and peristaltic pump optional

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Internet: www.buhlertech.com

Overview

The TC-Standard X2 series was designed specifically for high cooling capacities and high ambient temperatures.

The Peltier coolers are distinguished according to cooling capacity/operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications		
Operating temperature	104 °F	122 °F	
1 heat exchanger	TC-Standard 6111 X2	TC-Standard 6112 X2	3rd digit=1
2 heat exchangers	TC-Standard 6121 X2	TC-Standard 6122 X2	3rd digit=2
	4th digit=1	4th digit=2	

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector.

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 °F to 68 °F) (factory preset 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C/ 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via connected peristaltic pumps or add-on automatic condensate drains.

Fine mesh filters can also be used, which in turn can be installed in optional moisture detectors.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if a condensate enters the cooler due to a malfunction and the peristaltic pump or the automatic condensate drain is unable to remove it.

Delta T control option

Not all applications require an outlet dew point of 41 °F. In some applications a higher dew point is sufficient. In other applications a stable outlet dew point doesn't matter, it's enough for the gas to be dry, so if the outlet dew point has an adequate difference in temperature below the ambient temperature.

Here the electronics measure the ambient temperature and regulate the outlet dew point to an adjustable value below it. This extends the potential cooling capacity to the limits of the heat exchanger. Here it's important to note the outlet dew point fluctuates along with the ambient temperature and a stable dew point cannot be a prerequisite for the measurement.

The target temperature range is defined by the ambient temperature, the adjustable temperature difference and the alarm limits. If the block temperature is not within the target range with active Delta T-control, the status message "dt" will flash in the display.

Example: At a difference of 30 K/54 °F, at a set outlet dew point of 41 °F this means the dew point remains stable up to an ambient temperature of approx. 95 °F, and the safe drop is only preferred over the ambient temperature with ambient temperature peaks over 95 °F. The cooling capacity specified in the cooling capacity graphs at 95 °F is then available at above 95 °F.

Gas cooler technical data

Gas Cooler Technical Data						
Ready for operation	after max. 10 minutes					
Ambient temperature	41 °F to 122 °F					
Gas output dew temperature preset: adjustable:	 41 °F 36 °F...68 °F or Delta T control					
IP rating	IP 20					
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) 2 Hz-13.2 Hz amplitude ± 1.0 mm 13.2 Hz -100 Hz acceleration					
Housing	Stainless steel, brushed					
Packaging dimensions	approx. 14 x 8.7 x 8.1 in					
Weight incl. heat exchanger	approx. 16.5 lb approx. 13.2 lb (for 24 V DC) approx. 19.8 lb at full expansion stage					
Electrical data	Unit without add-on			Unit with add-on (1 peristaltic pump)		
	24 V DC	**230 V AC**	**115 V AC**	**24 V DC**	**230 V AC**	**115 V AC**
	±10%	+5/-10%	+5/-10%	±10%	+5/-10%	+5/-10%
	-	50/60 Hz	50/60 Hz	-	50/60 Hz	50/60 Hz
	5 A	0.6 A	1.2 A	5.5 A	0.7 A	1.4 A
	120 W	110 W / 140 VA		130 W	130 W / 160 VA	
Recommended fuse (characteristic: delayed action)	6.3 A	1.25 A	2.5 A	6.3 A	1.25 A	2.5 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free					
Electrical Connections	Plug per EN 175301-803					
Gas connections and condensate outlet	Heat exchanger see table "Heat Exchanger Overview" Filter, moisture detector adapter G1/4 or NPT 1/4"					
Parts in contact with media Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton					
Markings:	FM18ATEX0012X: II 3 G Ex ec nC IIC T4 Gc IECEx FMG 18.0005X: Ex ec nC IIC T4 Gc FM18US0021X/FM18CA0010X: CL I DIV 2 GP ABCD RU C-DE.HA65.B.00608/20					

Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Technical Data peristaltic pumps CPsingle X2 / CPdouble X2	
Ambient temperature	32 °F to 122 °F
Flow rate	0.005 lpm (50 Hz)/0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Condensate outlet	Hose nipple Ø6 mm (0.24 in) Screw connection 4/6 (metric), 1/6”-1/4” (US)
Protection class	IP 44
Materials Hose: Connections:	 Norprene (Standard), Marprene, Fluran PVDF

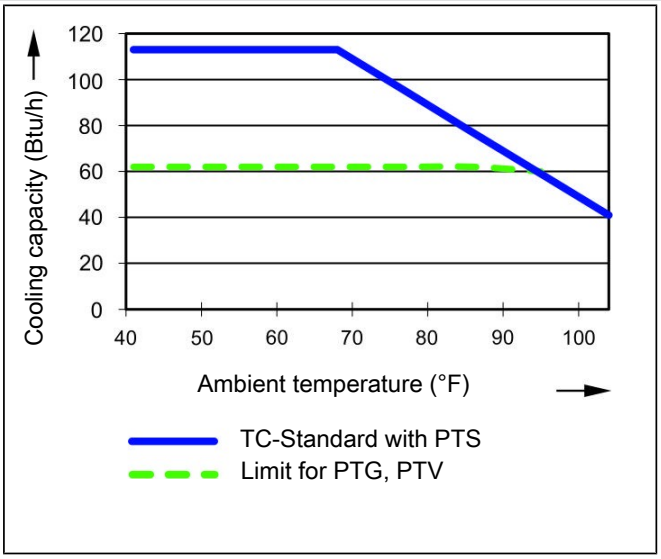
AGF-PV-30-F2 Filter Technical Data	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	58 psi
Filter surface	9.3 in^2
Filter fineness	2 µm
Dead volume	3.47 cu. in.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with media) Viton sintered PTFE

Performance curves

One heat exchanger

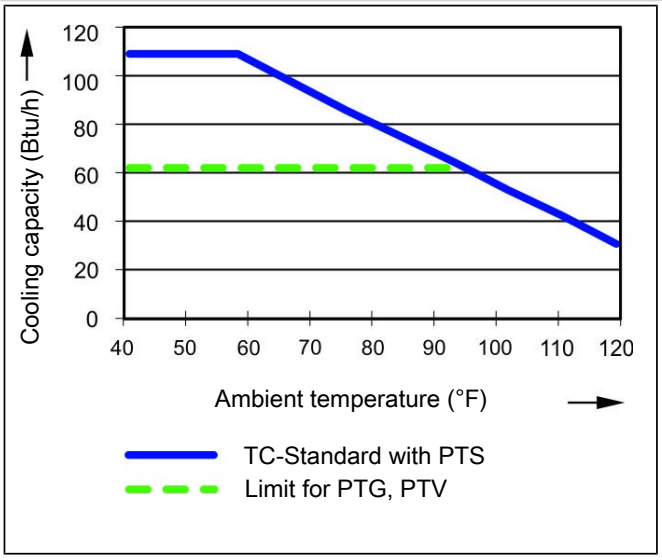
Model TC-Standard 6111 (X2)

Rated cooling capacity (at 77 °F)	95 Btu/h
Max. Ambient temperature	104 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K



Model TC-Standard 6112 (X2)

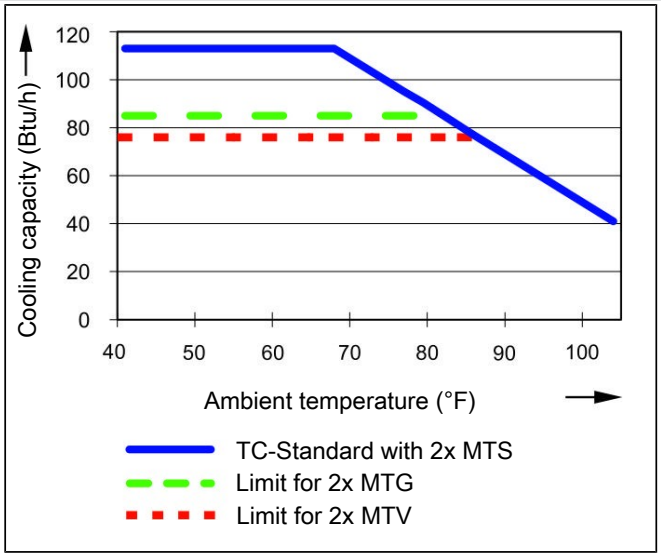
Rated cooling capacity (at 77 °F)	85 Btu/h
Max. Ambient temperature	122 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K



Two heat exchangers

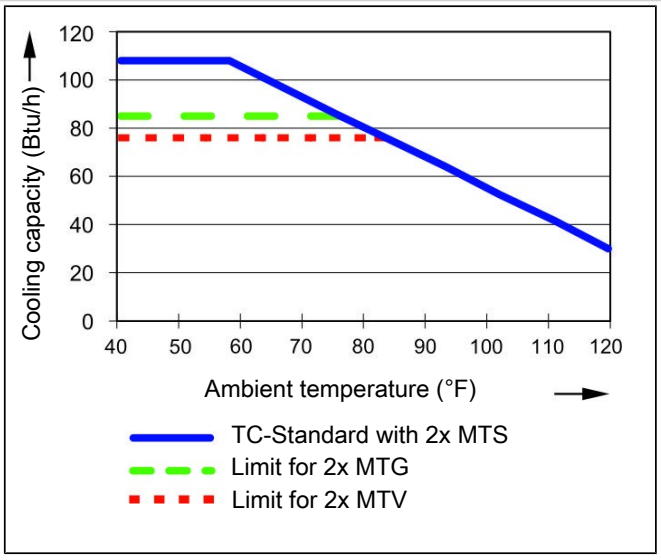
Model TC-Standard 6121 (X2)

Rated cooling capacity (at 77 °F)	95 Btu/h
Max. Ambient temperature	104 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K
Temperature difference between heat exchangers	< 0.5 K



Model TC-Standard 6122 (X2)

Rated cooling capacity (at 77 °F)	85 Btu/h
Max. Ambient temperature	122 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K
Temperature difference between heat exchangers	< 0.5 K



Note: The limit curves for the heat exchangers exchanger PTG, PTV or MTV apply to a dew point of 104 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

Heat exchanger	PTS PTS-I [2]	PTG PTG-I	PTV PTV-I [2]	MTS [3] MTS-I [2] [3]	MTG [3] MTG [3]	MTV [3] MTV-I [2] [3]
Materials in contact with media	Stainless steel	Glass PTFE	PVDF	Stainless steel PVDF	Glass PTFE	PVDF
Flow rate v_{max} [1]	7.5 lpm	4.2 lpm	4.2 lpm	5 lpm	3.5 lpm	3.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	149 °F	149 °F	149 °F	149 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F	284 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	142 Btu/h	85 Btu/h	85 Btu/h	90 Btu/h	76 Btu/h	62 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	29 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.15 psi	0.15 psi	0.15 psi	0.29 psi	0.28 psi	0.26 psi
Dead volume V_{tot}	1.8 cu. in.	1.8 cu. in.	3.48 cu. in.	1.2 cu. in.	1.1 cu. in.	1 cu. in.
Gas connections (metric)	6 mm	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm)	DN 4/6
Gas connections (US)	1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	G1/4	GL18 (8 mm)	G1/4
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	NPT 1/4"	GL18 (8 mm)	NPT 1/4"

[1] Max. cooling capacity of the cooler must be considered.

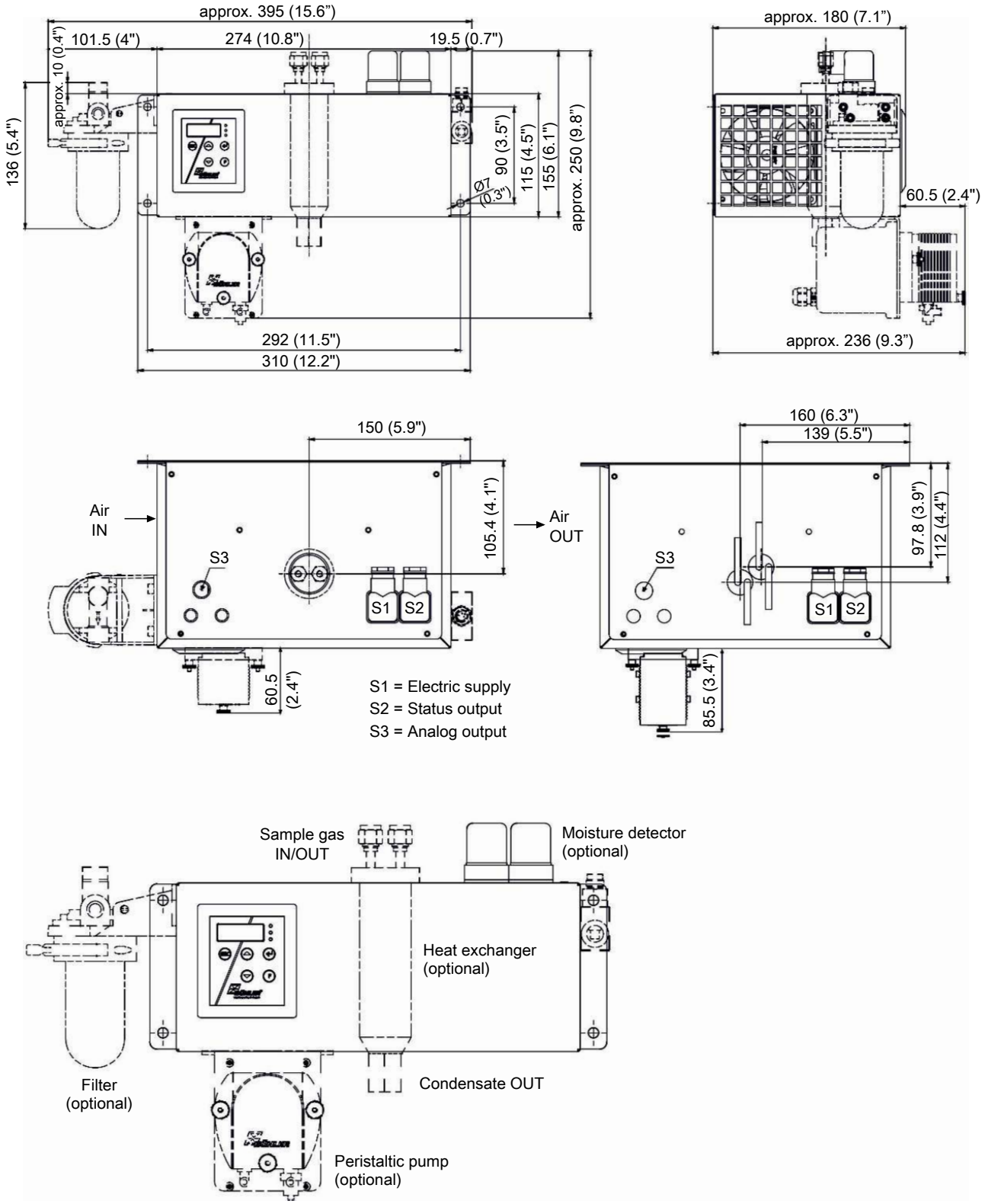
[2] Models marked I have NPT threads or US tubes, respectively.

[3] Passive discharge via automatic condensate drains or traps not applicable for MTG heat exchangers. For passive discharge on the MTS and MTV heat exchangers, use a screw connection with a clearance of at least 7 mm (9/32") (see accessories).

[4] Gasket inside diameter.

Dimensions (inch)

Models for standard applications (TC-Standard 611x and 612x):



Ordering instructions

Gas cooler models with one heat exchanger

The item number is a code for the configuration of your unit. Please use the following model code:

4496	2	1	1	X	2	X	1	X	X	X	0	X	X	X	0	X	0	0	Product Characteristics
																			Gas cooler models (with 1 heat exchanger)
				1															TC-Standard 6111 X2: Ambient temperature 104 °F
				2															TC-Standard 6112 X2: Ambient temperature 122 °F
																			Certifications
					2														for explosive areas
																			Supply voltage
						1													115 V AC, 50/60 Hz
						2													230 V AC, 50/60 Hz
						4													24 V DC
																			Heat exchanger
							1	1	0										Stainless steel, PTS, metric
							1	1	5										Stainless steel, PTS-I, US
							1	2	0										Duran glass, PTG, metric
							1	2	5										Duran glass, PTG-I, US
							1	3	0										PVDF, PTV, metric
							1	3	5										PVDF, PTV-I, US
																			Condensate drain [1]
										0	0								without condensate drain
										1	0								CPsingle X2 with hose nipple, angled
										3	0								CPsingle X2 with screw connection [3]
																			Moisture detector/filter
												0	0						without filter, without moisture detector
												0	1						without filter, 1 moisture detector with PVDF adapter [2]
												1	0						1 filter, without moisture detector
												1	1						1 filter with built-in moisture detector
																			Signal outputs
														0	0				status output only
														1	0				Analog output, 4...20 mA additional
																			Delta T control
																0	0		without Delta T control
																1	0		Delta T control option

[1] 24 V DC CPsingle not connected electrically.

[2] Also available in stainless steel.

[3] Metric or US connection, per heat exchanger.

Gas cooler models with two heat exchangers

The item number is a code for the configuration of your unit. Please use the following model code:

4496	2	1	2	X	2	X	2	X	X	X	0	X	X	X	0	X	0	0	Product Characteristics
																			Gas cooler models (with 2 heat exchangers)
				1															TC-Standard 6121 X2: Ambient temperature 104 °F
				2															TC-Standard 6122 X2: Ambient temperature 122 °F
																			Certifications
					2														for explosive areas
																			Supply voltage
						1													115 V AC, 50/60 Hz
						2													230 V AC, 50/60 Hz
						4													24 V DC
																			Heat exchanger
							2	1	0										Stainless steel, 2 MTS, metric
							2	1	5										Stainless steel, 2 MTS-I, US
							2	2	0										Duran glass, 2 MTG, metric
							2	2	5										Duran glass, 2 MTG-I, US
							2	3	0										PVDF, 2 MTV, metric
							2	3	5										PVDF, 2 MTV-I, US
																			Condensate drain [1]
										0	0								without condensate drain
										2	0								CPdouble X2 with hose nipple, angled
										4	0								CPdouble X2 with screw connection [3]
																			Moisture detector/filter
												0	0						without filter, without moisture detector
												0	1						without filter, 1 moisture detector with PVDF adapter [2]
												0	2						without filter, 2 moisture detectors with PVDF adapter [2]
												1	0						1 filter, without moisture detector
												1	1						1 filter with built-in moisture detector
												2	0						2 filters, without moisture detector
												2	1						2 filters, 1 moisture detector
												2	2						2 filters, 2 moisture detectors
																			Signal outputs
														0	0				status output only
														1	0				Analog output, 4...20 mA additional
																			Delta T control
																0	0		without Delta T control
																1	0		Delta T control option

[1] 24 V DC CPdouble not connected electrically.

[2] Also available in stainless steel.

[3] Metric or US connection, per heat exchanger.

Consumables and accessories

Sample gas cooler TC-Standard X2 with -H2/-O2 heat exchanger

When a compact design is required, the TC-Standard X2 sample gas cooler with -H2/-O2 heat exchanger is the ideal solution for reliable cooling of hydrogen (H_2) and oxygen (O_2) in extractive gas analysis. Green hydrogen produced by electrolysis using renewable energy sources is the key to a sustainable, emission-free future in the energy industry.

The safe, reliable cooling of the sample gas is decisive for gas analytics in the electrolyser (e.g. for LEL monitoring), as a higher moisture content is to be expected with some processes. The moisture in the process gas can damage the sensitive measuring cells in the analyser, so the gas temperature is kept below gas dew point at all times, thus causing the moisture to be emitted. The condensate is discharged via an automatic condensate drain.

As well as material-refining measures to prevent hydrogen-induced component damage, the heat exchangers for the H_2 series are subjected to a leak test using helium. For the O_2 version, special cleaning processes are used to remove particles, oils and fats from parts coming into contact with media. The contamination limits are based on the internationally used and applicable guideline EIGA Doc 33/18 “Cleaning of Equipment for Oxygen Service”.

Many applications require equipment which can be used in explosive areas. This is where the TC-Standard X2 series provides solutions for Zone 2 or Class I, Division 2.

- ATEX and IECEx Zone 2 approval
- FM C-US approval for Class I, Division 2
- For applications with high-purity hydrogen or oxygen
- Cleaning standard is based on EIGA Doc 33/18 as regards the absence of particles, oils and fats for heat exchangers with the O_2 version
- Materials in contact with media are suitability-tested for high H_2 and O_2 concentrations
- Heat exchanger leak tests using helium are performed on the H_2 series as standard
- Nominal cooling capacity 95 Btu/h (104 °F version) or 85 Btu/h (122 °F version)
- Constant dew point stability ± 0.2 °F
- Adjustable outlet dew point and alarm thresholds
- Cooling block temperature display
- Easy accessibility reduces maintenance costs

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e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The TC-Standard X2 with -H2/-O2 heat exchanger series was specially developed for use with high-purity hydrogen and oxygen.

The Peltier coolers are distinguished according to cooling capacity / operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the ordering information category.

Application	Standard applications	
Operating temperature	104 °F	122 °F
1 heat exchanger for H_2/O_2 applications	TC-Standard 6111	TC-Standard 6112

We also offer different signal outputs:

- Status output,
- Analog output, 4...20 mA, incl. status output.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset, the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured using the 5 buttons with the guidance of the menu. This applies to the target outlet dew point, which can be set from 2 to 20 °C (36 to 68 °F) (factory setting 5 °C/41 °F),

as well as the warning thresholds, which can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature, the range is τ_a -1 to - 3 K (at a minimum 1 °C/34 °F cooling block temperature); for the excess temperature, the range is τ_a +1 to +7 K. The factory settings for both values are 3 K.

The flashing display and the status relays indicate that the conditions are below or above the configured warning range (e.g. after switching on).

The separated condensate can be drained via add-on automatic condensate drains.

Delta T control option

Not all applications require an outlet dew point of 41 °F. In some applications a higher dew point is sufficient. In other applications a stable outlet dew point doesn't matter, it's enough for the gas to be dry, so if the outlet dew point has an adequate difference in temperature below the ambient temperature.

Here the electronics measure the ambient temperature and regulate the outlet dew point to an adjustable value below it. This extends the potential cooling capacity to the limits of the heat exchanger. Here it's important to note the outlet dew point fluctuates along with the ambient temperature and a stable dew point cannot be a prerequisite for the measurement.

The target temperature range is defined by the ambient temperature, the adjustable temperature difference and the alarm limits. If the block temperature is not within the target range with active Delta T-control, the status message "dt" will flash in the display.

Example: At a difference of 30 K/54 °F, at a set outlet dew point of 41 °F this means the dew point remains stable up to an ambient temperature of approx. 95 °F, and the safe drop is only preferred over the ambient temperature with ambient temperature peaks over 95 °F. The cooling capacity specified in the cooling capacity graphs at 95 °F is then available at above 95 °F.

Gas cooler technical data

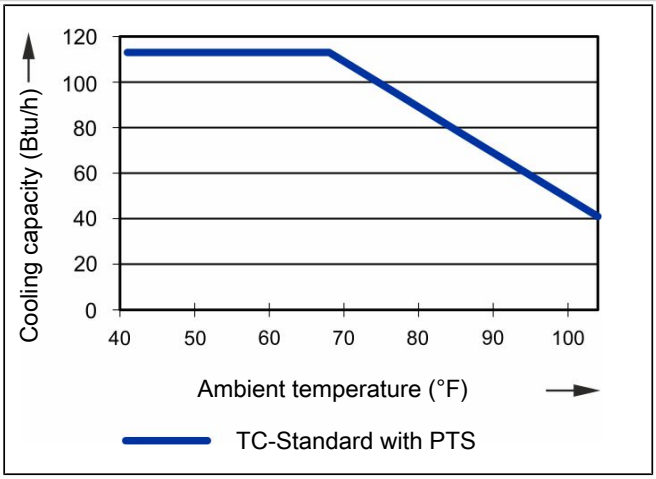
Gas Cooler Technical Data			
Ready for operation	after max. 10 minutes		
Ambient temperature	41 °F to 122 °F		
Gas outlet dew point preset: adjustable:	 41 °F 36 °F...68 °F or Delta T control		
IP rating	IP 20		
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7 g) 2–13.2 Hz amplitude ± 1.0 mm 13.2–100 Hz acceleration		
Housing	Stainless steel, brushed		
Packaging dimensions	approx. 14 x 8.7 x 8.1 in		
Weight incl. heat exchanger	approx. 16.5 lb approx. 13.2 lb (for 24 V DC)		
Electrical data	Unit without add-on		
	24 V DC	**230 V AC**	**115 V AC**
	±10%	+5/-10%	+5/-10%
	-	50/60 Hz	50/60 Hz
	5 A	0.6 A	1.2 A
	120 W	110 W / 140 VA	
Recommended fuse (characteristic: delayed action)	6.3 A	1.25 A	2.5 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free		
Electrical Connections	Plug per EN 175301-803		
Parts in contact with media Heat exchanger:	 see table ”Heat Exchanger Overview”		
Markings:	FM18ATEX0012X: II 3 G Ex ec nC IIC T4 Gc IECEx FMG 18.0005X: Ex ec nC IIC T4 Gc FM18US0021X/FM18CA0010X: CL I DIV 2 GP ABCD RU C-DE.HA65.B.00608/20		

Technical Data - Options

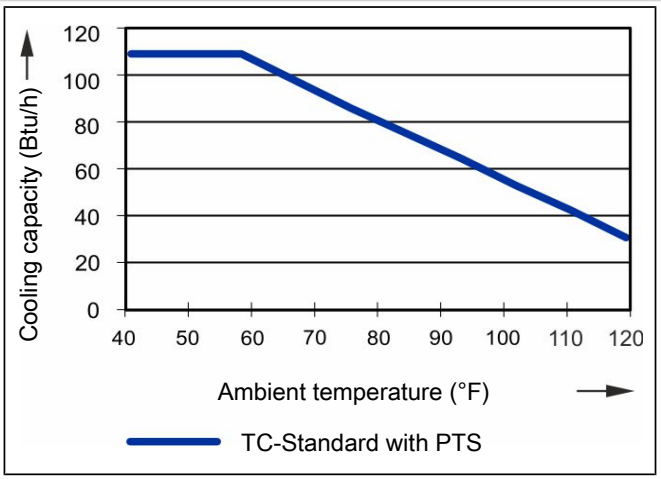
Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Performance curves

Model TC-Standard 6111	
Rated cooling capacity (at 77 °F)	95 Btu/h
Max. ambient temperature	104 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K



Model TC-Standard 6112	
Rated cooling capacity (at 77 °F)	85 Btu/h
Max. ambient temperature	122 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K



Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

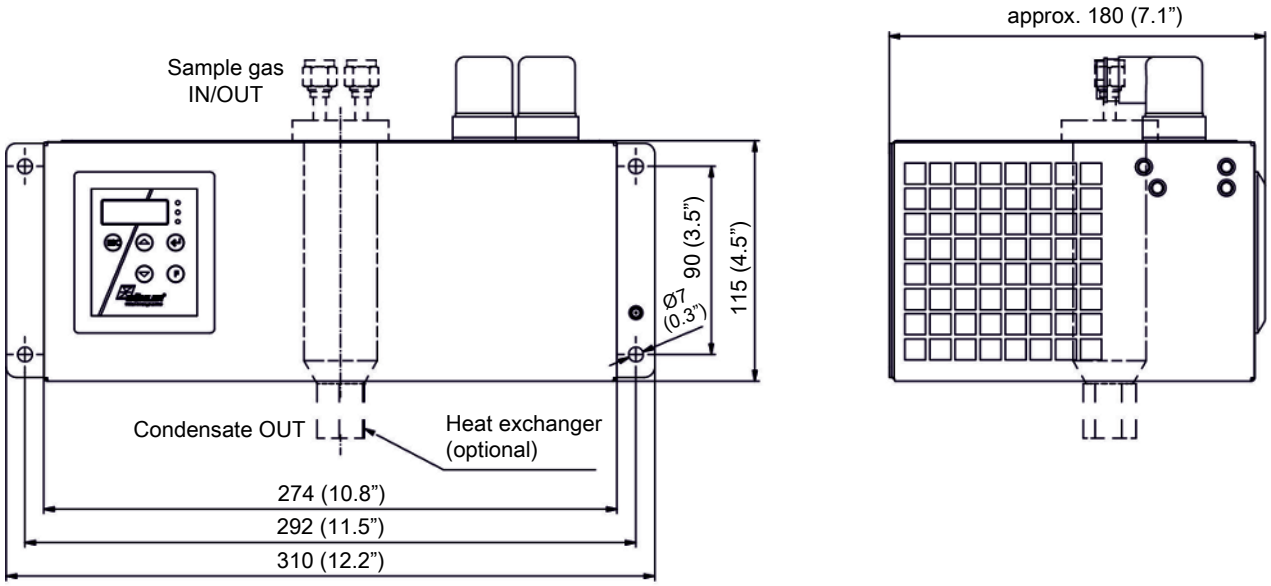
Heat exchanger overview

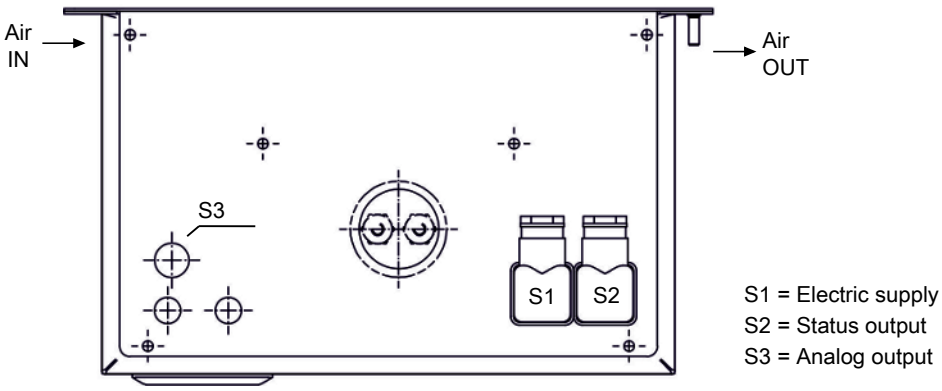
Heat exchanger	PTS-H2/-O2 PTS-I-H2/-O2 [2]
Materials in contact with media	Stainless steel
Flow rate v_{max} [1]	7.5 lpm
Inlet dew point $\tau_{e,max}$ [1]	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F
Max. cooling capacity Q_{max}	142 Btu/h
Gas pressure p_{max}	22 psi
Pressure drop Δp (v=2.5 lpm)	0.15 psi
Dead volume V_{dead}	1.8 cu. in.
Gas connections (metric)	6 mm
Gas connections (US)	1/4"
Condensate out connection (metric)	G3/8
Condensate out connection (US)	NPT 3/8"

[1] Max. cooling capacity of the cooler must be considered.

[2] Models marked I have NPT threads or US tubes.

Dimensions (inch)





S1 = Electric supply
S2 = Status output
S3 = Analog output

Ordering instructions

Gas cooler models with one heat exchanger for H2/O2 applications

The item number is a code for the configuration of your unit. Please use the following model code:

4496	2	1	1	X	2	X	1	1	X	0	0	0	0	X	0	X	0	X	Product Characteristics
																			Gas cooler models (with 1 heat exchanger)
				1															TC-Standard 6111 X2: Ambient temperature 104 °F
				2															TC-Standard 6112 X2: Ambient temperature 122 °F
																			Certifications
					2														for explosive areas
																			Supply voltage
						1													115 V AC, 50/60 Hz
						2													230 V AC, 50/60 Hz
																			Heat exchanger
							1	1	0									-O2	Stainless steel, PTS-O2, metric
							1	1	5									-O2	Stainless steel, PTS-I-O2, US
							1	1	0									-H2	Stainless steel, PTS-H2, metric
							1	1	5									-H2	Stainless steel, PTS-I-H2, US
																			Signal outputs
														0	0				status output only
														1	0				Analog output, 4...20 mA, incl. status output
																			Delta T control
																0	0		without Delta T control
																1	0		Delta T control option

Spare parts and accessories for cooler with -H2/-O2 heat exchanger

Item no.	Description
4410001 (see data sheet 450005)	Automatic condensate drain 11 LD V 38 [1]
4410001-O2 (see data sheet 450005)	Automatic condensate drain 11 LD V 38 optimised for oxygen
see data sheet 400016	Stainless steel pipe fittings for high-purity oxygen applications

[1] For use with high hydrogen concentrations max. 22 psi overpressure.

ModbusRTU

Sample gas cooler TC-Standard+

Many analysis processes require extracting sample gas from the process. This also extracts process-related contamination such as particles or moisture. These can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser. The sample gas cooler reduces the gas temperature to below the dew point for this purpose, causing moisture to drop out, which is then discharged as condensate.

In addition to the status output to monitor the sample gas cooler function, we offer an optional 4 – 20 mA analog output or digital interface. The process control can access the process and diagnostic data via the Modbus RTU interface as well as configure the device settings.

The Standard+ series features a new generation heat exchangers with a particularly low wash out effect of water-soluble components and are specifically suitable for measuring emissions. Particularly the wash out effect of SO_2 is low. These coolers can therefore be used for so-called automated measuring systems (AMS) per EN 15267-3.

- Low washout effects
- Compact design: Pre-installed and ready to connect
- Low maintenance costs based on easy accessibility
- Optimised heat exchanger type 2 in Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Nominal cooling capacity 95 Btu/h (104 °F version) or 85 Btu/h (122 °F version)
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperature display
- Optional 4 - 20 mA or Modbus RTU signal output
- Optional CE mark or FM approval
- Moisture detector, filter and condensate pump optional

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Overview

The TC-Standard+ series was designed specifically for the requirements in so-called automated measuring systems (AMS) according to EN 15267-3. The series connection of the heat exchangers will cool in two cycles to minimise wash out effects.

The Peltier coolers are distinguished according to cooling capacity/operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications	
Operating temperature	104 °F	122 °F
2 heat exchangers in series	TC-Standard+ 6121	TC-Standard+ 6122

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector

In addition, we offer different signal outputs:

- Status output
- Analog output, 4...20 mA, incl. status output,
- Modbus RTU digital output, incl. status output

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 °F to 68 °F) (factory preset 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C/ 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via connected peristaltic pumps or add-on automatic condensate drains.

Fine mesh filters can also be used, which in turn can be installed in optional moisture detectors.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if a condensate enters the cooler due to a malfunction and the peristaltic pump or the automatic condensate drain is unable to remove it.

Gas cooler technical data

Gas Cooler Technical Data						
Ready for operation	after max. 10 minutes					
Ambient temperature	41 °F to 122 °F					
Gas output dew temperature preset: adjustable:	 41 °F 36 °F...68 °F					
IP rating	IP 20					
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) 2 Hz-13.2 Hz amplitude ± 1.0 mm 13.2 Hz -100 Hz acceleration					
Housing	Stainless steel, brushed					
Packaging dimensions	approx. 14 x 8.7 x 8.1 in					
Weight incl. heat exchanger	approx. 16.5 lb approx. 13.2 lb (for 24 V DC) approx. 19.8 lb at full expansion stage					
Electrical data	Unit without add-on			Unit with add-on (1 peristaltic pump)		
	24 V DC	**230 V AC**	**115 V AC**	**24 V DC**	**230 V AC**	**115 V AC**
	±10%	+5/-10%	+5/-10%	±10%	+5/-10%	+5/-10%
	-	50/60 Hz	50/60 Hz	-	50/60 Hz	50/60 Hz
	5 A	0.6 A	1.2 A	5.5 A	0.7 A	1.4 A
	120 W	110 W / 140 VA		130 W	130 W / 160 VA	
Recommended fuse (characteristic: delayed action)	6.3 A	1.25 A	2.5 A	6.3 A	1.25 A	2.5 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free					
Electrical Connections	Plug per EN 175301-803					
Gas connections and condensate outlet	Heat exchanger see table "Heat Exchanger Overview" Filter, moisture detector adapter G1/4 or NPT 1/4"					
Parts in contact with media Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton					
FM no.:	3062014					

Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Digital interface technical data	
Signal	Modbus RTU (RS-485)
Connection	M12x1 connector, DIN EN 61076-2-101

Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

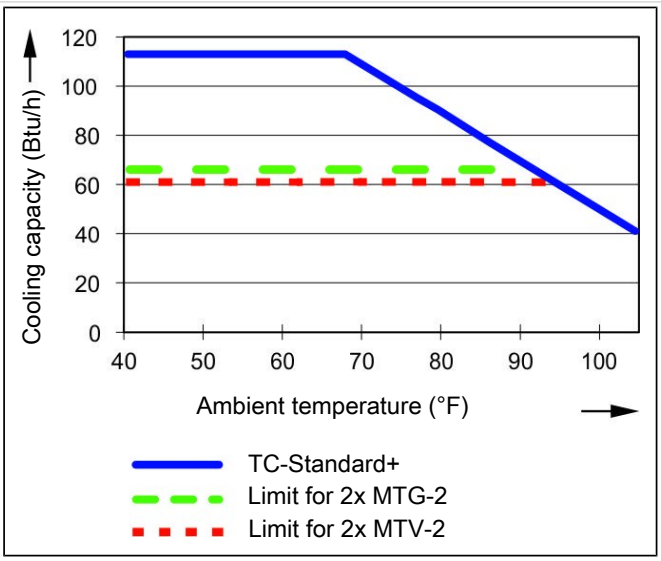
CPdouble Peristaltic Pump Technical Data	
Ambient temperature	32 °F to 131 °F
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Degree of protection	IP 44
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

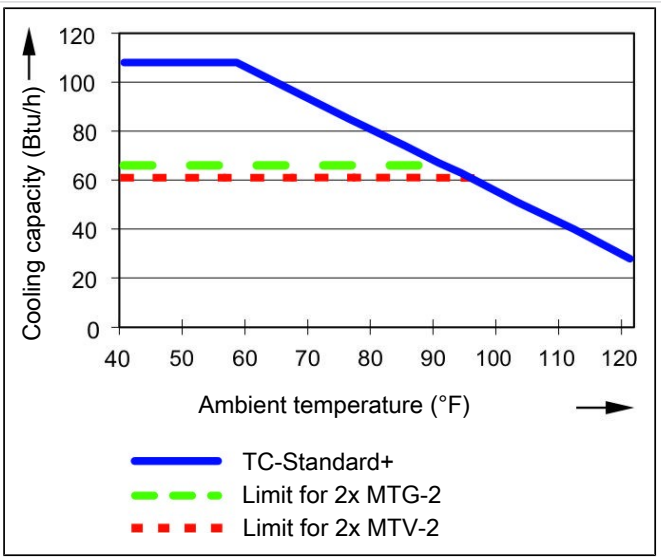
AGF-PV-30-F2 Filter Technical Data	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	58 psi
Filter surface	9.3 in^2
Filter fineness	2 µm
Dead volume	3.47 cu. in.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with media) Viton sintered PTFE

Output

Model TC-Standard+ 6121	
Rated cooling capacity (at 77 °F)	95 Btu/h
Max. Ambient temperature	104 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K
Temperature difference between heat exchangers	< 0.5 K

Model TC-Standard+ 6122	
Rated cooling capacity (at 77 °F)	85 Btu/h
Max. Ambient temperature	122 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K
Temperature difference between heat exchangers	< 0.5 K





Note: The limit curves for the heat exchangers MTV-2 and MTG-2 apply to a dew point of 122 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

Heat exchanger	2x MTG-2 [3] 2x MTG-2-I [2] [3]	2x MTV-2 [3] 2x MTV-2-I [2] [3]
Materials in contact with media	Glass PTFE	PVDF
Flow rate v_{max} [1]	3.5 lpm	3.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F
Max. Cooling capacity Q_{max}	76 Btu/h	62 Btu/h
Gas pressure p_{max}	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.28 psi	0.26 psi
Dead volume V_{tot}	2.3 cu. in.	2.1 cu. in.
Gas connections (metric)	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	GL14 (1/4") [4]	1/4"-1/6"
Condensate out connection (metric)	GL18 (8 mm) [4]	G1/4
Condensate out connection (US)	GL18 (8 mm) [4]	NPT 1/4"

[1] Max. cooling capacity of the cooler must be considered.

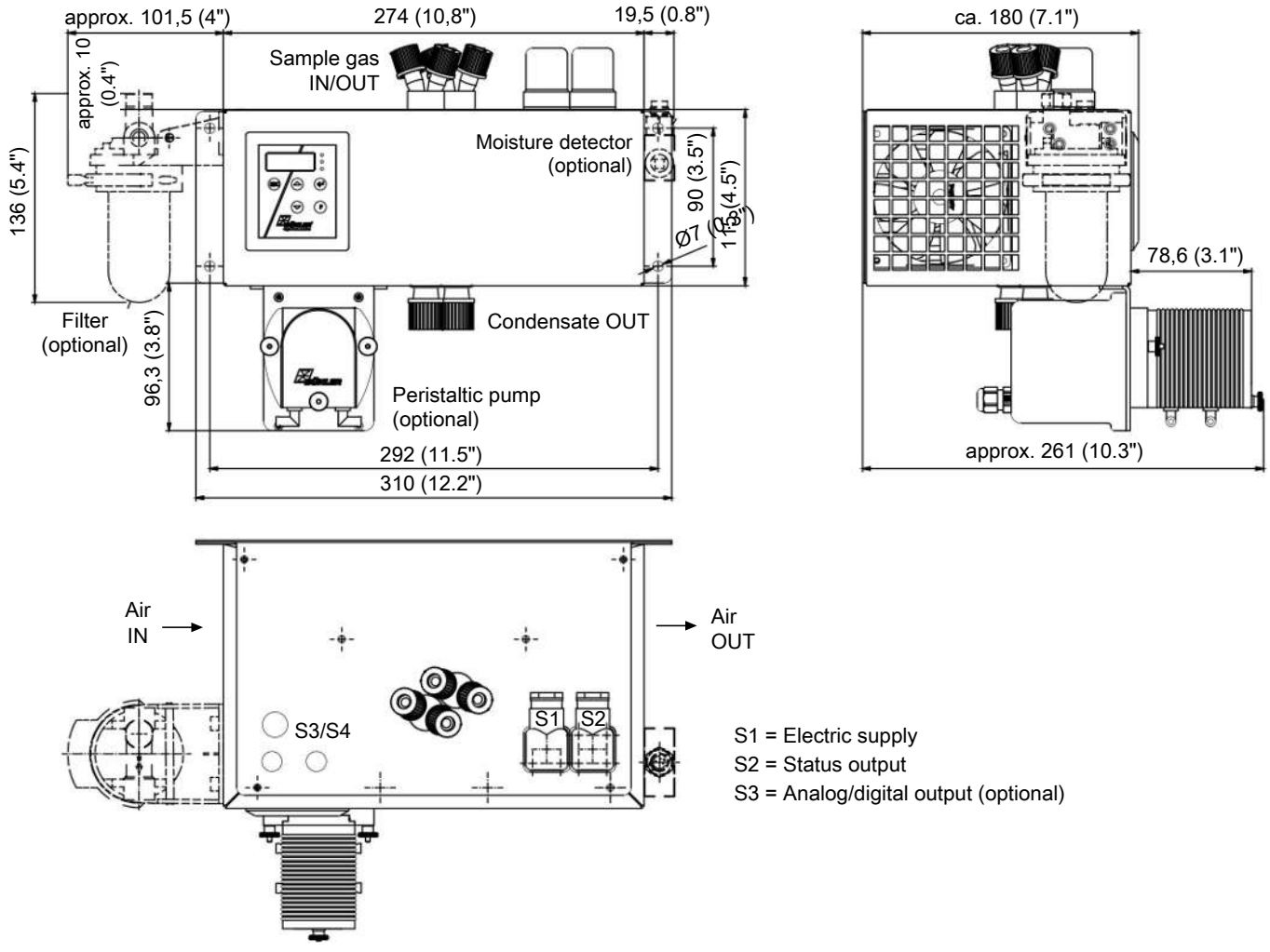
[2] Models marked I have NPT threads or US tubes, respectively.

[3] Passive discharge via automatic condensate drains or traps not applicable for MTG-2 heat exchangers. For passive discharge on MTV-2 heat exchangers, use a screw connection with a clearance of at least 7 mm (9/32") (see accessories).

[4] Gasket inside diameter.

Dimensions (inch)

Models for standard applications (TC-Standard 612x):



Ordering instructions

Gas cooler model with two heat exchangers in series

The item number is a code for the configuration of your unit. Please use the following model code:

4496	2	1	2	X	X	X	1	X	X	X	0	X	X	X	0	0	0	Product Characteristics
																		Gas cooler models (with 2 in-line heat exchangers)
				1														TC-Standard+ 6121: Ambient temperature 104 °F
				2														TC-Standard+ 6122: Ambient temperature 122 °F
																		Certifications
					0													Standard applications – CE
					1													for common locations - FM
																		Supply voltage
						1												115 V AC, 50/60 Hz
						2												230 V AC, 50/60 Hz
						4												24 V DC
																		Heat exchanger
							1	2	2									Duran glass, 2x MTG-2, metric
							1	2	7									Duran glass, 2x MTG-2-I, US
							1	3	2									PVDF, 2x MTV-2, metric
							1	3	7									PVDF, 2x MTV-2-I, US
																		Condensate drain [1]
										0	0							without condensate drain
										2	0							CPdouble with hose nipple, angled
										4	0							CPdouble with screw connection [3]
																		Moisture detector/filter
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with PVDF adapter [2]
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
																		Signal outputs
														0	0			status output only
														1	0			Analog output, 4...20 mA incl. status output
														2	0			Modbus RTU digital output incl. status output [4]

[1] 24 V DC CPdouble not connected electrically.

[2] Also available in stainless steel.

[3] Metric or US connection, per heat exchanger.

[4] Option only available for CE version.

Consumables and accessories

Item no.	Description
4510008	Automatic condensate drain AK 5.2 (pressure operation only)
4510028	Automatic condensate drain AK 5.5 (pressure operation only)
4410004	Automatic condensate drain AK 20 (pressure operation only)
4410001	Automatic condensate drain 11 LD V 38 (pressure operation only)
41030050	Replacement filter element F2; 5-pack
9144050038	Cable for cooler temperature analog output 4 m
4410005	Condensate trap GL1, 0.4 L
44920035012	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple
44920035016	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (metric)
44920035017	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (US)
4381045	Screw connection G1/4 – DN 8/12 for passive condensate connection MTS or MTV(-2)
4381048	Screw connection NPT 1/4” for passive condensate connection MTS-I or MTV(-2)-I

Gas Analysis

Sample gas cooler TC-Standard+ X2

In emission measurement, process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations as well as measurements in small combustion plants or exhaust gas analysis in automotive engineering.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

Many applications require equipment which can be used in explosive areas. This is where the TC-Standard+ X2 series provides solutions for Zone 2 or Class I, Division 2.

- ATEX and IECEx Zone 2 approval
- FM C-US approval for Class I, Division 2
- Compact design: Pre-installed and ready to connect
- Low maintenance costs based on easy accessibility
- One gas path
- Optimised heat exchanger type 2 in Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Low operating noise
- Rated capacity 95/85 Btu/h, 104 °F / 122 °F - Version
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperature display
- Moisture detector connection, analog output, filter, and peristaltic pump optional

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Overview

The TC-Standard+ X2 series was designed specifically for the requirements in so-called automated measuring systems (AMS) according to EN 15267-3. The series connection of the heat exchangers will cool in two cycles to minimise wash out effects.

The Peltier coolers are distinguished according to cooling capacity/operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications	
Operating temperature	104 °F	122 °F
2 heat exchangers in series	TC-Standard+ 6121 X2	TC-Standard+ 6122 X2

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector.

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 °F to 68 °F) (factory preset 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C/ 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via connected peristaltic pumps or add-on automatic condensate drains.

Fine mesh filters can also be used, which in turn can be installed in optional moisture detectors.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if a condensate enters the cooler due to a malfunction and the peristaltic pump or the automatic condensate drain is unable to remove it.

Gas cooler technical data

Gas Cooler Technical Data						
Ready for operation	after max. 10 minutes					
Ambient temperature	41 °F to 122 °F					
Gas output dew temperature preset: adjustable:	 41 °F 36 °F...68 °F					
IP rating	IP 20					
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) 2 Hz-13.2 Hz amplitude ± 1.0 mm 13.2 Hz -100 Hz acceleration					
Housing	Stainless steel, brushed					
Packaging dimensions	approx. 14 x 8.7 x 8.1 in					
Weight incl. heat exchanger	approx. 16.5 lb approx. 13.2 lb (for 24 V DC) approx. 19.8 lb at full expansion stage					
Electrical data	Unit without add-on			Unit with add-on (1 peristaltic pump)		
	24 V DC	**230 V AC**	**115 V AC**	**24 V DC**	**230 V AC**	**115 V AC**
	±10%	+5/-10%	+5/-10%	±10%	+5/-10%	+5/-10%
	-	50/60 Hz	50/60 Hz	-	50/60 Hz	50/60 Hz
	5 A	0.6 A	1.2 A	5.5 A	0.7 A	1.4 A
	120 W	110 W / 140 VA		130 W	130 W / 160 VA	
Recommended fuse (characteristic: delayed action)	6.3 A	1.25 A	2.5 A	6.3 A	1.25 A	2.5 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free					
Electrical Connections	Plug per EN 175301-803					
Gas connections and condensate outlet	Heat exchanger see table "Heat Exchanger Overview" Filter, moisture detector adapter G1/4 or NPT 1/4"					
Parts in contact with media Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton					
Markings:	FM18ATEX0012X: II 3 G Ex ec nC IIC T4 Gc IECEx FMG 18.0005X: Ex ec nC IIC T4 Gc FM18US0021X/FM18CA0010X: CL I DIV 2 GP ABCD RU C-DE.HA65.B.00608/20					

Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

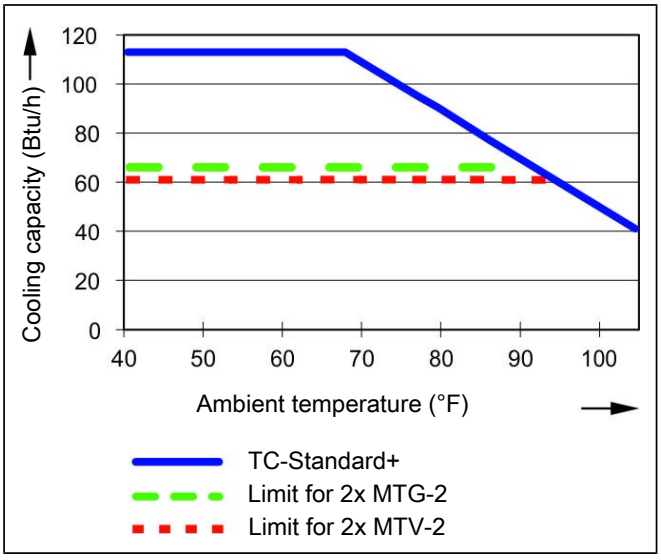
Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Technical Data peristaltic pump CPdouble X2	
Ambient temperature	32 °F to 122 °F
Flow rate	0.005 lpm (50 Hz)/0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Degree of protection	IP 44
Materials	
Hose:	Norprene (standard), Marprene, Fluran
Connections:	PVDF

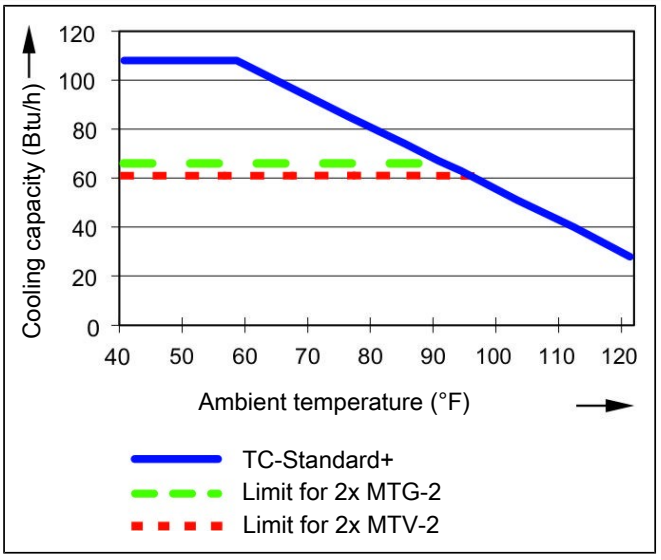
AGF-PV-30-F2 Filter Technical Data	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	58 psi
Filter surface	9.3 in^2
Filter fineness	2 µm
Dead volume	3.47 cu. in.
Materials	
Filter:	PVDF, Duran glass (parts in contact with media)
Seal:	Viton
Filter element:	sintered PTFE

Performance curves

Model TC-Standard+ 6121 (X2)	
Rated cooling capacity (at 77 °F)	95 Btu/h
Max. Ambient temperature	104 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K
Temperature difference between heat exchangers	< 0.5 K



Model TC-Standard+ 6122 (X2)	
Rated cooling capacity (at 77 °F)	85 Btu/h
Max. Ambient temperature	122 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K
Temperature difference between heat exchangers	< 0.5 K



Note: The limit curves for the heat exchangers MTV-2 and MTG-2 apply to a dew point of 122 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

Heat exchanger	2x MTG-2 [3] 2x MTG-2-I [2] [3]	2x MTV-2 [3] 2x MTV-2-I [2] [3]
Materials in contact with media	Glass PTFE	PVDF
Flow rate v_{max} [1]	3.5 lpm	3.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F
Max. Cooling capacity Q_{max}	76 Btu/h	62 Btu/h
Gas pressure p_{max}	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.28 psi	0.26 psi
Dead volume V_{tot}	2.3 cu. in.	2.1 cu. in.
Gas connections (metric)	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	GL14 (1/4") [4]	1/4"-1/6"
Condensate out connection (metric)	GL18 (8 mm) [4]	G1/4
Condensate out connection (US)	GL18 (8 mm) [4]	NPT 1/4"

[1] Max. cooling capacity of the cooler must be considered.

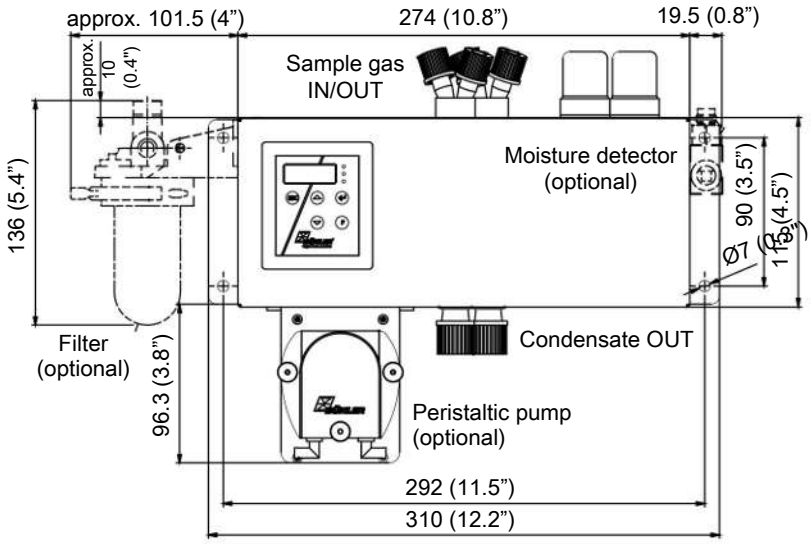
[2] Models marked I have NPT threads or US tubes, respectively.

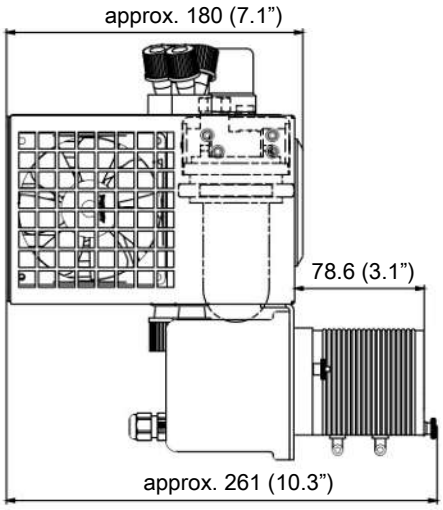
[3] Passive discharge via automatic condensate drains or traps not applicable for MTG-2 heat exchangers. For passive discharge on MTV-2 heat exchangers, use a screw connection with a clearance of at least 7 mm (9/32") (see accessories).

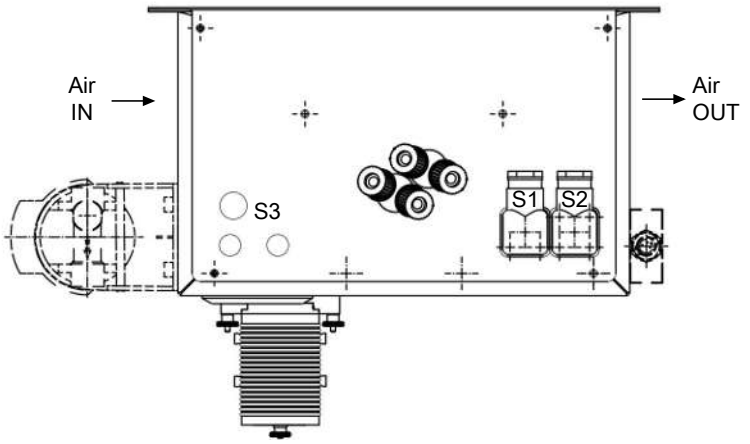
[4] Gasket inside diameter.

Dimensions (inch)

Models for standard applications (TC-Standard 612x):







S1 = Electric supply
S2 = Status output
S3 = Analog output

Ordering instructions

Gas cooler model with two heat exchangers in series

The item number is a code for the configuration of your unit. Please use the following model code:

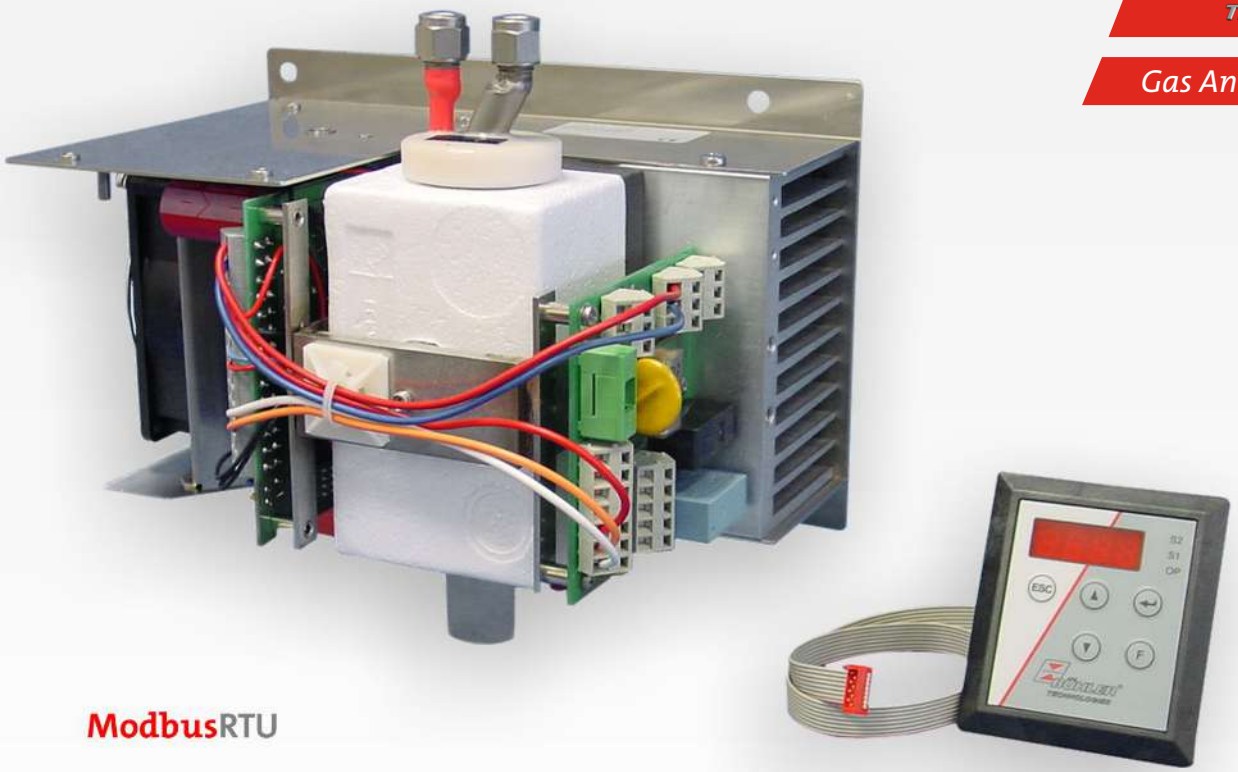
4496	2	1	2	X	2	X	1	X	X	X	0	X	X	X	0	0	0	0	Product Characteristics
																			Gas cooler models (with 2 in-line heat exchangers)
				1															TC-Standard+ 6121 X2 Ambient temperature 104 °F
				2															TC-Standard+ 6122 X2 Ambient temperature 122 °F
																			Certifications
					2														for explosive areas
																			Supply voltage
						1													115 V AC, 50/60 Hz
						2													230 V AC, 50/60 Hz
						4													24 V DC
																			Heat exchanger
							1	2	2										Duran glass, 2x MTG-2, metric
							1	2	7										Duran glass, 2x MTG-2-I, US
							1	3	2										PVDF, 2x MTV-2, metric
							1	3	7										PVDF, 2x MTV-2-I, US
																			Condensate drain [1]
										0	0								without condensate drain
										2	0								CPdouble X2 with hose nipple, angled
										4	0								CPdouble X2 with screw connection [3]
																			Moisture detector/filter
												0	0						without filter, without moisture detector
												0	1						without filter, 1 moisture detector with PVDF adapter [2]
												1	0						1 filter, without moisture detector
												1	1						1 filter with built-in moisture detector
																			Signal outputs
														0	0				status output only
														1	0				Analog output, 4...20 mA additional

[1] 24 V DC CPdouble not connected electrically.

[2] Also available in stainless steel.

[3] Metric or US connection, per heat exchanger.

Consumables and accessories



Gas cooler series TC-Standard OEM

Many analysis processes require extracting sample gas from the process. This also extracts process-related contamination such as particles or moisture. These can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser. The sample gas cooler reduces the gas temperature to below the dew point for this purpose, causing moisture to drop out, which is then discharged as condensate.

In addition to the status output to monitor the sample gas cooler function, we offer an optional 4 – 20 mA analog output or digital interface. The process control can access the process and diagnostic data via the Modbus RTU interface as well as configure the device settings.

The small TC-Standard OEM sample gas cooler offers a variety of options for installation in gas analysis systems.

- Compact design for installation in a gas cooling system
- Version 230 V/115 V or with 24 V transformer, lighter with switching power supply
- One or two gas paths
- Heat exchanger made from stainless steel, Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Nominal capacity 85 Btu/h
- Dew point stability 0.2 °F
- MCD400 display module for separate installation
- Moisture detector, condensate pump and sample gas pump connection and control option
- Optional 4 - 20 mA or Modbus RTU signal output

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Overview

The TC-Standard OEM series consists of various models which can be classified by the number of heat exchangers.

This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications	
Ambient temperature	122 °F	
1 heat exchanger	TC-Standard OEM 6912	3rd digit=1
2 heat exchangers	TC-Standard OEM 6922	3rd digit=2

Additional components which every conditioning system should feature can optionally be connected:

- Peristaltic pump for condensate drainage
- Moisture detector
- Sample gas pump

In addition, we offer different signal outputs:

- Status output
- Analog output, 4...20 mA, incl. status output,
- Modbus RTU digital output, incl. status output

Description of functions

The cooler is controlled by a microprocessor. Following factory presetting, the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. This enables the target outlet dew point to be set within the range 2 to 20 °C (factory preset 5 °C).

Subsequently the warning thresholds can be adjusted for the low and high temperature alarms. These are set relative to the outlet dew point T_a setting.

For the low temperature the range is T_a -1 to - 3 K (at a minimum 1 °C cooling block temperature) and for the high temperature the range is T_a +1 to +7 K. The factory presets for both values are ± 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (for example after switching on).

The status output can for example be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut the pump off in the event of a moisture detector alarm.

Delta T control option

Not all applications require an outlet dew point of 41 °F. In some applications a higher dew point is sufficient. In other applications a stable outlet dew point doesn't matter, it's enough for the gas to be dry, so if the outlet dew point has an adequate difference in temperature below the ambient temperature.

Here the electronics measure the ambient temperature and regulate the outlet dew point to an adjustable value below it. This extends the potential cooling capacity to the limits of the heat exchanger. Here it's important to note the outlet dew point fluctuates along with the ambient temperature and a stable dew point cannot be a prerequisite for the measurement.

The target temperature range is defined by the ambient temperature, the adjustable temperature difference and the alarm limits. If the block temperature is not within the target range with active Delta T-control, the status message "dt" will flash in the display.

Example: At a difference of 30 K/54 °F, at a set outlet dew point of 41 °F this means the dew point remains stable up to an ambient temperature of approx. 95 °F, and the safe drop is only preferred over the ambient temperature with ambient temperature peaks over 95 °F. The cooling capacity specified in the cooling capacity graphs at 95 °F is then available at above 95 °F.

Gas cooler technical data

Gas cooler technical data			
Ready for operation	after max. 10 minutes		
Ambient temperature	41 °F to 122 °F		
Gas output dew temperature preset: adjustable:	 41 °F 36 °F...68 °F or Delta T control		
Protection class:	IP00		
Rack material:	Stainless steel		
Packaging dimensions	approx. 14 x 8.7 x 8.1 in		
Weight without heat exchanger	approx. 10.3 lb (transformer) approx. 8.2 lb (switching power supply) approx. 7.4 lb (with 24 V DC)		
Electrical power input	**24 V DC**	**230 V AC**	**115 V AC**
	±10%	+5/-10%	+5/-10%
	-	50/60 Hz	50/60 Hz
	5 A	0.6 A	1.2 A
	120 W	110 W / 140 VA	
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free		
Electrical connections	Cable clamp (with transformer, 24 V DC) or blade receptacle (with switching power supply)		
Gas connections	Heat exchanger see table "Heat exchanger overview"		
Parts in contact with media Heat exchanger:	 see table "Heat Exchanger Overview"		

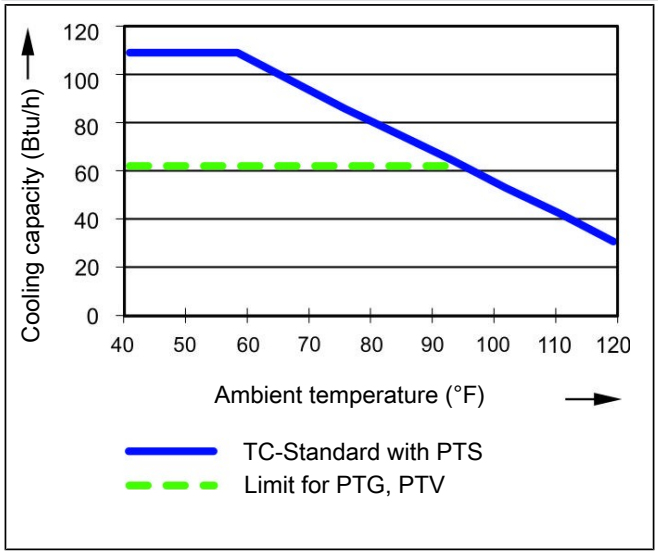
Technical Data - Options

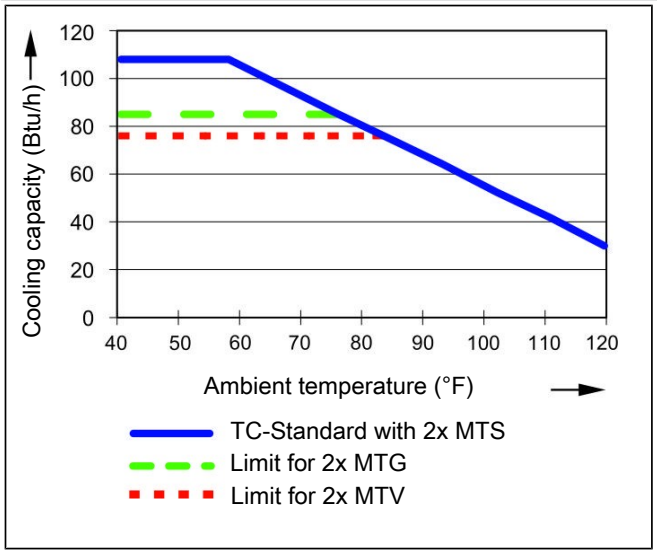
Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Digital interface technical data	
Signal	Modbus RTU (RS-485)
Connection	M12x1 connector, DIN EN 61076-2-101

Outlet

One heat exchanger		Two heat exchangers	
Model TC-Standard OEM 6912		**Model TC-Standard OEM 6922**	
Rated cooling capacity (at 77 °F)	85 Btu/h	Rated cooling capacity (at 77 °F)	85 Btu/h
Max. Ambient temperature	122 °F	Max. Ambient temperature	122 °F
Dew point fluctuations		Dew point fluctuations	
static	± 0.1 K	static	± 0.1 K
in the entire specification range	± 1.5 K	in the entire specification range	± 1.5 K
		Temperature difference between heat exchangers	< 0.5 K





Remark: The limit curves for the heat exchangers exchanger PTG, PTV or MTV apply to a dew point of 104 °F.

With ideal installation the TC-Standard OEM cooling capacity curves correspond with those for TC-Standard. Depending how it is installed, the value may deviate from the cooling capacity curve.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

Heat exchanger	PTS PTS-I [2]	PTG PTG-I	PTV PTV-I [2]	MTS [3] MTS-I [2] [3]	MTG [3] MTG [3]	MTV [3] MTV-I [2] [3]
Materials in contact with media	Stainless steel	Glass PTFE	PVDF	Stainless steel PVDF	Glass PTFE	PVDF
Flow rate v_{max} [1]	7.5 lpm	4.2 lpm	4.2 lpm	5 lpm	3.5 lpm	3.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	149 °F	149 °F	149 °F	149 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F	284 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	142 Btu/h	85 Btu/h	85 Btu/h	90 Btu/h	76 Btu/h	62 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	29 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.15 psi	0.15 psi	0.15 psi	0.29 psi	0.28 psi	0.26 psi
Dead volume V_{tot}	1.8 cu. in.	1.8 cu. in.	3.48 cu. in.	1.2 cu. in.	1.1 cu. in.	1 cu. in.
Gas connections (metric)	6 mm	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm)	DN 4/6
Gas connections (US)	1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	G1/4	GL18 (8 mm)	G1/4
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	NPT 1/4"	GL18 (8 mm)	NPT 1/4"

[1] Max. cooling capacity of the cooler must be considered.

[2] Models marked I have NPT threads or US tubes, respectively.

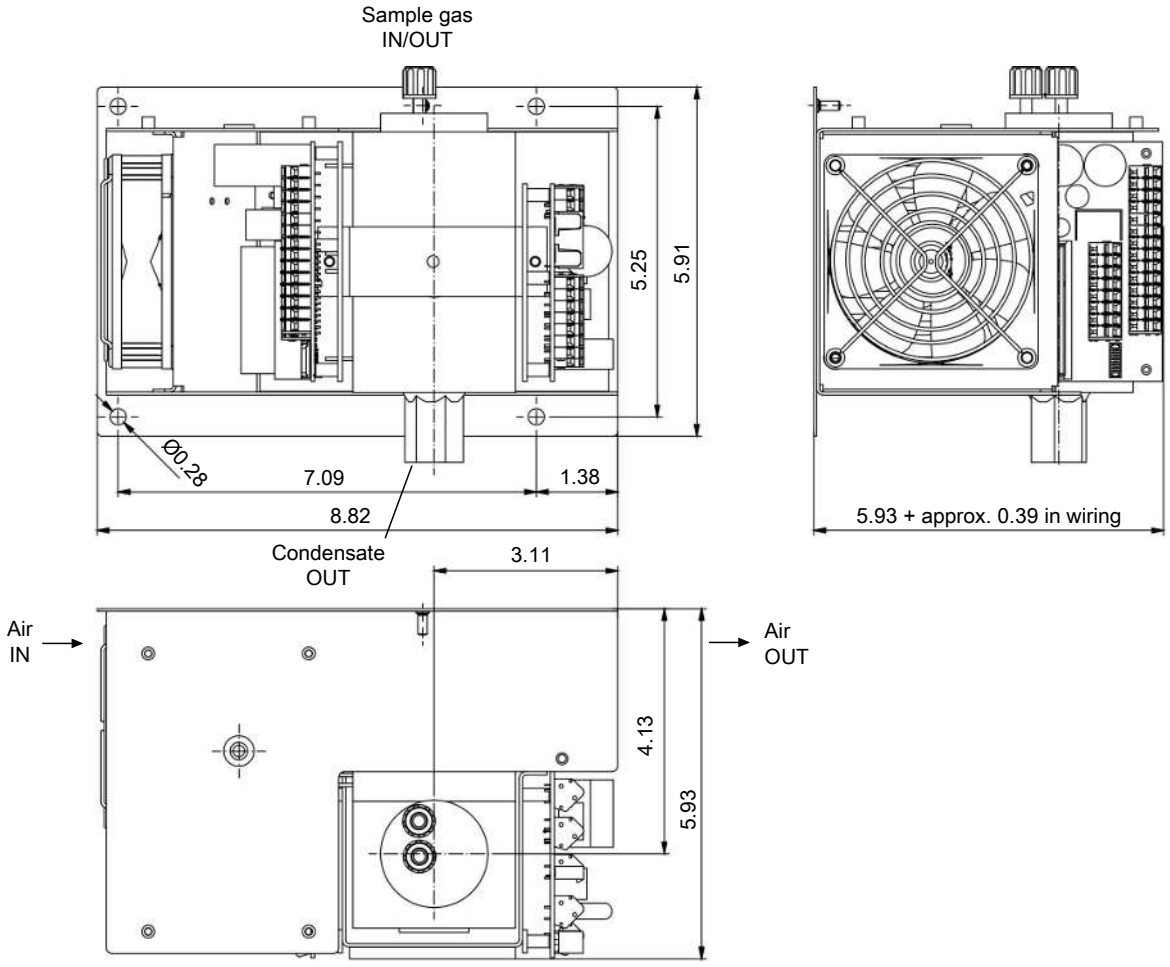
[3] Passive discharge via automatic condensate drains or traps not applicable for MTG heat exchangers. For passive discharge on the MTS and MTV heat exchangers, use a screw connection with a clearance of at least 7 mm (9/32") (see accessories).

[4] Gasket inside diameter.

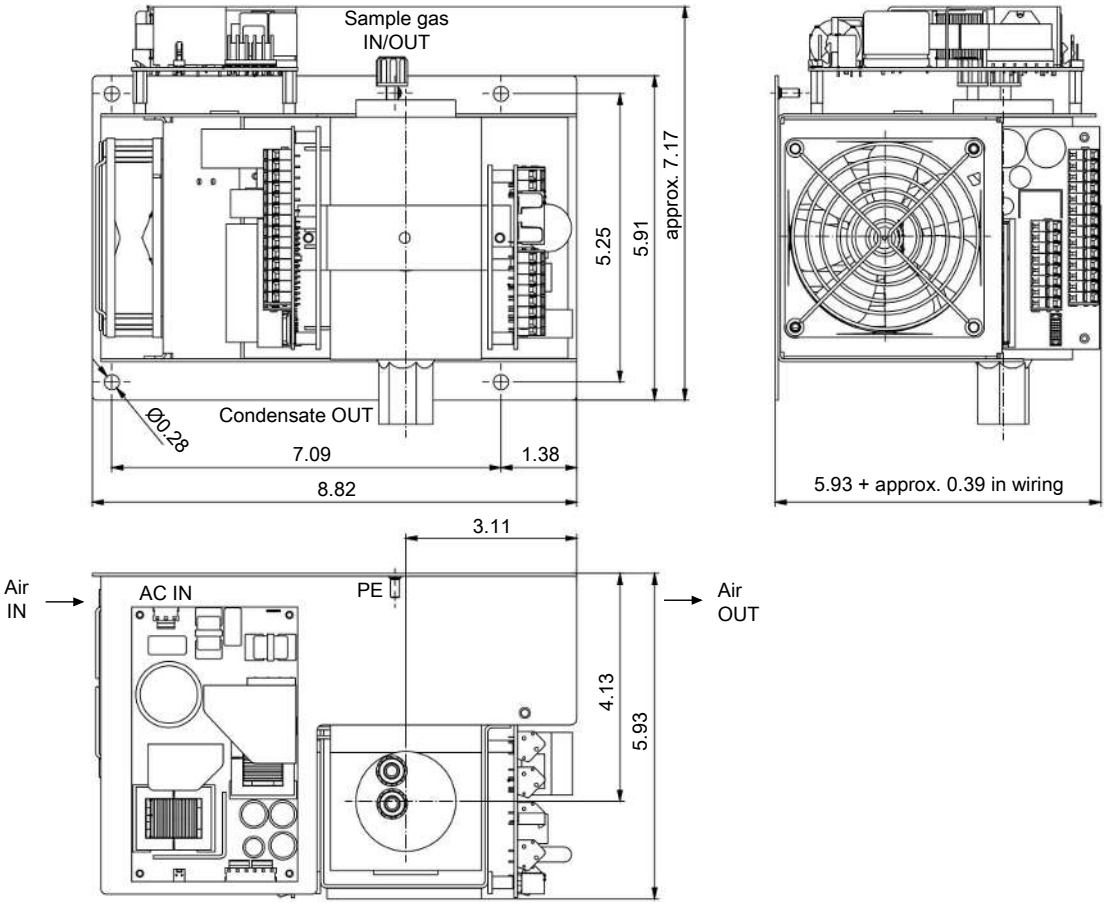
Dimensions (inch)

Models for standard applications TC-Standard OEM 6912 and 6922

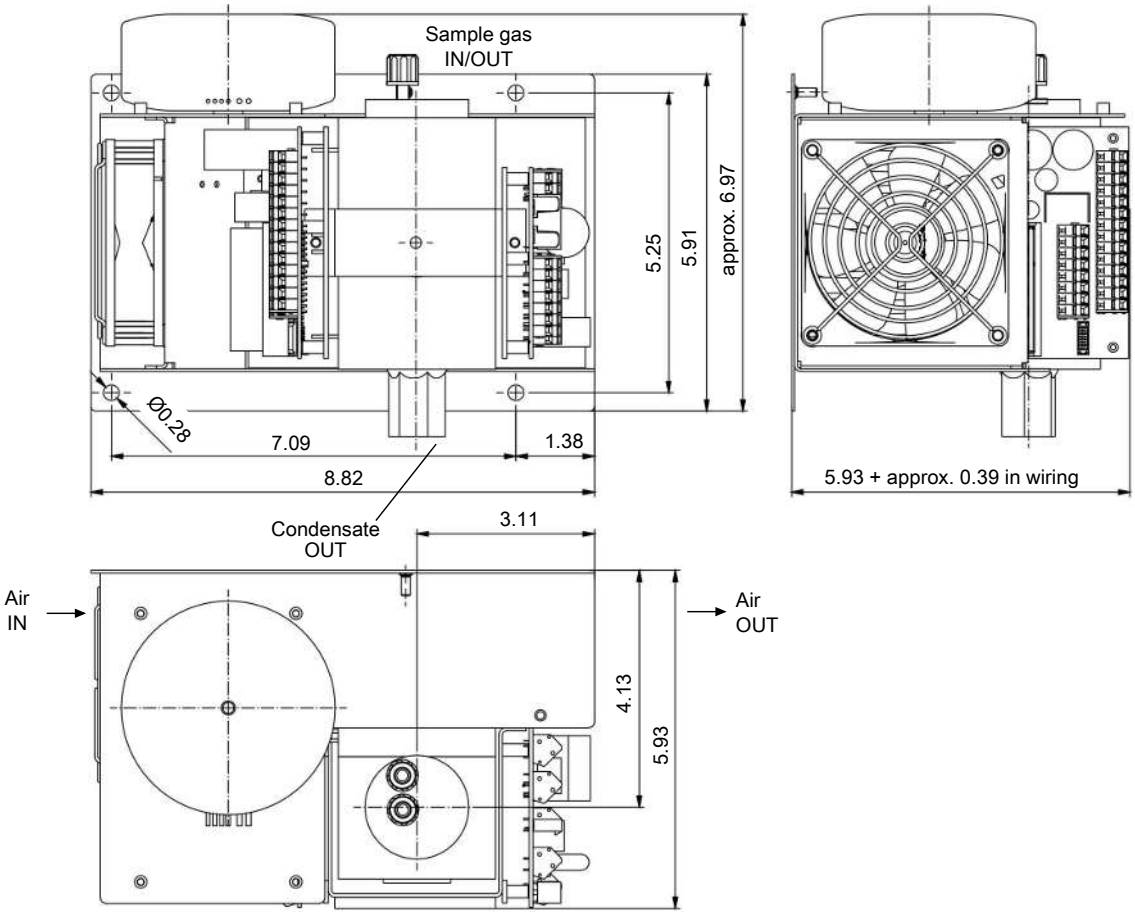
24 V DC models



Models with 230 V / 115 V switching power supply



Models with 230 V / 115 V transformer



Ordering instructions

Gas cooler models

The item number is a code for the configuration of your unit. Please use the following model code:

4496	2	9	X	2	0	X	X	X	Product characteristics
			1						Gas cooler with 1 heat exchanger
			2						Gas cooler with 2 heat exchangers
									Gas cooler type
				2	0				TC-Standard OEM: Ambient temperature 122 °F
									Supply voltage
						1			115 V AC, 50/60 Hz (transformer)
						2			230 V AC, 50/60 Hz (transformer)
						4			24 V DC
						5			115 V AC, 50/60 Hz (switching power supply)
						6			230 V AC, 50/60 Hz (switching power supply)
									DeltaT control
							0		without DeltaT control
							1		DeltaT control option
									Signal outputs
								0	Status output + analog output
								2	Status output + Modbus RTU digital output [1]

[1] Analog output function not applicable.

Heat exchanger options

Item no.	Description
4465099	MTS, steel heat exchanger ø0.79 in, metric connections
4465099I	MTS-I, steel heat exchanger ø0.79 in, US connections
4465299	MTS-WS, steel heat exchanger ø0.79 in, horizontal gas inlet/output, metric connections
4465199	MTV, plastic heat exchanger ø0.79 in, metric connections
4465199I	MTV-I, plastic heat exchanger ø0.79 in, US connections
44651997	MTG, glass heat exchanger ø0.79 in, metric and US connections
4447999	PTS, steel heat exchanger ø1.38 in, metric connections
4448999I	PTS-I, steel heat exchanger ø1.38 in, US connections
4446999	PTV, plastic heat exchanger ø1.38 in, metric connections
4446999I	PTV-I, plastic heat exchanger ø1.38 in, US connections
4445999	PTG, glass heat exchanger ø1.38 in, metric and US connections

Spare parts and accessories

Item no.	Description
see data sheet 450005	Automatic condensate drain
see data sheet 410011	Moisture detector and adapter, various models
41111000	Moisture detector connection cable, 4 m
9144050082	Moisture detector connection cable, 450 mm
9144050038	Cable for cooler temperature analogue output 4 m
see data sheet 420011	Sample gas pump P1.x
see data sheet 450020	Peristaltic pump CPsingle, CPdouble and replacement hose
see data sheet 440002	Condensate trap
4381045	Screw connection G1/4 – DN 8/12 for passive condensate connection MTS and MTV
4381048	Screw connection NPT 1/4" for passive condensate connection MTS and MTV
449601000	Analogue Output Kit
449600049	Status/alarm output, M3 plug, cable length 340 mm (13.39 in)
9144050143	Modbus RTU connection cable 2 m (6.6 ft)
9144050144	Modbus RTU connection cable 5 m (16.4 ft)

Gas Analysis

ModbusRTU

Sample gas cooler TC-MIDI

Many analysis processes require extracting sample gas from the process. This also extracts process-related contamination such as particles or moisture. These can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser. The sample gas cooler reduces the gas temperature to below the dew point for this purpose, causing moisture to drop out, which is then discharged as condensate.

In addition to the status output to monitor the sample gas cooler function, we offer an optional 4 – 20 mA analog output or digital interface. The process control can access the process and diagnostic data via the Modbus RTU interface as well as configure the device settings.

The TC-MIDI series is in the top performance class of sample gas coolers with one or two gas paths. Plug-in heat exchangers are available in a variety of materials and a large range of accessories can be directly built in to adapt the unit to the operating conditions. The TC-MIDI Sample gas cooler is particularly a component in gas conditioning when the process or ambient conditions require a higher cooling capacity.

- Compact design: Pre-installed and ready to connect
- Low maintenance costs based on easy accessibility
- One or two gas paths
- Heat exchanger made from stainless steel, Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Nominal cooling capacity 185 Btu/h (104 °F version) or 166 Btu/h (122 °F version)
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperature display
- Optional 4 - 20 mA or Modbus RTU signal output
- Optional CE mark or FM approval
- Moisture detector, filter, condensate pump and sample gas pump optional

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Overview

The TC-MIDI series was designed specifically for high cooling capacities and high ambient temperatures.

The Peltier coolers are distinguished according to cooling capacity/operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications	
Operating temperature	104 °F	122 °F
1 heat exchanger (single or double)	TC-MIDI 6111	TC-MIDI 6112

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector,
- sample gas pump.

In addition, we offer different signal outputs:

- Status output
- Analog output, 4...20 mA, incl. status output,
- Modbus RTU digital output, incl. status output

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 °F to 68 °F) (factory preset 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C/ 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via connected peristaltic pumps or add-on automatic condensate drains.

Fine mesh filters can also be used, which in turn can be installed in optional moisture detectors.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if a condensate enters the cooler due to a malfunction and the peristaltic pump or the automatic condensate drain is unable to remove it.

A P1 gas pump can be attached to the gas cooler, optionally also with bypass valve for regulating the flow. This allows the sample gas pump to be expanded by a single-leg system, so when equipped with a single heat exchanger or for the respective application the two gas paths of the dual heat exchangers are switched in series, for example Cooling 1 – Pump – Cooling 2.

Delta T control option

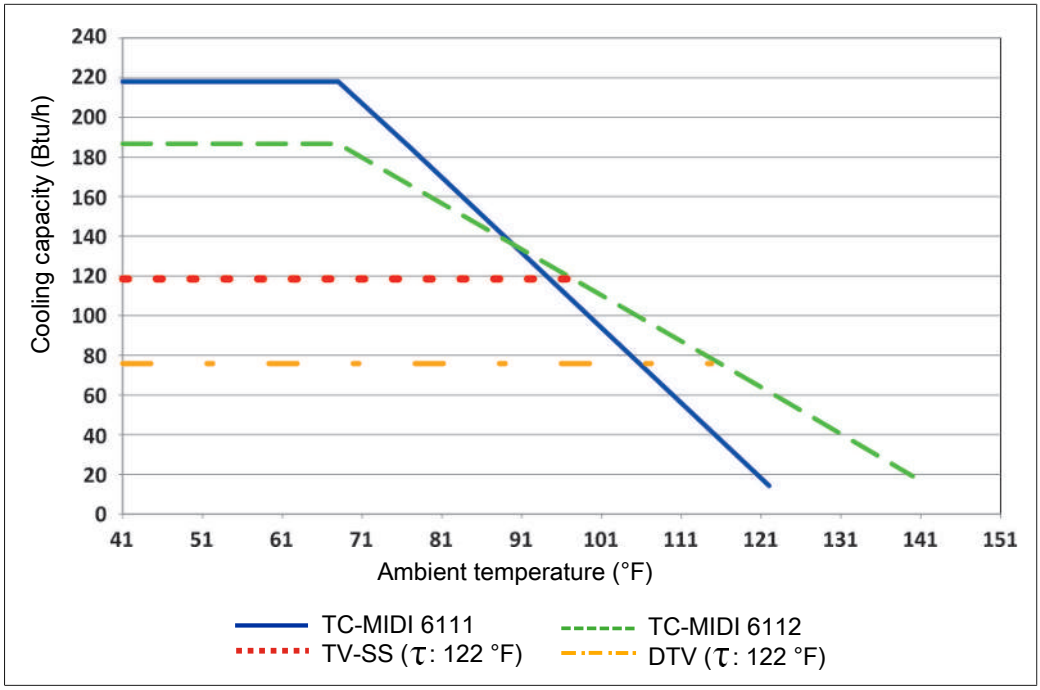
Not all applications require an outlet dew point of 41 °F. In some applications a higher dew point is sufficient. In other applications a stable outlet dew point doesn't matter, it's enough for the gas to be dry, so if the outlet dew point has an adequate difference in temperature below the ambient temperature.

Here the electronics measure the ambient temperature and regulate the outlet dew point to an adjustable value below it. This extends the potential cooling capacity to the limits of the heat exchanger. Here it's important to note the outlet dew point fluctuates along with the ambient temperature and a stable dew point cannot be a prerequisite for the measurement.

The target temperature range is defined by the ambient temperature, the adjustable temperature difference and the alarm limits. If the block temperature is not within the target range with active Delta T-control, the status message "dt" will flash in the display.

Example: At a difference of 30 K/54 °F, at a set outlet dew point of 41 °F this means the dew point remains stable up to an ambient temperature of approx. 95 °F, and the safe drop is only preferred over the ambient temperature with ambient temperature peaks over 95 °F. The cooling capacity specified in the cooling capacity graphs at 95 °F is then available at above 95 °F.

Performance Data



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 122 °F.

Gas cooler technical data

Gas Cooler Technical Data				
Ready for operation	after max. 10 minutes			
Ambient temperature	41 °F to 140 °F			
Gas outlet dew point preset: adjustable:	 41 °F 36 °F...68 °F or Delta T control			
IP rating	IP 20			
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) [1] 2 Hz-13.2 Hz amplitude ± 1.0 mm 13.2 Hz -100 Hz acceleration			
Housing	Stainless steel, brushed			
Packaging dimensions	approx. 13.8 x 8.7 x 8.7 in			
Weight incl. heat exchanger	approx. 13.8 lb approx. 33 lb at full expansion stage			
Electrical data	Unit without add-on		Unit with add-on (P1.x + peristaltic pump)	
	230 V AC	**115 V AC**	**230 V AC**	**115 V AC**
	+5/-10%	+5/-10%	+-5%	+-5%
	50/60 Hz	50/60 Hz	50 Hz	60 Hz
	1.2 A	2.4 A	1.8 A	3.6 A
	200 W / 280 VA		290 W / 420 VA	
Recommended fuse (characteristic: delayed action)	3.15 A	6.3 A	3.15 A	6.3 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free			
Electrical Connections	Plug per EN 175301-803			
Gas connections and condensate outlet	Heat exchanger see table "Heat Exchanger Overview" Filter, moisture detector adapter G1/4 or NPT 1/4"			
Parts in contact with media Filter: Moisture detector: Heat exchanger: Peristaltic pump: Sample gas pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" see "Technical Data - Options" PTFE/Viton			
FM no.:	3062014			

[1] not in conjunction with add-on sample gas pump

Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Digital interface technical data	
Signal	Modbus RTU (RS-485)
Connection	M12x1 connector, DIN EN 61076-2-101

Technical Data Peristaltic Pumps CPsingle / CPdouble	
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Condensate outlet	Hose nipple Ø6 mm (0.24 in) Screw connection 4/6 (metric), 1/6”-1/4” (US)
Protection class	IP 40
Materials Hose: Connections:	 Norprene (Standard), Marprene, Fluran PVDF

Technical Data Sample Gas Pump P1	
Ambient temperature	32 °F to 122 °F
Operating pressure	max. 18.8 psi abs.
Nominal outlet	4.6 lpm (at p = 14.5 psi abs.)
Materials in contact with media vary by configuration	PTFE, PVDF, 1.4571, 1.4401, Viton, PFA

Technical Data Filter AGF-PV-30-F2-L	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	58 psi
Filter surface	19.4 in^2
Filter fineness	2 µm
Dead volume	6.59 cu. in.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with mediums) Viton sintered PTFE

Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e(moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load by the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 122 °F and ϑ_G = 158 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below the parameters τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the heat exchanger, TG the parameter triple τ_e = 104 °F, ϑ_G = 158 °F and v = 7.1 lpm can also be used in place of τ_e = 122 °F, ϑ_G = 158 °F and v = 5.8 lpm.

Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	TS TS-I [2]	TG TG	TV TV-I [2]	DTS (DTS-6 [3]) DTS-I (DTS-6-I [3]) [2]	DTG DTG	DTV [3] DTV-I [2] [3]
Materials in contact with media	Stainless steel	Glass PTFE	PVDF	Stainless steel	Glass PTFE	PVDF
Flow rate v_{max} [1]	8.3 lpm	6.7 lpm	3.9 lpm	2 x 4.2 lpm	2 x 3.3 lpm	2 x 2.7 lpm
Inlet dew point $\tau_{e,max}$ [1]	176 °F	176 °F	149 °F	176 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F	356 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	427 Btu/h	218 Btu/h	114 Btu/h	427 Btu/h	218 Btu/h	175 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	44 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.12 psi	0.12 psi	0.07 psi each	0.07 psi each	0.22 psi each
Dead volume V_{tot}	4.2 cu. in.	2.9 cu. in.	7.9 cu. in.	1.7/1.5 cu. in.	1.7/1.5 cu. in.	1.3/1.3 cu. in.
Gas connections (metric)	G1/4	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	NPT 1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")[4]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	Tube 10 mm (6 mm)	GL18 (10 mm) [4]	DN 5/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	Tube 3/8" (1/4")	GL18 (3/8") [4]	3/16"-5/16"

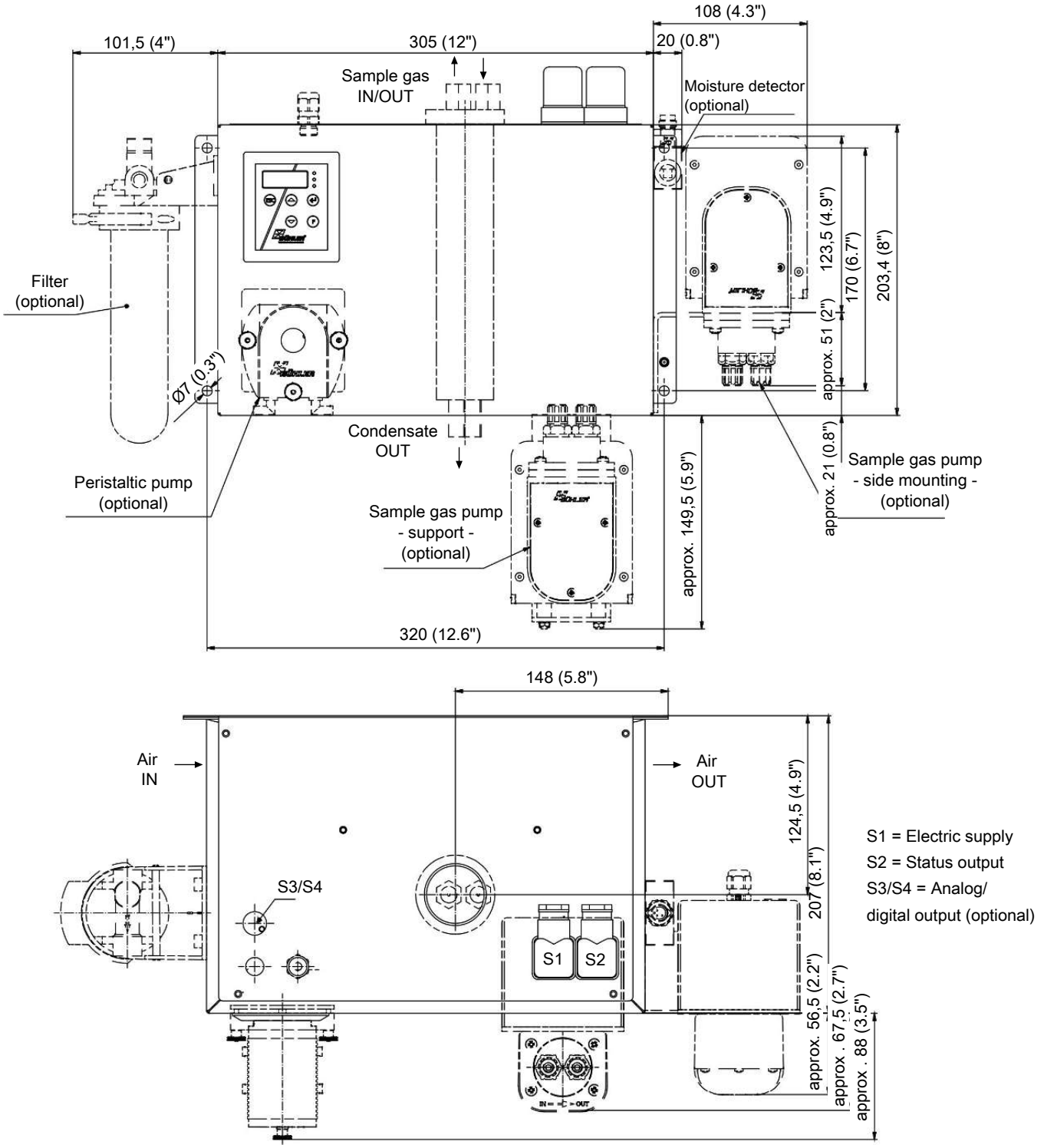
[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Condensate drain only possible with condensate pump

[4] Gasket inside diameter

Dimensions (inch)



Ordering instructions

Gas cooler models with one gas path inside the heat exchanger

The item number is a code for the configuration of your unit. Please use the following model code:

4496	3	1	1	X	X	X	1	X	X	X	X	X	X	0	X	0	0	Product Characteristics
																		Gas cooler models
				1														TC-MIDI 6111: Ambient temperature 104 °F
				2														TC-MIDI 6112: Ambient temperature 140 °F
																		Certifications
					0													Standard applications – CE
					1													for common locations - FM
																		Supply voltage
						1												115 V AC, 50/60 Hz
						2												230 V AC, 50/60 Hz
																		Heat exchanger
							1	1	0									Stainless steel, TS, metric
							1	1	5									Stainless steel, TS-I, US
							1	2	0									Duran glass, TG, metric
							1	2	5									Duran glass, TG-I, US
							1	3	0									PVDF, TV-SS, metric
							1	3	5									PVDF, TV-SS-I, US
																		Condensate drain [2]
										0								without condensate drain
										1								CPsingle with hose nipple, angled
										3								CPsingle with screw connection [4]
																		Sample gas pumps [1]
											0							without sample gas pump
											1							P1, PVDF, bottom mounted
											2							P1, with bypass valve, bottom mounted
											6							P1, PVDF, mounted externally
											7							P1, with bypass valve, side mounted
																		Moisture detector [2] **/ Filter**
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with PVDF adapter [3]
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
																		Signal outputs
														0	0			status output only
														1	0			Analog output, 4...20 mA incl. status output
														2	0			Modbus RTU digital output incl. status output [5]
																		Delta T control
																0	0	without Delta T control
																1	0	Delta T control option

[1] Factory installed tubing for suction operation.

[2] With this option, the maximum ambient temperature is limited to 122 °F.

[3] Also available in stainless steel.

[4] Metric or US connection, per heat exchanger.

[5] Option only available for CE version.

Gas cooler models with two gas paths insides the heat exchanger

The item number is a code for the configuration of your unit. Please use the following model code:

4496	3	1	1	X	X	X	2	X	X	X	X	X	X	0	X	0	0	Product Characteristics
																		Gas cooler models
				1														TC-MIDI 6111: Ambient temperature 104 °F
				2														TC-MIDI 6112: Ambient temperature 140 °F
																		Certifications
					0													Standard applications – CE
					1													for common locations - FM
																		Supply voltage
						1												115 V AC, 50/60 Hz
						2												230 V AC, 50/60 Hz
																		Heat exchanger
							2	6	0									Stainless steel, DTS, metric
							2	6	5									Stainless steel, DTS-I, US
							2	6	1									Stainless steel, DTS 6, metric [1]
							2	6	6									Stainless steel, DTS 6-I, US [1]
							2	7	0									Duran glass, DTG, metric
							2	7	5									Duran glass, DTG-I, US
							2	8	0									PVDF, DTV, metric [1]
							2	8	5									PVDF, DTV-I, US [1]
																		Condensate drain [4]
										0								without condensate drain
										2								CPdouble with hose nipple, angled
										4								CPdouble with screw connection [6]
																		Sample gas pumps [3]
											0							without sample gas pump
											1							P1, 1 gas path, PVDF, bottom mounted
											2							P1, 1 gas path, with bypass valve, bottom mounted
											6							P1, 1 gas path, PVDF, mounted externally [2]
											7							P1, 1 gas path, with bypass valve, side mounted [2]
																		Moisture detector [4] **/ Filter**
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with PVDF adapter [5]
												0	2					without filter, 2 moisture detectors with PVDF adapter [5]
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
												2	0					2 filters, without moisture detector [2]
												2	1					2 filters, 1 moisture detector [2]
												2	2					2 filters, 2 moisture detectors [2]
																		Signal outputs
														0	0			status output only
														1	0			Analog output, 4...20 mA incl. status output
														2	0			Modbus RTU digital output incl. status output [7]
																		Delta T control
																0	0	without Delta T control
																1	0	Delta T control option

[1] Condensate outlets only suitable when connecting peristaltic pumps.
[2] External sample gas pump P1 only allows 1 filter.
[3] Factory installed tubing for suction operation.
[4] With this option, the maximum ambient temperature is limited to 122 °F.
[5] Also available in stainless steel.
[6] Metric or US connection, per heat exchanger.
[7] Option only available for CE version.

Consumables and accessories

Item no.	Description
4510008	Automatic condensate drain AK 5.2 (pressure operation only)
4510028	Automatic condensate drain AK 5.5 (pressure operation only)
4410004	Automatic condensate drain AK 20 (pressure operation only)
4410001	Automatic condensate drain 11 LD V 38 (pressure operation only)
9144050038	Cable for cooler temperature analog output 4 m
41020050	Filter element F2-L; 2-pack
4410005	Condensate trap GL1, 0.4 L
44920035012	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple
44920035016	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (metric)
44920035017	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (US)
4228003	Bellow for P1 pump
9009398	O-ring for bypass P1 pump
4228066	Set inlet/outlet valves 158 °F for P1 pump
see data sheet 420011	Sample Gas Pumps P1
see data sheet 450020	CPsingle, CPdouble peristaltic condensate pumps

ModbusRTU

H_2/O_2 ready

Sample gas cooler TC-MIDI with -H2/-O2 heat exchanger

When powerful cooling is required, the TC-MIDI sample gas cooler with -H2/-O2 heat exchanger is the ideal solution for reliable cooling of hydrogen (H_2) and oxygen (O_2) in extractive gas analysis. Green hydrogen produced by electrolysis using renewable energy sources is the key to a sustainable, emission-free future in the energy industry.

The safe, reliable cooling of the sample gas is decisive for gas analytics in the electrolyser (e.g. for LEL monitoring), as a higher moisture content is to be expected with some processes. The moisture in the process gas can damage the sensitive measuring cells in the analyser, so the gas temperature is kept below gas dew point at all times, thus causing the moisture to be emitted. The condensate is discharged via an automatic condensate drain.

As well as material-refining measures to prevent hydrogen-induced component damage, the heat exchangers for the H_2 series are subjected to a leak test using helium. For the O_2 version, special cleaning processes are used to remove particles, oils and fats from parts coming into contact with media. The contamination limits are based on the internationally used and applicable guideline EIGA Doc 33/18 “Cleaning of Equipment for Oxygen Service”.

- For applications with high-purity hydrogen or oxygen
- Cleaning standard is based on EIGA Doc 33/18 as regards the absence of particles, oils and fats for heat exchangers with the O_2 version
- Materials in contact with media are suitability-tested for high H_2 and O_2 concentrations
- Heat exchanger leak tests using helium are performed on the H_2 series as standard
- Nominal cooling capacity 185 Btu/h (104 °F version) or 166 Btu/h (122 °F version)
- Constant dew point stability ± 0.2 °F
- Adjustable outlet dew point and alarm thresholds
- Cooling block temperature display
- Optional 4 - 20 mA or Modbus RTU signal output

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e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The TC-MIDI with -H2/-O2 heat exchanger series was specially developed for use with high-purity hydrogen and oxygen.

The Peltier coolers are distinguished according to cooling capacity / operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the ordering information category.

Application	Standard applications	
Operating temperature	104 °F	122 °F
1 heat exchanger for H_2/O_2 applications	TC-MIDI 6111	TC-MIDI 6112

We also offer different signal outputs:

- Status output,
- Analog output, 4...20 mA, incl. status output,
- Modbus RTU digital output, incl. status output.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset, the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured using the 5 buttons with the guidance of the menu. This applies to the target outlet dew point, which can be set from 2 to 20 °C (36 to 68 °F) (factory setting 5 °C/41 °F),

as well as the warning thresholds, which can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature, the range is τ_a -1 to - 3 K (at a minimum 1 °C/34 °F cooling block temperature); for the excess temperature, the range is τ_a +1 to +7 K. The factory settings for both values are 3 K.

The flashing display and the status relays indicate that the conditions are below or above the configured warning range (e.g. after switching on).

The separated condensate can be drained via add-on automatic condensate drains.

Delta T control option

Not all applications require an outlet dew point of 41 °F. In some applications a higher dew point is sufficient. In other applications a stable outlet dew point doesn't matter, it's enough for the gas to be dry, so if the outlet dew point has an adequate difference in temperature below the ambient temperature.

Here the electronics measure the ambient temperature and regulate the outlet dew point to an adjustable value below it. This extends the potential cooling capacity to the limits of the heat exchanger. Here it's important to note the outlet dew point fluctuates along with the ambient temperature and a stable dew point cannot be a prerequisite for the measurement.

The target temperature range is defined by the ambient temperature, the adjustable temperature difference and the alarm limits. If the block temperature is not within the target range with active Delta T-control, the status message "dt" will flash in the display.

Example: At a difference of 30 K/54 °F, at a set outlet dew point of 41 °F this means the dew point remains stable up to an ambient temperature of approx. 95 °F, and the safe drop is only preferred over the ambient temperature with ambient temperature peaks over 95 °F. The cooling capacity specified in the cooling capacity graphs at 95 °F is then available at above 95 °F.

Gas cooler technical data

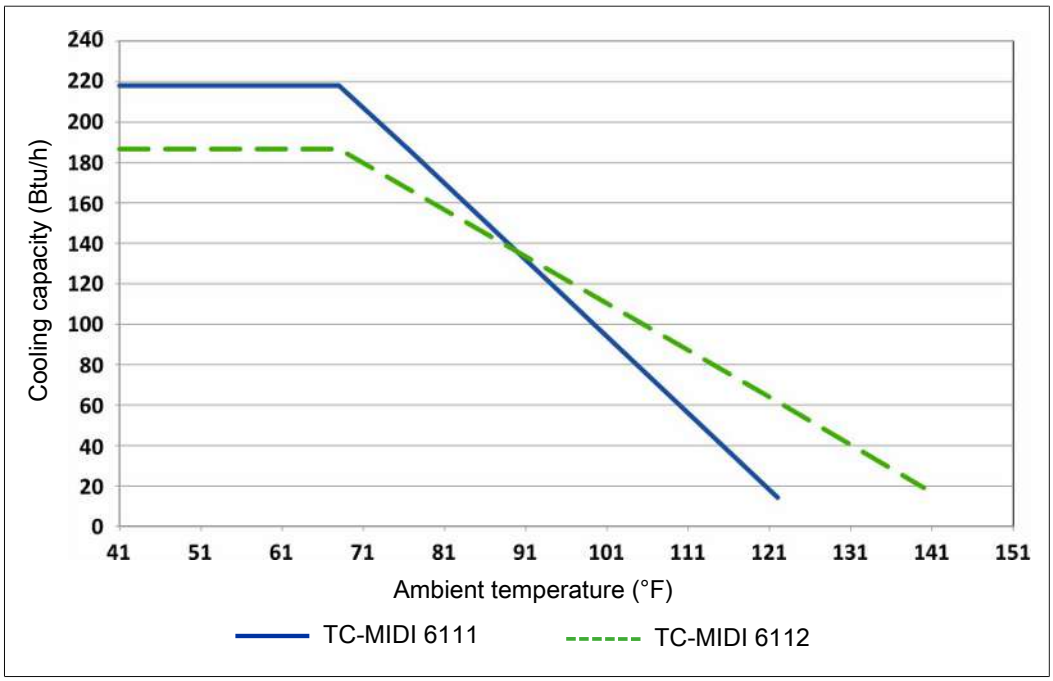
Gas cooler technical data		
Ready for operation	after max. 10 minutes	
ambient temperature	41 °F to 140 °F	
Gas outlet dew point preset: adjustable:	 41 °F 36 °F...68 °F	
IP rating	IP 20	
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7 g) 2 Hz-13.2 Hz amplitude ± 1.0 mm 13.2 Hz -100 Hz acceleration	
Housing	Stainless steel, brushed	
Packaging dimensions	approx. 13.8 x 8.7 x 8.7 in	
Weight incl. heat exchanger	approx. 26.5 lb	
Electrical data	Unit without add-on	
	230 V AC	**115 V AC**
	+5/-10%	+5/-10%
	50/60 Hz	50/60 Hz
	1.2 A	2.4 A
	200 W / 280 VA	
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free	
Electrical Connections	Plug per EN 175301-803	
Parts in contact with media Heat exchanger:	 see table "Heat Exchanger Overview"	

Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Digital interface technical data	
Signal	Modbus RTU (RS-485)
Connection	M12x1 connector, DIN EN 61076-2-101

Performance Data



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 122 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e(moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load by the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 122 °F and ϑ_G = 158 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below the parameters τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the heat exchanger, TG the parameter triple τ_e = 104 °F, ϑ_G = 158 °F and v = 7.1 lpm can also be used in place of τ_e = 122 °F, ϑ_G = 158 °F and v = 5.8 lpm.

Please contact our experts for clarification or refer to our design program.

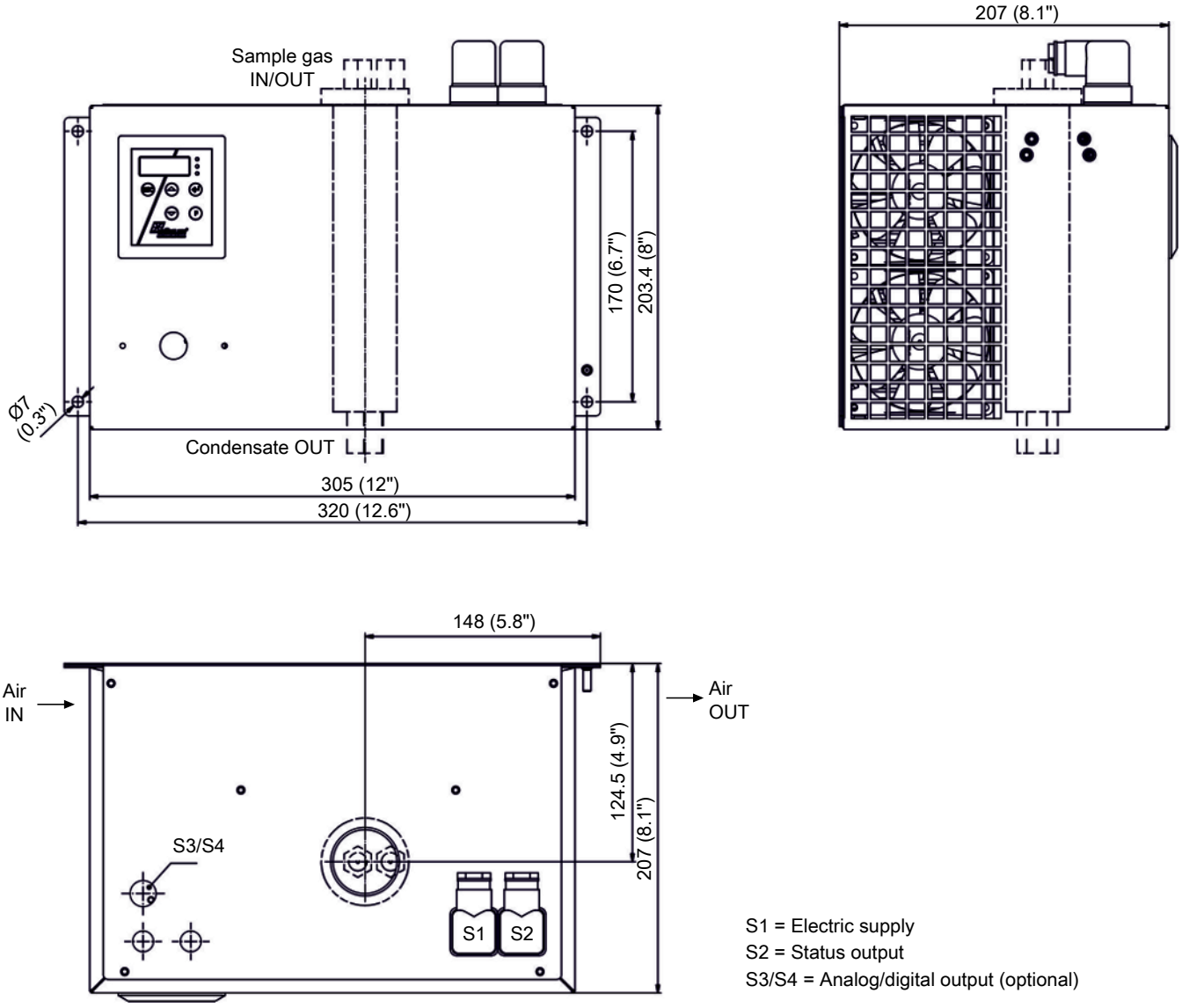
Heat exchanger overview

Heat exchanger	TS-H2/-O2 TS-I-H2/-O2 [2)]	DTS-H2/-O2 DTS-I-H2/-O2 [2)]
Materials in contact with media	Stainless steel	Stainless steel
Flow rate v_{max} [1)]	8.3 lpm	2 x 4.2 lpm
Inlet dew point $\tau_{e,max}$ [1)]	176 °F	176 °F
Gas inlet temperature $\vartheta_{G,max}$ [1)]	356 °F	356 °F
Max. cooling capacity Q_{max}	427 Btu/h	427 Btu/h
Gas pressure p_{max}	22 psi	22 psi
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.07 psi each
Dead volume V_{dead}	4.2 cu. in.	1.7/1.5 cu. in.
Gas connections (metric)	G1/4	6 mm tube
Gas connections (US)	NPT 1/4"	1/4" tube
Condensate out connection (metric)	G3/8	Tube 10 mm (6 mm)
Condensate out connection (US)	NPT 3/8"	Tube 3/8" (1/4")

[1)] Max. cooling capacity of the cooler must be considered.

[2)] Models marked I have NPT threads or US tubes.

Dimensions (inch)



S1 = Electric supply
S2 = Status output
S3/S4 = Analog/digital output (optional)

Ordering instructions

Gas cooler models with one or two gas paths in the heat exchanger for H2/O2 applications

The item number is a code for the configuration of your unit. Please use the following model code:

4496	3	1	1	X	X	X	X	X	X	0	0	0	0	X	0	X	0	X	Product Characteristics
																			Gas cooler models
				1															TC-MIDI 6111: Ambient temperature 104 °F
				2															TC-MIDI 6112: Ambient temperature 140 °F
																			Certifications
					0														Standard applications – CE
					1														for common locations - FM
																			Supply voltage
						1													115 V AC, 50/60 Hz
						2													230 V AC, 50/60 Hz
																			Heat exchanger
							1	1	0								-O2		Stainless steel, TS-O2, metric
							1	1	5								-O2		Stainless steel, TS-I-O2, US
							1	1	0								-H2		Stainless steel, TS-H2, metric
							1	1	5								-H2		Stainless steel, TS-I-H2, US
							2	6	0								-O2		Stainless steel, DTS-O2, metric
							2	6	5								-O2		Stainless steel, DTS-I-O2, US
							2	6	0								-H2		Stainless steel, DTS-H2, metric
							2	6	5								-H2		Stainless steel, DTS-I-H2, US
														0	0				**Signal outputs**
														0	0				status output only
														1	0				Analog output, 4..20 mA, incl. status output
														2	0				Modbus RTU digital output incl. status output [1]
																0	0		**Delta T control**
																0	0		without Delta T control
																1	0		Delta T control option

[1] Option only available for CE version.

Spare parts and accessories for cooler with -H2/-O2 heat exchanger

Item no.	Description
4410001 (see data sheet 450005)	Automatic condensate drain 11 LD V 38 [1]
4410001-O2 (see data sheet 450005)	Automatic condensate drain 11 LD V 38 optimised for oxygen
see data sheet 400016	Stainless steel pipe fittings for high-purity oxygen applications

[1] For use with high hydrogen concentrations max. 22 psi overpressure.

Gas Analysis

Sample gas cooler TC-MIDI X2

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

Many applications require equipment which can be used in explosive areas. This is where the TC-MIDI X2 series provides solutions for Zone 2 or Class I, Division 2.

The TC-MIDI X2 sample gas cooler is a component in this conditioning chain if the process or ambient conditions require a higher cooling capacity.

- ATEX and IECEx Zone 2 approval
- FM C-US approval for Class I, Division 2
- Compact design: Pre-installed and ready to connect
- Low maintenance costs based on easy accessibility
- One or two gas paths
- Heat exchanger made from stainless steel, Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Low operating noise
- Rated capacity 185/166 Btu/h, 104 °F/122 °F - Version
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperature display
- Moisture detector, filter, analog output, peristaltic pump, and sample gas pump optional

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Internet: www.buhlertech.com

Overview

The TC-MIDI X2 series was designed specifically for high cooling capacities and high ambient temperatures.

The Peltier coolers are distinguished according to cooling capacity / operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the ordering information category.

Application	Standard applications	
Operating temperature	104 °F	122 °F
1 heat exchanger (single or double)	TC-MIDI 6111 X2	TC-MIDI 6112 X2

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector,
- Sample gas pump.

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 °F to 68 °F) (factory preset 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C/ 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via connected peristaltic pumps or add-on automatic condensate drains.

Fine mesh filters can also be used, which in turn can be installed in optional moisture detectors.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if a condensate enters the cooler due to a malfunction and the peristaltic pump or the automatic condensate drain is unable to remove it.

A P1 gas pump can be attached to the gas cooler, optionally also with bypass valve for regulating the flow. This allows the sample gas pump to be expanded by a single-leg system, so when equipped with a single heat exchanger or for the respective application the two gas paths of the dual heat exchangers are switched in series, for example Cooling 1 – Pump – Cooling 2.

Delta T control option

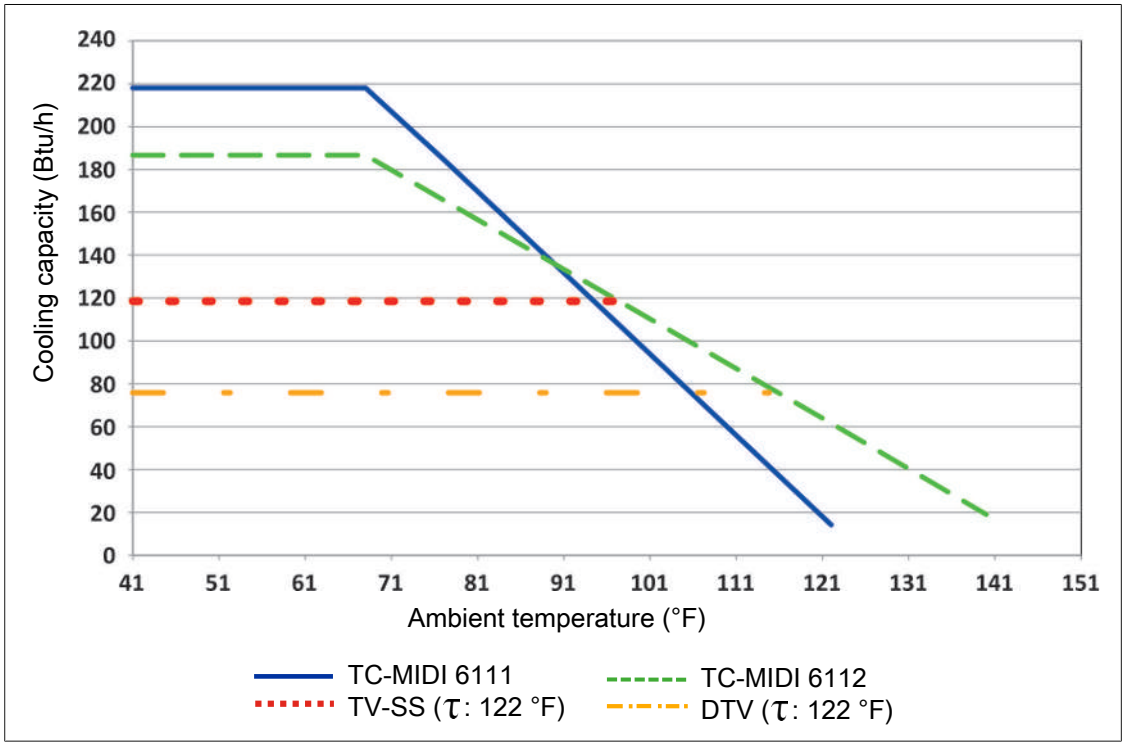
Not all applications require an outlet dew point of 41 °F. In some applications a higher dew point is sufficient. In other applications a stable outlet dew point doesn't matter, it's enough for the gas to be dry, so if the outlet dew point has an adequate difference in temperature below the ambient temperature.

Here the electronics measure the ambient temperature and regulate the outlet dew point to an adjustable value below it. This extends the potential cooling capacity to the limits of the heat exchanger. Here it's important to note the outlet dew point fluctuates along with the ambient temperature and a stable dew point cannot be a prerequisite for the measurement.

The target temperature range is defined by the ambient temperature, the adjustable temperature difference and the alarm limits. If the block temperature is not within the target range with active Delta T-control, the status message "dt" will flash in the display.

Example: At a difference of 30 K/54 °F, at a set outlet dew point of 41 °F this means the dew point remains stable up to an ambient temperature of approx. 95 °F, and the safe drop is only preferred over the ambient temperature with ambient temperature peaks over 95 °F. The cooling capacity specified in the cooling capacity graphs at 95 °F is then available at above 95 °F.

Performance Data



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 122 °F.

Gas cooler technical data

Gas Cooler Technical Data				
Ready for operation	after max. 10 minutes			
Ambient temperature	41 °F to 140 °F			
Gas output dew temperature preset: adjustable:	 41 °F 36 °F...68 °F or Delta T control			
IP rating	IP 20			
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) [1] 2 Hz-13.2 Hz amplitude ± 1.0 mm 13.2 Hz -100 Hz acceleration			
Housing	Stainless steel, brushed			
Packaging dimensions	approx. 13.8 x 8.7 x 8.7 in			
Weight incl. heat exchanger	approx. 13.8 lb approx. 33 lb at full expansion stage			
Electrical data	Unit without add-on		Unit with add-on (P1.x + peristaltic pump)	
	230 V AC	**115 V AC**	**230 V AC**	**115 V AC**
	+5/-10%	+5/-10%	+-5%	+-5%
	50/60 Hz	50/60 Hz	50 Hz	60 Hz
	1.2 A	2.4 A	1.8 A	3.6 A
	200 W / 280 VA		290 W / 420 VA	
Recommended fuse (characteristic: delayed action)	3.15 A	6.3 A	3.15 A	6.3 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free			
Electrical Connections	Plug per EN 175301-803			
Gas connections and condensate outlet	Heat exchanger see table "Heat Exchanger Overview" Filter, moisture detector adapter G1/4 or NPT 1/4"			
Parts in contact with media Filter: Moisture detector: Heat exchanger: Peristaltic pump: Sample gas pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" see "Technical Data - Options" PTFE/Viton			
Markings:	FM18ATEX0012X: II 3 G Ex ec nC IIC T4 Gc IECEx FMG 18.0005X: Ex ec nC IIC T4 Gc FM18US0021X/FM18CA0010X: CL I DIV 2 GP ABCD RU C-DE.HA65.B.00608/20			

[1] not in conjunction with add-on sample gas pump

Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Technical Data peristaltic pumps CPsingle X2 / CPdouble X2	
Flow rate	0.005 lpm (50 Hz)/0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Condensate outlet	Hose nipple Ø6 mm (0.24 in) Screw connection 4/6 (metric), 1/6”-1/4” (US)
Protection class	IP 40
Materials Hose: Connections:	 Norprene (Standard), Marprene, Fluran PVDF

Technical Data Sample Gas Pump P1.3	
Ambient temperature	32 °F to 122 °F
Operating pressure	max. 18.8 psi abs.
Nominal outlet	4.6 lpm (at p = 14.5 psi abs.)
Materials in contact with media vary by configuration	PTFE, PVDF, 1.4571, 1.4401, Viton

Technical Data Filter AGF-PV-30-F2-L	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	58 psi
Filter surface	19.4 in^2
Filter fineness	2 µm
Dead volume	6.59 cu. in.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with mediums) Viton sintered PTFE

Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e(moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load by the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 122 °F and ϑ_G = 158 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below the parameters τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the heat exchanger, TG the parameter triple τ_e = 104 °F, ϑ_G = 158 °F and v = 7.1 lpm can also be used in place of τ_e = 122 °F, ϑ_G = 158 °F and v = 5.8 lpm.

Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	**TS** **TS-I** [2]	**TG** **TG**	**TV** **TV-I** [2]	**DTS (DTS-6** [3]**)** **DTS-I (DTS-6-I** [3]**)** [2]	**DTG** **DTG**	**DTV** [3] **DTV-I** [2] [3]
Materials in contact with media	Stainless steel	Glass PTFE	PVDF	Stainless steel	Glass PTFE	PVDF
Flow rate v_{max} [1]	8.3 lpm	6.7 lpm	3.9 lpm	2 x 4.2 lpm	2 x 3.3 lpm	2 x 2.7 lpm
Inlet dew point $\tau_{e,max}$ [1]	176 °F	176 °F	149 °F	176 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F	356 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	427 Btu/h	218 Btu/h	114 Btu/h	427 Btu/h	218 Btu/h	175 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	44 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.12 psi	0.12 psi	0.07 psi each	0.07 psi each	0.22 psi each
Dead volume V_{tot}	4.2 cu. in.	2.9 cu. in.	7.9 cu. in.	1.7/1.5 cu. in.	1.7/1.5 cu. in.	1.3/1.3 cu. in.
Gas connections (metric)	G1/4	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	NPT 1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")[4]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	Tube 10 mm (6 mm)	GL18 (10 mm) [4]	DN 5/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	Tube 3/8" (1/4")	GL18 (3/8") [4]	3/16"-5/16"

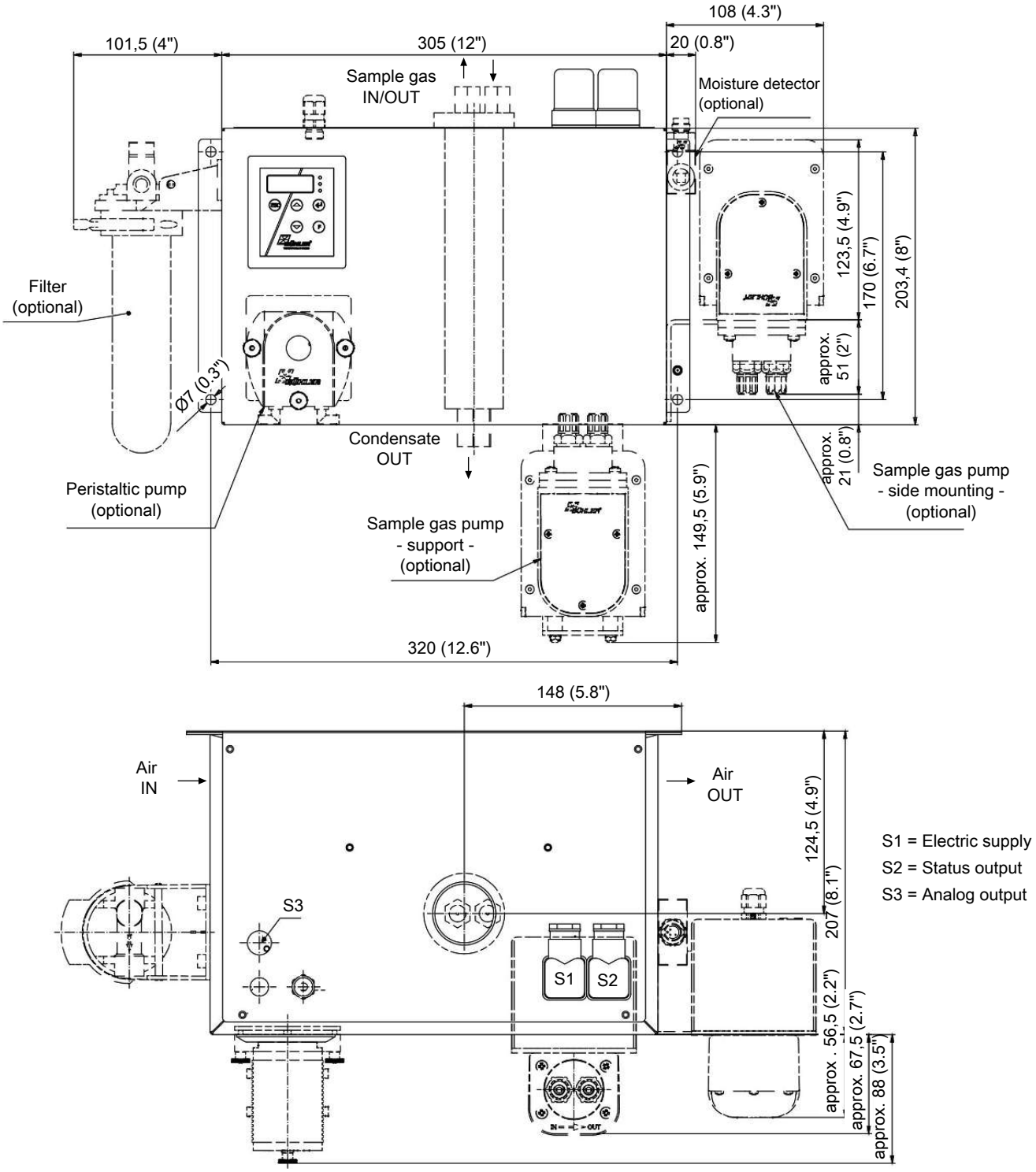
[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Condensate drain only possible with condensate pump

[4] Gasket inside diameter

Dimensions (inch)



Ordering instructions

Gas cooler models with one gas path inside the heat exchanger

The item number is a code for the configuration of your unit. Please use the following model code:

4496	3	1	1	X	2	X	1	X	X	X	X	X	X	0	X	0	0	Product Characteristics
																		Gas cooler models
				1														TC-MIDI 6111 X2: Ambient temperature 104 °F
				2														TC-MIDI 6112 X2: Ambient temperature 140 °F
																		Certifications
					2													for explosive areas
																		Supply voltage
						1												115 V AC, 50/60 Hz
						2												230 V AC, 50/60 Hz
																		Heat exchanger
							1	1	0									Stainless steel, TS, metric
							1	1	5									Stainless steel, TS-I, US
							1	2	0									Duran glass, TG, metric
							1	2	5									Duran glass, TG-I, US
							1	3	0									PVDF, TV-SS, metric
							1	3	5									PVDF, TV-SS-I, US
																		Condensate drain [2]
										0								without condensate drain
										1								CPsingle X2 with hose nipple, angled
										3								CPsingle X2 with screw connection [4]
																		Sample gas pumps [1]
											0							without sample gas pump
											1							P1.3, PVDF, bottom mounted
											2							P1.3, with bypass valve, bottom mounted
											6							P1.3, PVDF, mounted externally
											7							P1.3, with bypass valve, mounted externally
																		Moisture detector [2] **/ Filter**
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with PVDF adapter [3]
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
																		Signal outputs
														0	0			status output only
														1	0			Analog output, 4...20 mA additional
																		Delta T control
																0	0	without Delta T control
																1	0	Delta T control option

[1] Factory installed tubing for suction operation.

[2] With this option, the maximum ambient temperature is limited to 122 °F.

[3] Also available in stainless steel.

[4] Metric or US connection, per heat exchanger.

Gas cooler models with two gas paths insides the heat exchanger

The item number is a code for the configuration of your unit. Please use the following model code:

4496	3	1	1	X	2	X	2	X	X	X	X	X	X	0	X	0	0	Product Characteristics
																		Gas cooler models
				1														TC-MIDI 6111 X2: Ambient temperature 104 °F
				2														TC-MIDI 6112 X2: Ambient temperature 140 °F
																		Certifications
					2													for explosive areas
																		Supply voltage
						1												115 V AC, 50/60 Hz
						2												230 V AC, 50/60 Hz
																		Heat exchanger
							2	6	0									Stainless steel, DTS, metric
							2	6	5									Stainless steel, DTS-I, US
							2	6	1									Stainless steel, DTS 6, metric [1]
							2	6	6									Stainless steel, DTS 6-I, US [1]
							2	7	0									Duran glass, DTG, metric
							2	7	5									Duran glass, DTG-I, US
							2	8	0									PVDF, DTV, metric [1]
							2	8	5									PVDF, DTV-I, US [1]
																		Condensate drain [4]
										0								without condensate drain
										2								CPdouble X2 with hose nipple, angled
										4								CPdouble X2 with screw connection [6]
																		Sample gas pumps [3]
											0							without sample gas pump
											1							P1.3, 1 gas path, PVDF, bottom mounted
											2							P1.3, 1 gas path, with bypass valve, bottom mounted
											6							P1.3, 1 gas path, PVDF, mounted externally [2]
											7							P1.3, 1 gas path, with bypass valve, mounted externally [2]
																		Moisture detector [4] **/ Filter**
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with PVDF adapter [5]
												0	2					without filter, 2 moisture detectors with PVDF adapter [5]
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
												2	0					2 filters, without moisture detector [2]
												2	1					2 filters, 1 moisture detector [2]
												2	2					2 filters, 2 moisture detectors [2]
																		Signal outputs
														0	0			status output only
														1	0			Analog output, 4...20 mA additional
																		Delta T control
																0	0	without Delta T control
																1	0	Delta T control option

[1] Condensate outlets only suitable when connecting peristaltic pumps.

[2] External sample gas pump P1.3 only allows 1 filter.

[3] Factory installed tubing for suction operation.

[4] With this option, the maximum ambient temperature is limited to 122 °F.

[5] Also available in stainless steel.

[6] Metric or US connection, per heat exchanger.

Consumables and accessories

Item no.	Description
4510008	Automatic condensate drain AK 5.2 (pressure operation only)
4510028	Automatic condensate drain AK 5.5 (pressure operation only)
4410004	Automatic condensate drain AK 20 (pressure operation only)
4410001	Automatic condensate drain 11 LD V 38 (pressure operation only)
9144050038	Cable for cooler temperature analog output 4 m
41020050	Filter element F2-L; 2-pack
4410005	Condensate trap GL1, 0.4 L
44920035012	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple
44920035016	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (metric)
44920035017	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (US)
4228003	Bellow for P1 pump
9009398	O-ring for bypass P1 pump
4228066	Set inlet/outlet valves 158 °F for P1 pump
see data sheet 420011	Sample Gas Pumps P1
see data sheet 450020	CPsingle, CPdouble peristaltic condensate pumps

Sample gas cooler TC-MIDI X2 with -H2/-O2 heat exchanger

When powerful cooling is required, the TC-MIDI X2 sample gas cooler with -H2/-O2 heat exchanger is the ideal solution for reliable cooling of hydrogen (H_2) and oxygen (O_2) in extractive gas analysis. Green hydrogen produced by electrolysis using renewable energy sources is the key to a sustainable, emission-free future in the energy industry.

The safe, reliable cooling of the sample gas is decisive for gas analytics in the electrolyser (e.g. for LEL monitoring), as a higher moisture content is to be expected with some processes. The moisture in the process gas can damage the sensitive measuring cells in the analyser, so the gas temperature is kept below gas dew point at all times, thus causing the moisture to be emitted. The condensate is discharged via an automatic condensate drain.

As well as material-refining measures to prevent hydrogen-induced component damage, the heat exchangers for the H_2 series are subjected to a leak test using helium. For the O_2 version, special cleaning processes are used to remove particles, oils and fats from parts coming into contact with media. The contamination limits are based on the internationally used and applicable guideline EIGA Doc 33/18 “Cleaning of Equipment for Oxygen Service”.

Many applications require equipment which can be used in explosive areas. This is where the TC-MIDI X2 series provides solutions for Zone 2 or Class I, Division 2.

- ATEX and IECEx Zone 2 approval
- FM C-US approval for Class I, Division 2
- For applications with high-purity hydrogen or oxygen
- Cleaning standard is based on EIGA Doc 33/18 as regards the absence of particles, oils and fats for heat exchangers with the O_2 version
- Materials in contact with media are suitability-tested for high H_2 and O_2 concentrations
- Heat exchanger leak tests using helium are performed on the H_2 series as standard
- Nominal cooling capacity 185 Btu/h (104 °F version) or 166 Btu/h (122 °F version)
- Constant dew point stability ± 0.2 °F
- Adjustable outlet dew point and alarm thresholds
- Cooling block temperature display

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The TC-MIDI X2 with -H2/-O2 heat exchanger series was specially developed for use with high-purity hydrogen and oxygen.

The Peltier coolers are distinguished according to cooling capacity / operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the ordering information category.

Application	Standard applications	
Operating temperature	104 °F	122 °F
1 heat exchanger for H_2/O_2 applications	TC-MIDI 6111	TC-MIDI 6112

We also offer different signal outputs:

- Status output,
- Analog output, 4...20 mA, incl. status output.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset, the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured using the 5 buttons with the guidance of the menu. This applies to the target outlet dew point, which can be set from 2 to 20 °C (36 to 68 °F) (factory setting 5 °C/41 °F),

as well as the warning thresholds, which can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature, the range is τ_a -1 to - 3 K (at a minimum 1 °C/34 °F cooling block temperature); for the excess temperature, the range is τ_a +1 to +7 K. The factory settings for both values are 3 K.

The flashing display and the status relays indicate that the conditions are below or above the configured warning range (e.g. after switching on).

The separated condensate can be drained via add-on automatic condensate drains.

Delta T control option

Not all applications require an outlet dew point of 41 °F. In some applications a higher dew point is sufficient. In other applications a stable outlet dew point doesn't matter, it's enough for the gas to be dry, so if the outlet dew point has an adequate difference in temperature below the ambient temperature.

Here the electronics measure the ambient temperature and regulate the outlet dew point to an adjustable value below it. This extends the potential cooling capacity to the limits of the heat exchanger. Here it's important to note the outlet dew point fluctuates along with the ambient temperature and a stable dew point cannot be a prerequisite for the measurement.

The target temperature range is defined by the ambient temperature, the adjustable temperature difference and the alarm limits. If the block temperature is not within the target range with active Delta T-control, the status message "dt" will flash in the display.

Example: At a difference of 30 K/54 °F, at a set outlet dew point of 41 °F this means the dew point remains stable up to an ambient temperature of approx. 95 °F, and the safe drop is only preferred over the ambient temperature with ambient temperature peaks over 95 °F. The cooling capacity specified in the cooling capacity graphs at 95 °F is then available at above 95 °F.

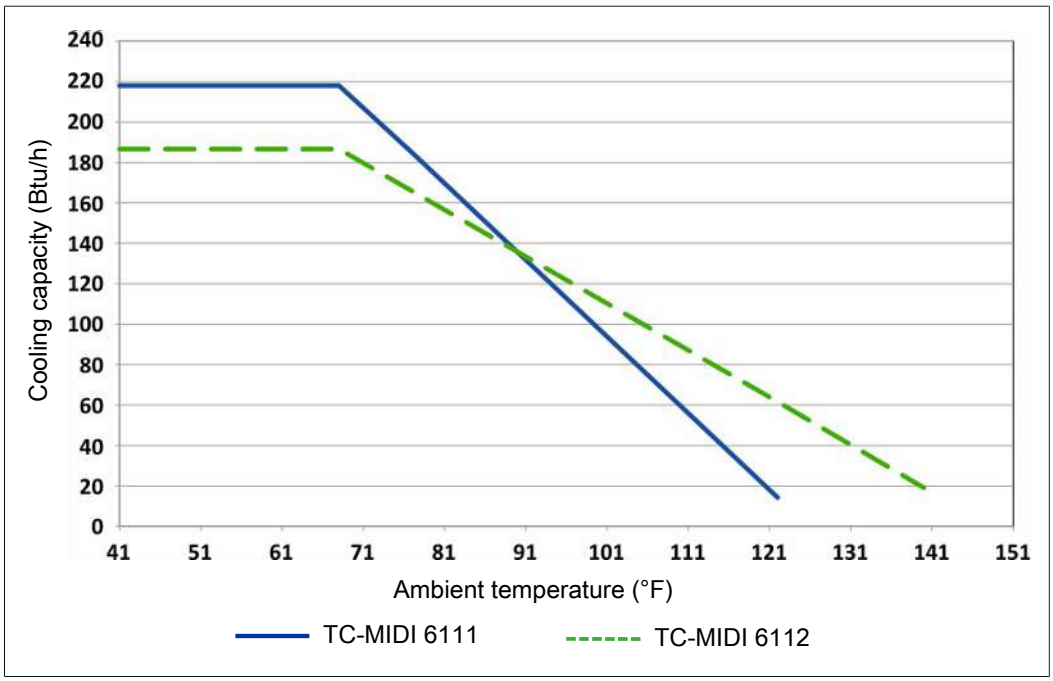
Gas cooler technical data

Gas Cooler Technical Data		
Ready for operation	after max. 10 minutes	
Ambient temperature	41 °F to 140 °F	
Gas outlet dew point preset: adjustable:	 41 °F 36 °F...68 °F	
IP rating	IP 20	
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7 g) 2–13.2 Hz amplitude ± 1.0 mm 13.2–100 Hz acceleration	
Housing	Stainless steel, brushed	
Packaging dimensions	approx. 13.8 x 8.7 x 8.7 in	
Weight incl. heat exchanger	approx. 26.5 lb	
Electrical data	Unit without add-on	
	230 V AC	**115 V AC**
	+5/-10%	+5/-10%
	50/60 Hz	50/60 Hz
	1.2 A	2.4 A
	200 W / 280 VA	
Recommended fuse (characteristic: delayed action)	3.15 A	6.3 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free	
Electrical Connections	Plug per EN 175301-803	
Parts in contact with media Heat exchanger:	 see table ”Heat Exchanger Overview”	
Markings:	FM18ATEX0012X: II 3 G Ex ec nC IIC T4 Gc IECEx FMG 18.0005X: Ex ec nC IIC T4 Gc FM18US0021X/FM18CA0010X: CL I DIV 2 GP ABCD RU C-DE.HA65.B.00608/20	

Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Performance Data



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 122 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e(moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load by the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 122 °F and ϑ_G = 158 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below the parameters τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the heat exchanger, TG the parameter triple τ_e = 104 °F, ϑ_G = 158 °F and v = 7.1 lpm can also be used in place of τ_e = 122 °F, ϑ_G = 158 °F and v = 5.8 lpm.

Please contact our experts for clarification or refer to our design program.

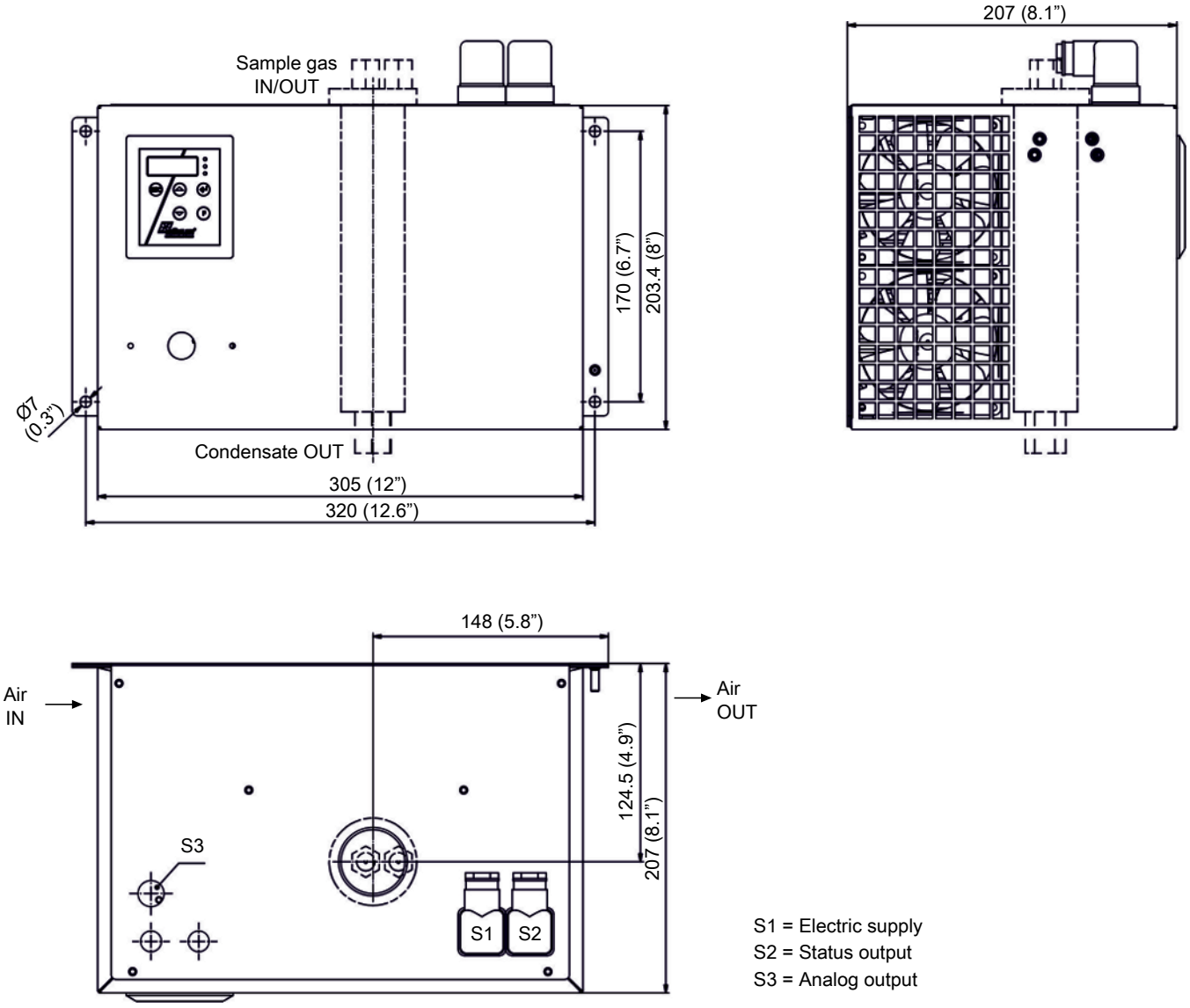
Heat exchanger overview

Heat exchanger	TS-H2/-O2 TS-I-H2/-O2 [2)]	DTS-H2/-O2 DTS-I-H2/-O2 [2)]
Materials in contact with media	Stainless steel	Stainless steel
Flow rate v_{max} [1)]	8.3 lpm	2 x 4.2 lpm
Inlet dew point $\tau_{e,max}$ [1)]	176 °F	176 °F
Gas inlet temperature $\vartheta_{G,max}$ [1)]	356 °F	356 °F
Max. cooling capacity Q_{max}	427 Btu/h	427 Btu/h
Gas pressure p_{max}	22 psi	22 psi
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.07 psi each
Dead volume V_{dead}	4.2 cu. in.	1.7/1.5 cu. in.
Gas connections (metric)	G1/4	6 mm tube
Gas connections (US)	NPT 1/4"	1/4" tube
Condensate out connection (metric)	G3/8	Tube 10 mm (6 mm)
Condensate out connection (US)	NPT 3/8"	Tube 3/8" (1/4")

[1)] Max. cooling capacity of the cooler must be considered.

[2)] Models marked I have NPT threads or US tubes.

Dimensions (inch)



Ordering instructions

Gas cooler models with one or two gas paths in the heat exchanger for H2/O2 applications

The item number is a code for the configuration of your unit. Please use the following model code:

4496	3	1	1	X	2	X	X	X	X	0	0	0	0	X	0	X	0	X	Product Characteristics
																			Gas cooler models
				1															TC-MIDI 6111 X2: Ambient temperature 104 °F
				2															TC-MIDI 6112 X2: Ambient temperature 140 °F
																			Certifications
					2														for explosive areas
																			Supply voltage
						1													115 V AC, 50/60 Hz
						2													230 V AC, 50/60 Hz
																			Heat exchanger
							1	1	0									-O2	Stainless steel, TS-O2, metric
							1	1	5									-O2	Stainless steel, TS-I-O2, US
							1	1	0									-H2	Stainless steel, TS-H2, metric
							1	1	5									-H2	Stainless steel, TS-I-H2, US
							2	6	0									-O2	Stainless steel, DTS-O2, metric
							2	6	5									-O2	Stainless steel, DTS-I-O2, US
							2	6	0									-H2	Stainless steel, DTS-H2, metric
							2	6	5									-H2	Stainless steel, DTS-I-H2, US
																			Signal outputs
										0	0								status output only
										1	0								Analog output, 4..20 mA, incl. status output
																			Delta T control
															0	0			without Delta T control
															1	0			Delta T control option

Spare parts and accessories for cooler with -H2/-O2 heat exchanger

Item no.	Description
4410001 (see data sheet 450005)	Automatic condensate drain 11 LD V 38 [1]
4410001-O2 (see data sheet 450005)	Automatic condensate drain 11 LD V 38 optimised for oxygen
see data sheet 400016	Stainless steel pipe fittings for high-purity oxygen applications

[1] For use with high hydrogen concentrations max. 22 psi overpressure.

Gas Analysis

ModbusRTU

Sample gas cooler TC-MIDI+

Many analysis processes require extracting sample gas from the process. This also extracts process-related contamination such as particles or moisture. These can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser. The sample gas cooler reduces the gas temperature to below the dew point for this purpose, causing moisture to drop out, which is then discharged as condensate.

In addition to the status output to monitor the sample gas cooler function, we offer an optional 4 – 20 mA analog output or digital interface. The process control can access the process and diagnostic data via the Modbus RTU interface as well as configure the device settings.

The TC-MIDI+ sample gas cooler is particularly a component in gas conditioning when the process or ambient conditions require a higher cooling capacity. It further features a new generation heat exchangers with particularly low washout of water-soluble components and particularly suitable for measuring emissions. Most notably, the washout of SO_2 is low. The TC-MIDI+ sample gas coolers can therefore be used for so-called automated measuring systems (AMS) as per EN 15267-3.

- Compact design: Pre-installed and ready to connect
- Low maintenance costs based on easy accessibility
- Duran glass or PVDF heat exchanger
- Adjustable outlet dew point and alarm thresholds
- Nominal cooling capacity 185 Btu/h (104 °F version) or 166 Btu/h (122 °F version)
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperature display
- Optional 4 - 20 mA or Modbus RTU signal output
- Optional CE mark or FM approval
- Moisture detector, filter, condensate pump and sample gas pump optional

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Overview

The TC-MIDI+ series was designed specifically for the requirements in so-called automated measuring systems (AMS) according to EN 15267-3. The series connection of the heat exchangers will cool in two cycles to minimise wash out effects.

The Peltier coolers are distinguished by two types according to cooling capacity or operation temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications	
Operating temperature	104 °F	122 °F
2 heat exchangers in series	TC-MIDI+ 6121	TC-MIDI+ 6122

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector,
- sample gas pump.

In addition, we offer different signal outputs:

- Status output
- Analog output, 4...20 mA, incl. status output,
- Modbus RTU digital output, incl. status output

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 °F to 68 °F) (factory preset 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C/ 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via connected peristaltic pumps or add-on automatic condensate drains.

Fine mesh filters can also be used, which in turn can be installed in optional moisture detectors.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if a condensate enters the cooler due to a malfunction and the peristaltic pump or the automatic condensate drain is unable to remove it.

A P1 gas pump can be attached to the gas cooler, optionally also with bypass valve for regulating the flow. This allows the sample gas pump to be expanded by a single-leg system, so when equipped with a single heat exchanger or for the respective application the two gas paths of the dual heat exchangers are switched in series, for example Cooling 1 – Pump – Cooling 2.

Gas cooler technical data

Gas Cooler Technical Data				
Ready for operation	after max. 10 minutes			
Ambient temperature	41 °F to 140 °F			
Gas outlet dew point preset: adjustable:	 41 °F 36 °F...68 °F			
IP rating	IP 20			
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) [1] 2 Hz-13.2 Hz amplitude ± 1.0 mm 13.2 Hz -100 Hz acceleration			
Housing	Stainless steel, brushed			
Packaging dimensions	approx. 13.8 x 8.7 x 8.7 in			
Weight incl. heat exchanger	approx. 13.8 lb approx. 32 lb at full expansion stage			
Electrical data	Unit without add-on		Unit with add-on (P1.x + peristaltic pump)	
	230 V AC	**115 V AC**	**230 V AC**	**115 V AC**
	+5/-10%	+5/-10%	+-5%	+-5%
	50/60 Hz	50/60 Hz	50 Hz	60 Hz
	1.2 A	2.4 A	1.8 A	3.6 A
	200 W / 280 VA		290 W / 420 VA	
Recommended fuse (characteristic: delayed action)	3.15 A	6.3 A	3.15 A	6.3 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free			
Electrical Connections	Plug per EN 175301-803			
Gas connections and condensate outlet	Heat exchanger see table "Heat Exchanger Overview" Filter, moisture detector adapter G1/4 or NPT 1/4"			
Parts in contact with media Filter: Moisture detector: Heat exchanger: Peristaltic pump: Sample gas pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" see "Technical Data - Options" PTFE/Viton			
FM no.:	3062014			

[1] not in conjunction with add-on sample gas pump

Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Digital interface technical data	
Signal	Modbus RTU (RS-485)
Connection	M12x1 connector, DIN EN 61076-2-101

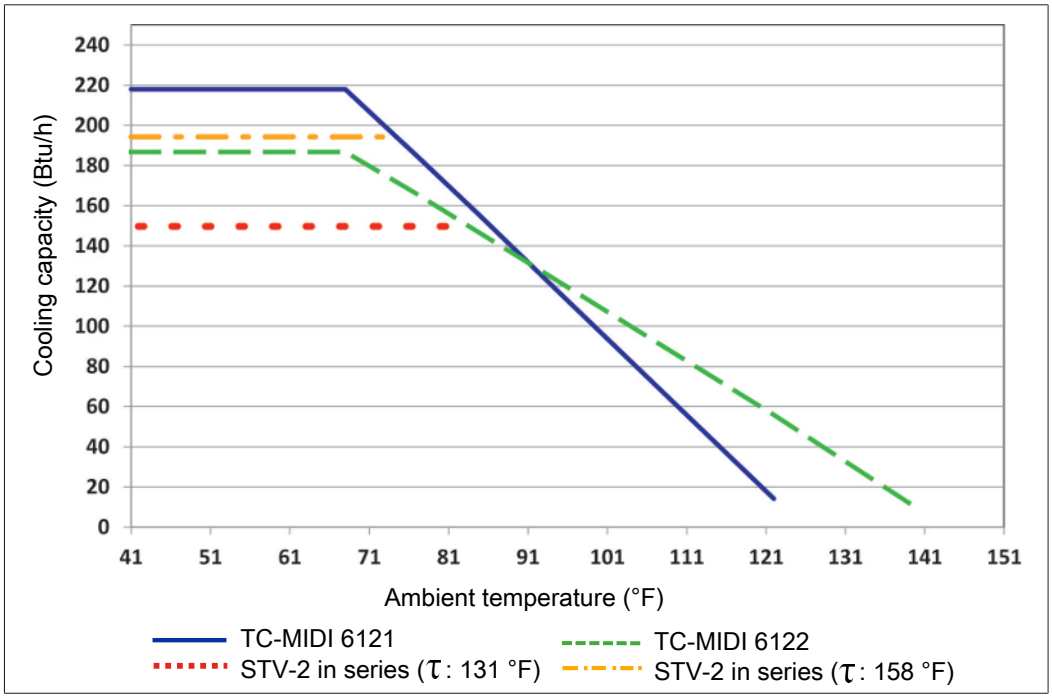
Technical Data Peristaltic Pumps CPdouble	
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1,6 mm (0.04 in)
Condensate outlet	Hose nipple Ø6 mm Screw connection 4/6 (metric), 1/6“-1/4“ (US)
Protection class	IP 40
Materials Hose: Connections:	 Norprene (Standard), Marprene, Fluran PVDF

Technical Data Sample Gas Pump P1	
Ambient temperature	32 °F to 122 °F
Operating pressure	max. 18.8 psi abs.
Nominal outlet	4.6 lpm (at p = 14.5 psi abs.)
Materials in contact with media vary by configuration	PTFE, PVDF, 1.4571, 1.4401, Viton, PFA

Technical Data Filter AGF-PV-30-F2-L	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	58 psi
Filter surface	19.4 in^2
Filter fineness	2 µm
Dead volume	6.59 cu. in.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with mediums) Viton sintered PTFE

Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Performance Data



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 122 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a standard operating point of τ_e = 122 °F and ϑ_G = 158 °F. The maximum volume flow v_{max} in lpm of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the STG-2 heat exchanger the parameter triple τ_e = 104 °F, ϑ_G = 158 °F and v = 9.6 lpm may also be used in place of τ_e = 122 °F, ϑ_G = 158 °F and v = 5.3 lpm.

Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

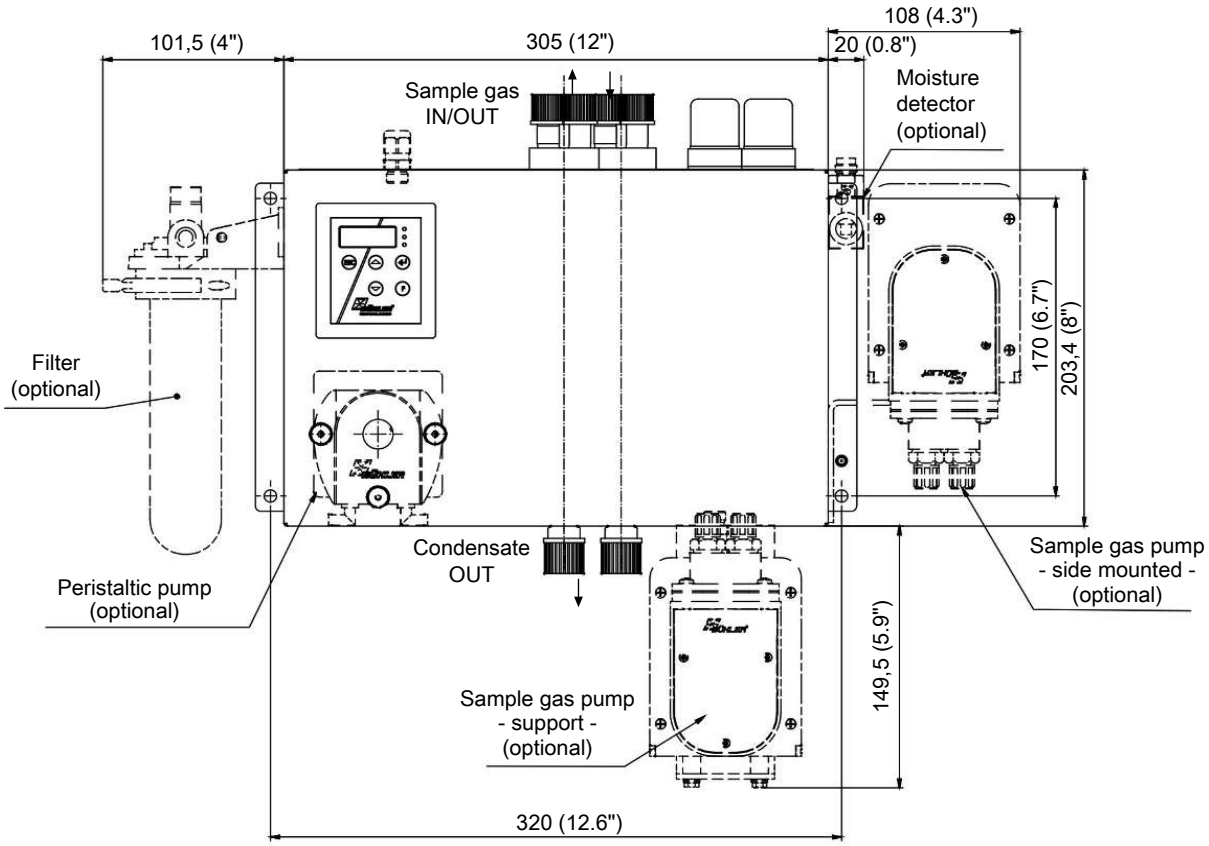
Heat exchanger	2x STG-2 2x STG-2-I [2]	2x STV-2 2x STV-2-I [2]
Materials in contact with media	Glass PTFE	PVDF
Flow rate v_{max} [1]	5.3 lpm	5 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F
Gas pressure p_{max}	44 psi	44 psi
Pressure drop Δp (v=150 L/h)	0.04 psi	0.04 psi
Max. Cooling capacity Q_{max}	327 Btu/h	199 Btu/h
Dead volume V_{tot}	2.9 cu.in.	2.5 cu.in.
Gas connections (metric)	GL 14 (6 mm) [3]	DN 4/6
Gas connections (US)	GL 14 (1/4") [3]	1/4"-1/6"
Condensate out connection (metric)	GL 18 (10 mm) [3]	G1/4
Condensate out connection (US)	GL18 (10 mm) [3]	NPT 1/4"

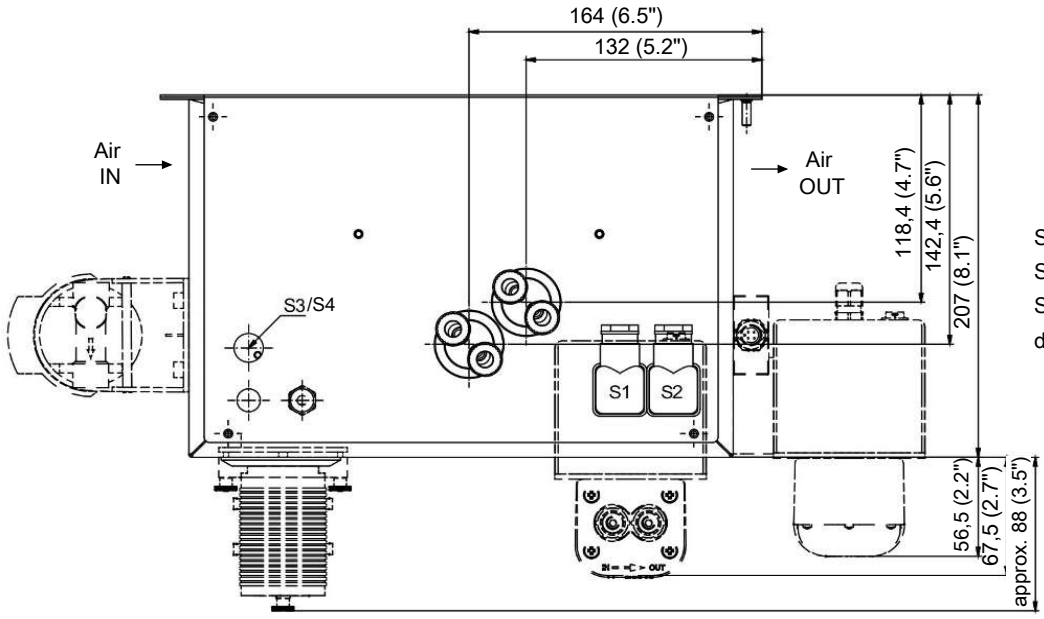
[1] Max. cooling capacity of the cooler must be considered.

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter

Dimensions (inch)





S1 = Electric supply
S2 = Status output
S3/S4 = Analog/
digital output (optional)

Ordering instructions

Gas cooler model with two heat exchangers in series

The item number is a code for the configuration of your unit. Please use the following model code:

4496	3	1	2	X	X	X	1	X	X	X	X	X	X	0	0	0	0	Product Characteristics
																		Gas cooler models
				1														TC-MIDI+ 6121: Ambient temperature 104 °F
				2														TC-MIDI+ 6122: Ambient temperature 140 °F
																		Certifications
					0													Standard applications – CE
					1													for common locations - FM
																		Supply voltage
						1												115 V AC, 50/60 Hz
						2												230 V AC, 50/60 Hz
																		Heat exchanger
							1	2	2									Duran glass, STG-2, metric
							1	2	7									Duran glass, STG-2-I, US
							1	3	2									PVDF, STV-2, metric [1]
							1	3	7									PVDF, STV-2-I, US [1]
																		Condensate drain [4]
										0								without condensate drain
										2								CPdouble with hose nipple, angled
										4								CPdouble with screw connection [6]
																		Sample gas pumps [3]
											0							without sample gas pump
											1							P1, 1 gas path, PVDF, bottom mounted
											2							P1, 1 gas path, with bypass valve, bottom mounted
											6							P1, 1 gas path, PVDF, mounted externally [2]
											7							P1, 1 gas path, with bypass valve, side mounted [2]
																		Moisture detector [4] **/ Filter**
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with PVDF adapter [5]
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
																		Signal outputs
														0	0			status output only
														1	0			Analog output, 4...20 mA incl. status output
														2	0			Modbus RTU digital output incl. status output [7]

[1] Condensate outlets only suitable when connecting peristaltic pumps.

[2] External sample gas pump P1 only allows 1 filter.

[3] Factory installed tubing for suction operation.

[4] With this option, the maximum ambient temperature is limited to 122 °F.

[5] Also available in stainless steel.

[6] Metric or US connection, per heat exchanger.

[7] Option only available for CE version.

Consumables and accessories

Item no.	Description
4510008	Automatic condensate drain AK 5.2 (pressure operation only)
4510028	Automatic condensate drain AK 5.5 (pressure operation only)
4410004	Automatic condensate drain AK 20 (pressure operation only)
4410001	Automatic condensate drain 11 LD V 38 (pressure operation only)
9144050038	Cable for cooler temperature analog output 4 m
41020050	Filter element F2-L; 2-pack
4410005	Condensate trap GL1, 0.4 L
44920035012	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple
44920035016	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (metric)
44920035017	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (US)
4228003	Bellow for P1 pump
9009398	O-ring for bypass P1 pump
4228066	Set inlet/outlet valves 158 °F for P1 pump
see data sheet 420011	Sample Gas Pumps P1
see data sheet 450020	CPsingle, CPdouble peristaltic condensate pumps

Gas Analysis

Sample gas cooler TC-MIDI+ X2

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

Many applications require equipment which can be used in explosive areas. This is where the TC-MIDI+ X2 series provides solutions for Zone 2 or Class I, Division 2.

- ATEX and IECEx Zone 2 approval
- FM C-US approval for Class I, Division 2
- Compact design: Pre-installed and ready to connect
- Low maintenance costs based on easy accessibility
- Duran glass or PVDF heat exchanger
- Adjustable outlet dew point and alarm thresholds
- Low operating noise
- Rated capacity 185/166 Btu/h, 104 °F/122 °F version
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperature display
- Moisture detector, filter, analog output, peristaltic pump, and sample gas pump optional

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Overview

The TC-MIDI+ X2 series was designed specifically for the requirements in so-called automated measuring systems (AMS) according to EN 15267-3. The series connection of the heat exchangers will cool in two cycles to minimise wash out effects.

The Peltier coolers are distinguished according to cooling capacity/operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications	
Operating temperature	104 °F	122 °F
2 heat exchangers in series	TC-MIDI+ 6121 X2	TC-MIDI+ 6122 X2

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector,
- Sample gas pump.

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 °F to 68 °F) (factory preset 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C/ 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via connected peristaltic pumps or add-on automatic condensate drains.

Fine mesh filters can also be used, which in turn can be installed in optional moisture detectors.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if a condensate enters the cooler due to a malfunction and the peristaltic pump or the automatic condensate drain is unable to remove it.

A P1 gas pump can be attached to the gas cooler, optionally also with bypass valve for regulating the flow. This allows the sample gas pump to be expanded by a single-leg system, so when equipped with a single heat exchanger or for the respective application the two gas paths of the dual heat exchangers are switched in series, for example Cooling 1 – Pump – Cooling 2.

Gas cooler technical data

Gas Cooler Technical Data				
Ready for operation	after max. 10 minutes			
Ambient temperature	41 °F to 140 °F			
Gas output dew temperature preset: adjustable:	 41 °F 36 °F...68 °F			
IP rating	IP 20			
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) [1] 2 Hz-13.2 Hz amplitude ± 1.0 mm 13.2 Hz -100 Hz acceleration			
Housing	Stainless steel, brushed			
Packaging dimensions	approx. 13.8 x 8.7 x 8.7 in			
Weight incl. heat exchanger	approx. 13.8 lb approx. 32 lb at full expansion stage			
Electrical data	Unit without add-on		Unit with add-on (P1.x + peristaltic pump)	
	230 V AC	**115 V AC**	**230 V AC**	**115 V AC**
	+5/-10%	+5/-10%	+-5%	+-5%
	50/60 Hz	50/60 Hz	50 Hz	60 Hz
	1.2 A	2.4 A	1.8 A	3.6 A
	200 W / 280 VA		290 W / 420 VA	
Recommended fuse (characteristic: delayed action)	3.15 A	6.3 A	3.15 A	6.3 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free			
Electrical Connections	Plug per EN 175301-803			
Gas connections and condensate outlet	Heat exchanger see table "Heat Exchanger Overview" Filter, moisture detector adapter G1/4 or NPT 1/4"			
Parts in contact with media Filter: Moisture detector: Heat exchanger: Peristaltic pump: Sample gas pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" see "Technical Data - Options" PTFE/Viton			
Markings:	FM18ATEX0012X: II 3 G Ex ec nC IIC T4 Gc IECEx FMG 18.0005X: Ex ec nC IIC T4 Gc FM18US0021X/FM18CA0010X: CL I DIV 2 GP ABCD RU C-DE.HA65.B.00608/20			

[1] not in conjunction with add-on sample gas pump

Technical Data - Options

Analogue Output Cooler Temperature Technical Data

Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Technical Data Peristaltic Pumps CPdouble X2

Flow rate	0.3 L/h (50 Hz) / 0.36 L/h (60 Hz) with standard hose
Vacuum inlet	max. 11.60 psi
Pressure inlet	max. 14.50 psi
Output pressure	14.50 psi
Hose	0.16 x 0.06 in
Condensate outlet	Hose nipple Ø0.24 in Screw connection 4/6 (metric), 1/6”-1/4” (US)
IP rating	IP 40
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

Technical Data Sample Gas Pump P1.3

Ambient temperature	32 °F to 122 °F
Operating pressure	max. 18.8 psi abs.
Nominal outlet	4.6 lpm (at p = 14.5 psi abs.)
Materials in contact with media vary by configuration	PTFE, PVDF, 1.4571, 1.4401, Viton

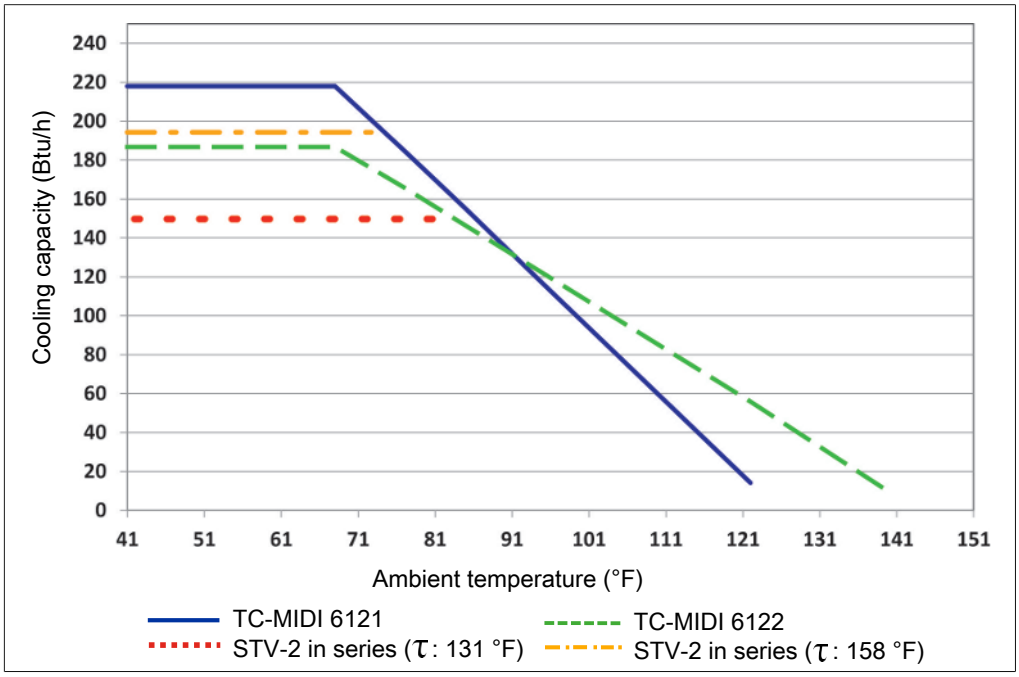
Technical Data Filter AGF-PV-30-F2-L

Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	58 psi
Filter surface	19.4 in^2
Filter fineness	2 µm
Dead volume	6.59 cu. in.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with mediums) Viton sintered PTFE

Technical Data FF-3-N Moisture Detector

Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Performance Data



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 122 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a standard operating point of τ_e = 122 °F and ϑ_G = 158 °F. The maximum volume flow v_{max} in lpm of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the STG-2 heat exchanger the parameter triple τ_e = 104 °F, ϑ_G = 158 °F and v = 9.6 lpm may also be used in place of τ_e = 122 °F, ϑ_G = 158 °F and v = 5.3 lpm.

Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

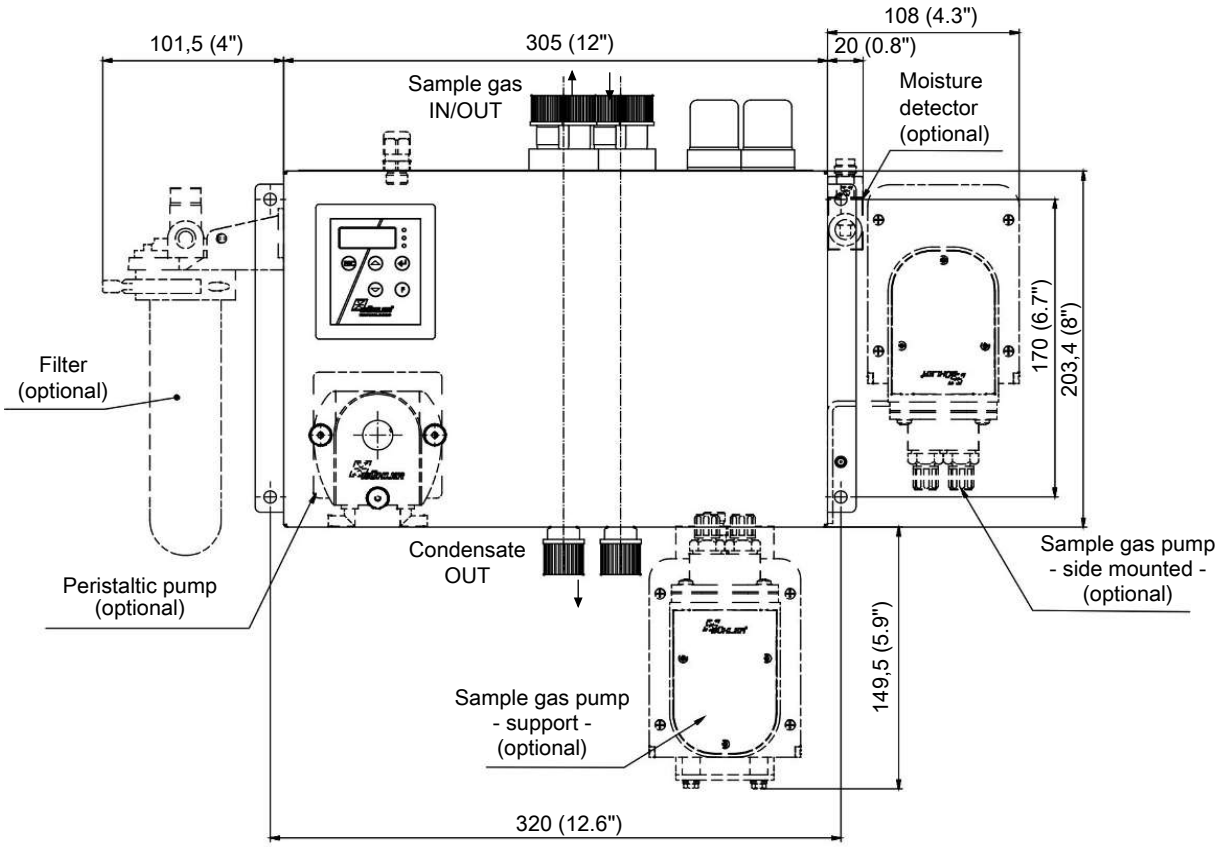
Heat exchanger	2x STG-2 2x STG-2-I [2]	2x STV-2 2x STV-2-I [2]
Materials in contact with media	Glass PTFE	PVDF
Flow rate v_{max} [1]	5.3 lpm	5 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F
Gas pressure p_{max}	44 psi	44 psi
Pressure drop Δp (v=150 L/h)	0.04 psi	0.04 psi
Max. Cooling capacity Q_{max}	327 Btu/h	199 Btu/h
Dead volume V_{tot}	2.9 cu.in.	2.5 cu.in.
Gas connections (metric)	GL 14 (6 mm) [3]	DN 4/6
Gas connections (US)	GL 14 (1/4") [3]	1/4"-1/6"
Condensate out connection (metric)	GL 18 (10 mm) [3]	G1/4
Condensate out connection (US)	GL18 (10 mm) [3]	NPT 1/4"

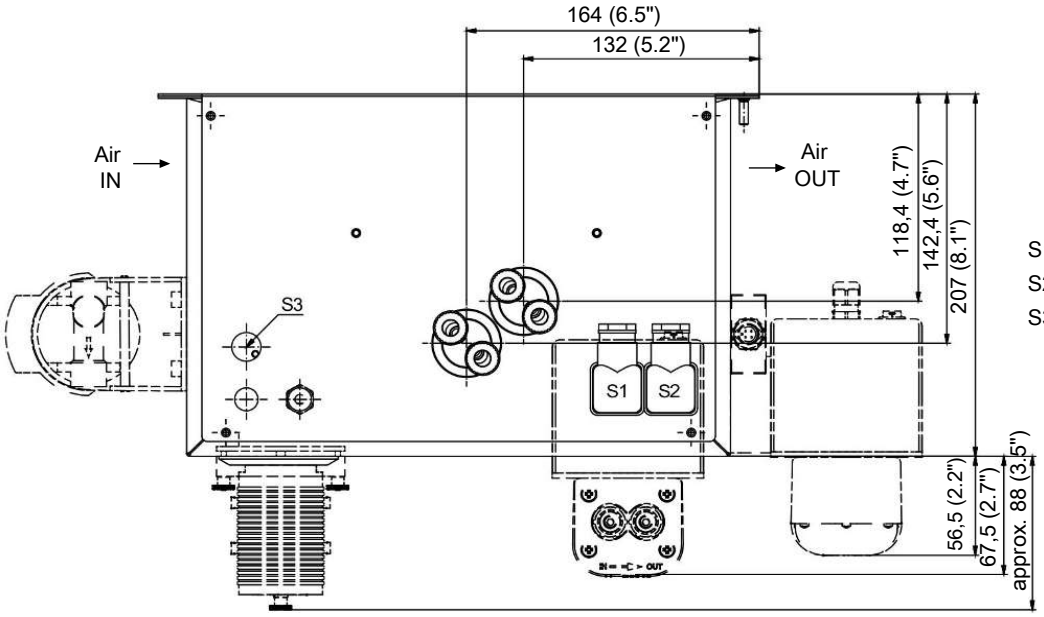
[1] Max. cooling capacity of the cooler must be considered.

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter

Dimensions (inch)





S1 = Electric supply
S2 = Status output
S3 = Analog output

Ordering instructions

Gas cooler models with two heat exchangers in series

The item number is a code for the configuration of your unit. Please use the following model code:

4496	3	1	2	X	2	X	1	X	X	X	X	X	X	0	0	0	0	Product Characteristics
																		Gas cooler models
				1														TC-MIDI+ 6121 X2: Ambient temperature 104 °F
				2														TC-MIDI+ 6122 X2: Ambient temperature 140 °F
																		Certifications
					2													for explosive areas
																		Supply voltage
						1												115 V AC, 50/60 Hz
						2												230 V AC, 50/60 Hz
																		Heat exchanger
							1	2	2									Duran glass, STG-2, metric
							1	2	7									Duran glass, STG-2-I, US
							1	3	2									PVDF, STV-2, metric [1]
							1	3	7									PVDF, STV-2-I, US [1]
																		Condensate drain [4]
										0								without condensate drain
										2								CPdouble X2 with hose nipple, angled
										4								CPdouble X2 with screw connection [6]
																		Sample gas pumps [3]
											0							without sample gas pump
											1							P1.3, 1 gas path, PVDF, bottom mounted
											2							P1.3, 1 gas path, with bypass valve, bottom mounted
											6							P1.3, 1 gas path, PVDF, mounted externally [2]
											7							P1.3, 1 gas path, with bypass valve, mounted externally [2]
																		Moisture detector [4] **/ Filter**
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with PVDF adapter [5]
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
																		Signal outputs
														0	0			status output only
														1	0			Analog output, 4...20 mA additional

[1] Condensate outlets only suitable when connecting peristaltic pumps.

[2] External sample gas pump P1.3 only allows 1 filter.

[3] Factory installed tubing for suction operation.

[4] With this option, the maximum ambient temperature is limited to 122 °F.

[5] Also available in stainless steel.

[6] Metric or US connection, per heat exchanger.

Consumables and accessories

Item no.	Description
4510008	Automatic condensate drain AK 5.2 (pressure operation only)
4510028	Automatic condensate drain AK 5.5 (pressure operation only)
4410004	Automatic condensate drain AK 20 (pressure operation only)
4410001	Automatic condensate drain 11 LD V 38 (pressure operation only)
9144050038	Cable for cooler temperature analog output 4 m
41020050	Filter element F2-L; 2-pack
4410005	Condensate trap GL1, 0.4 L
44920035012	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple
44920035016	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (metric)
44920035017	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (US)
4228003	Bellow for P1 pump
9009398	O-ring for bypass P1 pump
4228066	Set inlet/outlet valves 158 °F for P1 pump
see data sheet 420011	Sample Gas Pumps P1
see data sheet 450020	CPsingle, CPdouble peristaltic condensate pumps

ModbusRTU

Sample gas cooler TC-Double

Many analysis processes require extracting sample gas from the process. This also extracts process-related contamination such as particles or moisture. These can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser. The sample gas cooler reduces the gas temperature to below the dew point for this purpose, causing moisture to drop out, which is then discharged as condensate.

In addition to the status output to monitor the sample gas cooler function, we offer an optional 4 – 20 mA analog output or digital interface. The process control can access the process and diagnostic data via the Modbus RTU interface as well as configure the device settings.

The TC-Double is a power-optimised sample gas cooler with two cooling systems and two plug-in heat exchangers, designed to cool a sample gas efficiently yet gently. It allows you to precisely match the two-stage cooling system (series connection) through separate configuration of the cooling block temperatures. This allows the TC-Double to also be operated with built-in precooler.

- Two separate temperature settings
- Two-stage cooling option
- Heat exchanger made from stainless steel, Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Nominal cooling capacity 256 Btu/h (104 °F version) or 294 Btu/h (140 °F version)
- Max. ambient temperature 140 °F
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperatures display
- Optional 4 - 20 mA or Modbus RTU signal output
- Optional CE mark or FM approval
- Moisture detector, filter and condensate pump optional

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Overview

The TC-Double series was designed specifically for high cooling capacities, high ambient temperatures and to cool in two cycles to minimise wash out effects.

Any other use of this cooler is determined by the type of built-in passive pre-cooling, i.e. the first cooling level is not controlled electronically.

The Peltier coolers are distinguished according to cooling capacity/operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications	
Operating temperature	104 °F	122 °F
2 heat exchangers in series	TC-Double 6111	TC-Double 6112

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector,
- sample gas pump.

In addition, we offer different signal outputs:

- Status output
- Analog output, 4...20 mA, incl. status output,
- Modbus RTU digital output, incl. status output

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperatures in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. This applies to the outlet dew point setting on one hand and to the low and excess temperature warning thresholds on the other hand. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via the add-on peristaltic pump.

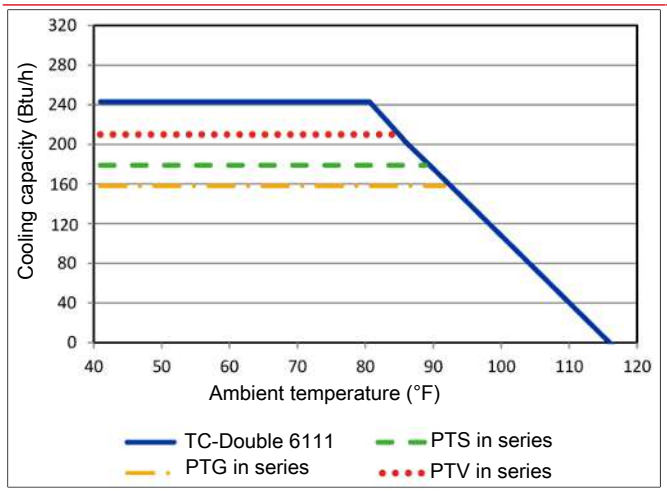
In addition, a fine filter can be attached to the cooler, which an optional moisture detector can be integrated into. The glass dome allows the dirt level of the filter element to easily be determined. The moisture detector can also be installed separately and is generally easy to remove. This may be required if water enters the cooler due to a malfunction and the peristaltic pump can no longer remove it.

A gas pump can be attached to the TC-Double and controlled. These are also available with bypass valve to regulate the flow rate.

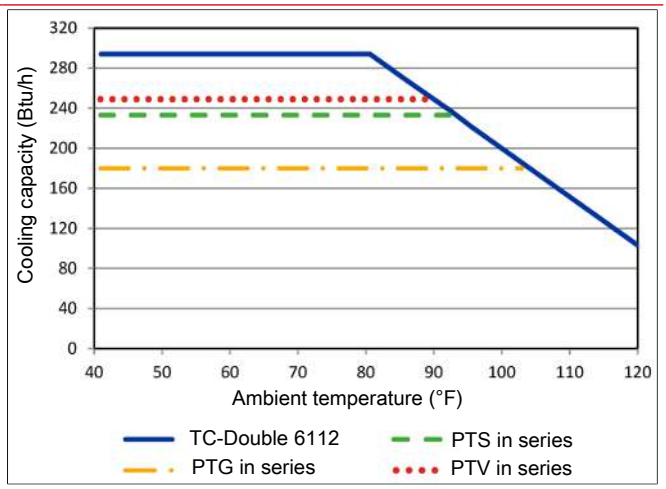
Performance curves

The TC-Double 6111 is designed for ambient temperatures of up to 104 °F. The cooling capacity is adequate up to this temperature. The TC-Double 6112 on the other hand can be used in higher temperatures up to nominal 140 °F. Please note the available cooling capacity.

Typ TC-Double 6111



Typ TC-Double 6112



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 122 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of τ_e = 122 °F and ϑ_G = 158 °F. Indicated is the maximum flow v_{max} in Nl/h of cooled air, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	2x PTS 2x PTS-I	2x PTG 2x PTG-I	2x PTV 2x PTV-I [2]
Materials in contact with media	Stainless steel	Glass PTFE	PVDF
Flow rate v_{max} [1]	7.5 lpm	4.2 lpm	4.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	294 Btu/h	204 Btu/h	280 Btu/h
Gas pressure p_{max}	44 psi [4]	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm) total	0.29 psi	0.29 psi	0.29 psi
Dead volume V_{tot} total	3.6 cu.in.	3.6 cu.in.	7 cu.in.
Gas connections (metric)	6 mm	GL 14 (6 mm) [3]	DN 4/6
Gas connections (US)	1/4"	GL 14 (1/4") [3]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [3]	G3/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [3]	NPT 3/8"

[1] Max. cooling capacity of the cooler must be considered.

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter.

[4] 2321 psi on request.

Gas Cooler Technical Data

Gas Cooler Technical Data				
Ready for operation	after max. 10 minutes			
Ambient temperature	41 °F to 140 °F			
Gas output dew temperature, preset: adjustable:	 41 °F 36 °F...68 °F			
IP rating	IP 20			
Housing	Stainless steel, brushed			
Packaging dimensions	approx. 16.8 x 11.8 x 11.5 in			
Weight incl. heat exchanger	approx. 13.8 lb approx. 33 lb at full expansion stage			
Electrical data	Unit without add-on		Unit with add-on (peristaltic pump + gas pump)	
	230 V AC	**115 V AC**	**230 V AC**	**115 V AC**
	+5/-10%	+5/-10%	+-5%	+-5%
	50/60 Hz	50/60 Hz	50 Hz	60 Hz
	1.6 A	3.2 A	2.1 A	4.1 A
	278 W / 350 VA	296 W / 370 VA	390 W / 487 VA	377 W / 472 VA
Recommended fuse (characteristic: delayed action)	2.5 A	4 A	2.5 A	5 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free			
Electrical Connections	Plug per EN 175301-803			
Gas connections	Heat exchange see table "Heat Exchanger Overview" Filter, moisture detector adapter, gas pump, G1/4 or NPT 1/4" or metric/US tube or pipe			
Parts in contact with media Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton			
FM no.:	3062014			

Technical Data - Options

Analogue Output Cooler Temperature Technical Data

Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Digital interface technical data

Signal	Modbus RTU (RS-485)
Connection	M12x1 connector, DIN EN 61076-2-101

Technical Data FF-3-N Moisture Detector

Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

CPdouble Peristaltic Pump Technical Data

Ambient temperature	32 °F to 131 °F
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Degree of protection	IP 44
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

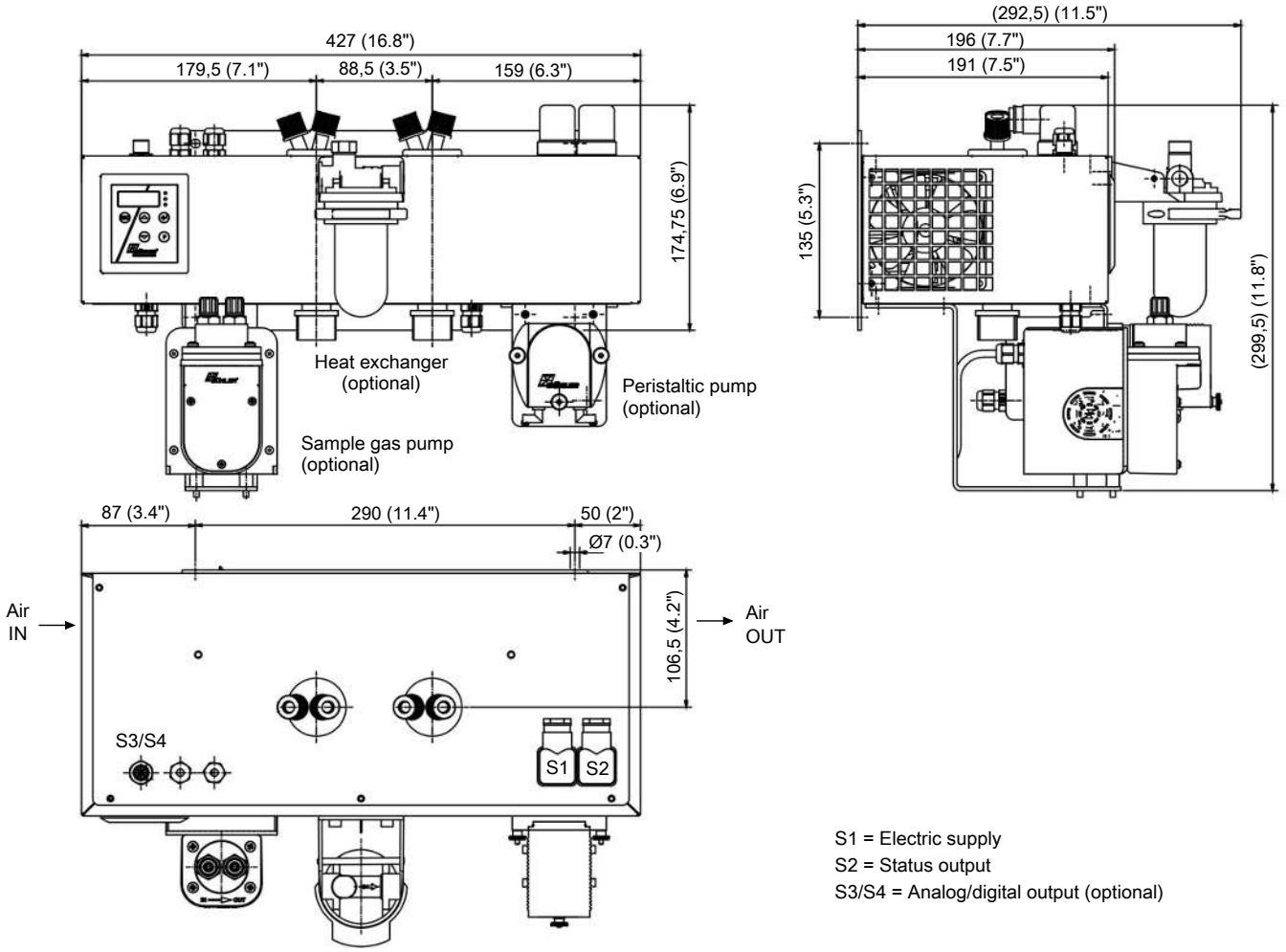
Technical Data Sample Gas Pump P1

Ambient temperature	32 °F to 122 °F
Operating pressure	max. 18.8 psi abs.
Nominal outlet	4.6 lpm (at p = 14.5 psi abs.)
Materials in contact with media vary by configuration	PTFE, PVDF, 1.4571, 1.4401, Viton, PFA

AGF-PV-30-F2 Filter Technical Data

Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	58 psi
Filter surface	9.3 in^2
Filter fineness	2 µm
Dead volume	3.47 cu. in.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with media) Viton sintered PTFE

Dimensions (inch)



S1 = Electric supply
S2 = Status output
S3/S4 = Analog/digital output (optional)

Ordering instructions

Gas cooler type with two in-line heat exchangers

The item number is a code for the configuration of your unit. Please use the following model code:

4496	6	1	1	X	X	X	1	X	X	X	X	X	X	0	0	0	0	Product Characteristics
																		Gas cooler model
				1														TC-Double 6111: Ambient temperature 104 °F
				2														TC-Double 6112: Ambient temperature 140 °F
																		Certifications
					0													Standard applications – CE
					1													for common locations - FM
																		Supply voltage
						1												115 V AC, 50/60 Hz
						2												230 V AC, 50/60 Hz
																		Heat exchanger
							1	1	0									Stainless steel, PTS, metric
							1	1	5									Stainless steel, PTS-I, US
							1	2	0									Duran glass, PTG, metric
							1	2	5									Duran glass, PTG-I, US
							1	3	0									PVDF, PTV, metric
							1	3	5									PVDF, PTV-I, US
																		Condensate drain [1]
										0								without condensate drain
										2								CPdouble with hose nipple, angled
										4								CPdouble with screw connection [2]
																		Sample gas pumps [1] [3]
											0							without sample gas pump
											1							P1, PVDF
											2							P1, with bypass valve
																		Humidity sensor/filter [1] [2]
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with PVDF adapter [4]
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
																		Signal outputs
														0	0			status output only
														1	0			Analog output, 4...20 mA incl. status output
														2	0			Modbus RTU digital output incl. status output [5]

[1] With this option, the maximum ambient temperature is limited to 122 °F.

[2] Metric or US connection, per heat exchanger.

[3] Factory installed tubing for suction operation.

[4] Also available in stainless steel.

[5] Option only available for CE version.

Consumables and accessories

Item no.	Description
4510008	Automatic condensate drain AK 5.2 (pressure operation only)
4510028	Automatic condensate drain AK 5.5 (pressure operation only)
4410004	Automatic condensate drain AK 20 (pressure operation only)
4410001	Automatic condensate drain 11 LD V 38 (pressure operation only)
41030050	Replacement filter element F2; 5-pack
9144050038	Cable for cooler temperature analog output 4 m
4410005	Condensate trap GL1, 0.4 L
44920035012	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple
44920035016	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (metric)
44920035017	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (US)
4228003	Bellow for P1 pump
9009398	O-ring for bypass P1 pump
4228066	Set inlet/outlet valves 158 °F for P1 pump

Sample gas cooler TC-Double X2

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

Many applications require equipment which can be used in explosive areas. This is where the TC-Double X2 series provides solutions for Zone 2 or Class I, Division 2.

- ATEX and IECEx Zone 2 approval
- FM C-US approval for Class I, Division 2
- One gas path
- Heat exchanger made from stainless steel, Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Rated power 256/294 Btu/h, 104 °F/140 °F version
- Max. ambient temperature 140 °F
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperatures display
- Moisture detector connection, analog output, filter, and peristaltic pump optional

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e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The TC-Double X2 series was designed specifically for high cooling capacities, high ambient temperatures and to cool in two cycles to minimise wash out effects.

Any other use of this cooler is determined by the type of built-in passive pre-cooling, i.e. the first cooling level is not controlled electronically.

The Peltier coolers are distinguished according to cooling capacity/operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications	
Operating temperature	104 °F	122 °F
2 heat exchangers in series	TC-Double 6111 X2	TC-Double 6112 X2

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector,
- Sample gas pump.

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperatures in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. This applies to the outlet dew point setting on one hand and to the low and excess temperature warning thresholds on the other hand. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via the add-on peristaltic pump.

In addition, a fine filter can be attached to the cooler, which an optional moisture detector can be integrated into. The glass dome allows the dirt level of the filter element to easily be determined. The moisture detector can also be installed separately and is generally easy to remove. This may be required if water enters the cooler due to a malfunction and the peristaltic pump can no longer remove it.

A gas pump can be attached to the TC-Double and controlled. These are also available with bypass valve to regulate the flow rate.

Gas Cooler Technical Data

Gas Cooler Technical Data				
Ready for operation	after max. 10 minutes			
Ambient temperature	41 °F to 140 °F			
Gas output dew temperature, preset: adjustable:	 41 °F 36 °F...68 °F			
IP rating	IP 20			
Housing	Stainless steel, brushed			
Packaging dimensions	approx. 16.8 x 11.8 x 11.5 in			
Weight incl. heat exchanger	approx. 13.8 lb approx. 33 lb at full expansion stage			
Electrical data	Unit without add-on		Unit with add-on (peristaltic pump + gas pump)	
	230 V AC	**115 V AC**	**230 V AC**	**115 V AC**
	+5/-10%	+5/-10%	+-5%	+-5%
	50/60 Hz	50/60 Hz	50 Hz	60 Hz
	1.6 A	3.2 A	2.1 A	4.1 A
	278 W / 350 VA	296 W / 370 VA	390 W / 487 VA	377 W / 472 VA
Recommended fuse (characteristic: delayed action)	2.5 A	4 A	2.5 A	5 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free			
Electrical Connections	Plug per EN 175301-803			
Gas connections	Heat exchange see table "Heat Exchanger Overview" Filter, moisture detector adapter, gas pump, G1/4 or NPT 1/4" or metric/US tube or pipe			
Parts in contact with media Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton			
Markings:	FM18ATEX0012X: II 3 G Ex ec nC IIC T4 Gc IECEx FMG 18.0005X: Ex ec nC IIC T4 Gc FM18US0021X/FM18CA0010X: CL I DIV 2 GP ABCD RU C-DE.HA65.B.00608/20			

Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Technical Data peristaltic pump CPdouble X2	
Ambient temperature	32 °F to 122 °F
Flow rate	0.005 lpm (50 Hz)/0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Degree of protection	IP 44
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

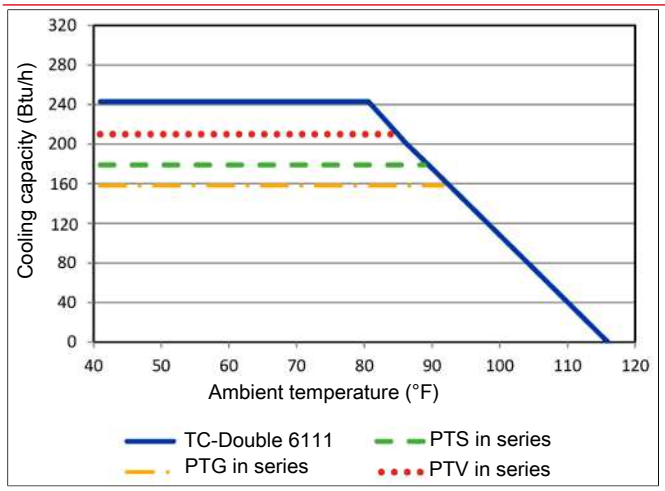
Technical Data Sample Gas Pump P1.3	
Ambient temperature	32 °F to 122 °F
Operating pressure	max. 18.8 psi abs.
Nominal outlet	4.6 lpm (at p = 14.5 psi abs.)
Materials in contact with media vary by configuration	PTFE, PVDF, 1.4571, 1.4401, Viton

AGF-PV-30-F2 Filter Technical Data	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	58 psi
Filter surface	9.3 in^2
Filter fineness	2 µm
Dead volume	3.47 cu. in.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with media) Viton sintered PTFE

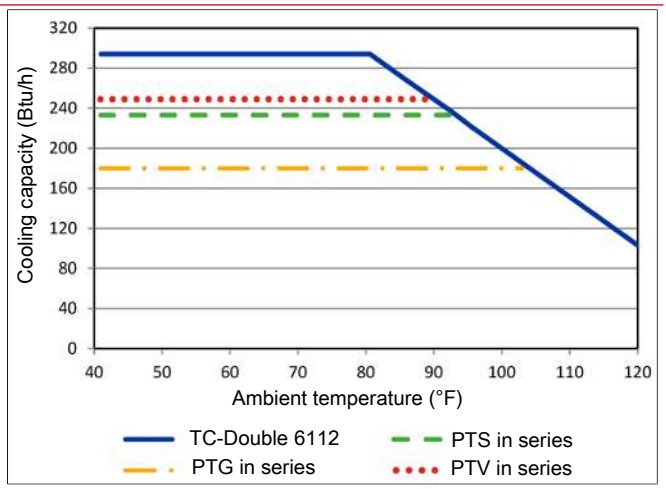
Performance curves

The TC-Double 6111 (X2) is designed for ambient temperatures of up to 104 °F. The cooling capacity is adequate up to this temperature. The TC-Double 6112 (X2) on the other hand can be used in higher temperatures up to nominal 140 °F. Please note the available cooling capacity.

Model TC-Double 6111 (X2)



Model TC-Double 6112 (X2)



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 122 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of τ_e = 122 °F and ϑ_G = 158 °F. Indicated is the maximum flow v_{max} in Nl/h of cooled air, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	2x PTS 2x PTS-I	2x PTG 2x PTG-I	2x PTV 2x PTV-I [2]
Materials in contact with media	Stainless steel	Glass PTFE	PVDF
Flow rate v_{max} [1]	7.5 lpm	4.2 lpm	4.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	294 Btu/h	204 Btu/h	280 Btu/h
Gas pressure p_{max}	44 psi [4]	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm) total	0.29 psi	0.29 psi	0.29 psi
Dead volume V_{tot} total	3.6 cu.in.	3.6 cu.in.	7 cu.in.
Gas connections (metric)	6 mm	GL 14 (6 mm) [3]	DN 4/6
Gas connections (US)	1/4"	GL 14 (1/4") [3]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [3]	G3/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [3]	NPT 3/8"

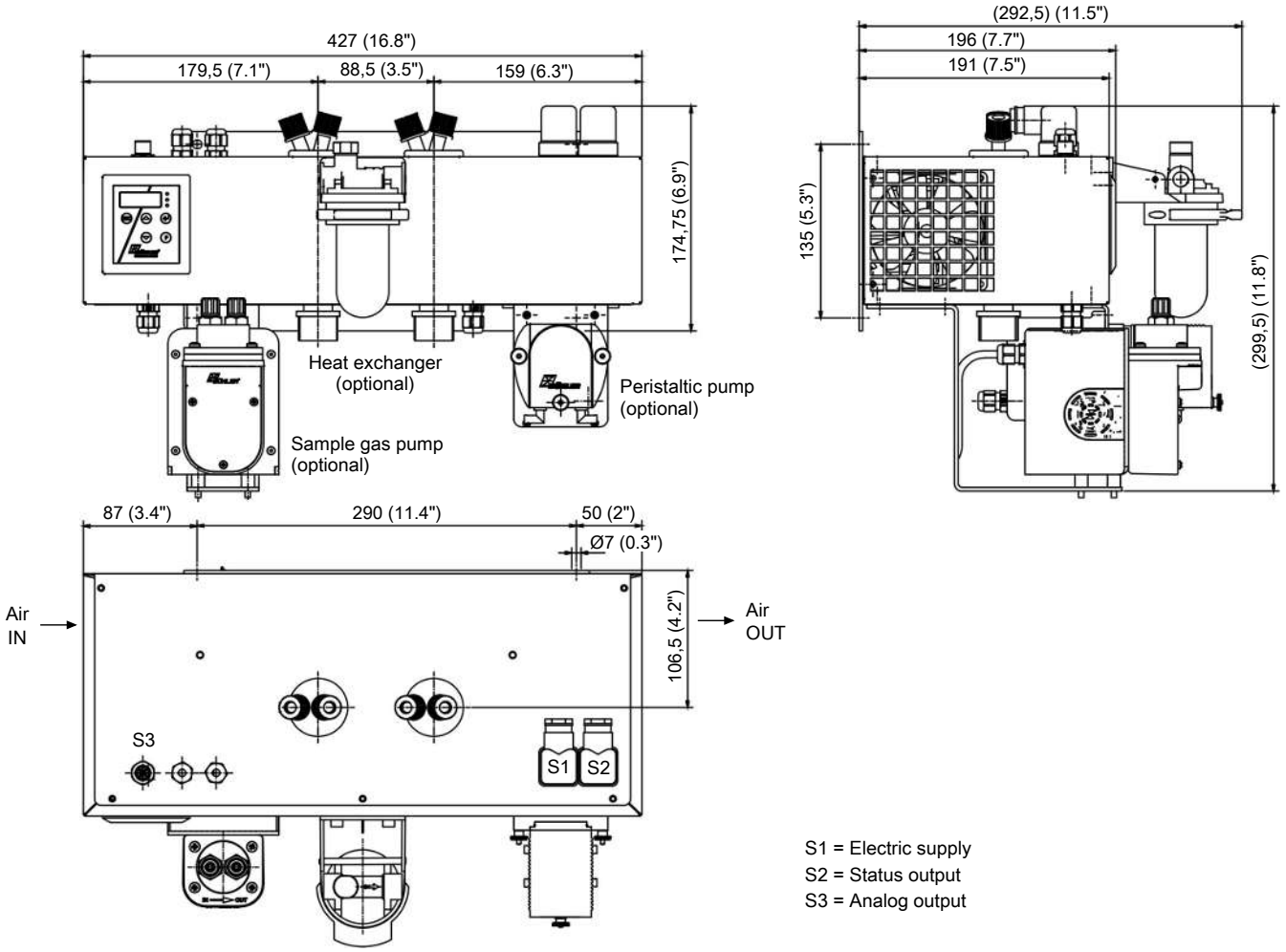
[1] Max. cooling capacity of the cooler must be considered.

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter.

[4] 2321 psi on request.

Dimensions (inch)



Ordering instructions

Gas cooler type with two in-line heat exchangers

The item number is a code for the configuration of your unit. Please use the following model code:

4496	6	1	1	X	2	X	1	X	X	X	X	X	X	0	0	0	0	Product Characteristics
																		Gas cooler model
				1														TC-Double 6111 X2 Ambient temperature 104 °F
				2														TC-Double 6112 X2 Ambient temperature 140 °F
																		Certifications
					2													for explosive areas
																		Supply voltage
						1												115 V AC, 50/60 Hz
						2												230 V AC, 50/60 Hz
																		Heat exchanger
							1	1	0									Stainless steel, PTS, metric
							1	1	5									Stainless steel, PTS-I, US
							1	2	0									Duran glass, PTG, metric
							1	2	5									Duran glass, PTG-I, US
							1	3	0									PVDF, PTV, metric
							1	3	5									PVDF, PTV-I, US
																		Condensate drain [1]
										0								without condensate drain
										2								CPdouble X2 with hose nipple, angled
										4								CPdouble X2 with screw connection [2]
																		Sample gas pumps [1] [3]
											0							without sample gas pump
											1							P1.3, PVDF
											2							P1.3, with bypass valve
																		Humidity sensor/filter [1] [2]
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with PVDF adapter [4]
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
																		Signal outputs
														0	0			status output only
														1	0			Analog output, 4...20 mA additional

[1] With this option, the maximum ambient temperature is limited to 122 °F.

[2] Metric or US connection, per heat exchanger.

[3] Factory installed tubing for suction operation.

[4] Also available in stainless steel.

Consumables and accessories

Item no.	Description
4510008	Automatic condensate drain AK 5.2 (pressure operation only)
4510028	Automatic condensate drain AK 5.5 (pressure operation only)
4410004	Automatic condensate drain AK 20 (pressure operation only)
4410001	Automatic condensate drain 11 LD V 38 (pressure operation only)
41030050	Replacement filter element F2; 5-pack
9144050038	Cable for cooler temperature analog output 4 m
4410005	Condensate trap GL1, 0.4 L
44920035012	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple
44920035016	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (metric)
44920035017	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (US)
4228003	Bellow for P1 pump
9009398	O-ring for bypass P1 pump
4228066	Set inlet/outlet valves 158 °F for P1 pump

ModbusRTU

Sample gas cooler TC-Double+

Many analysis processes require extracting sample gas from the process. This also extracts process-related contamination such as particles or moisture. These can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser. The sample gas cooler reduces the gas temperature to below the dew point for this purpose, causing moisture to drop out, which is then discharged as condensate.

In addition to the status output to monitor the sample gas cooler function, we offer an optional 4 – 20 mA analog output or digital interface. The process control can access the process and diagnostic data via the Modbus RTU interface as well as configure the device settings.

The TC-Double+ series combines the double cooling system of the TC-Double with special heat exchangers. The TC-Double+ features a new generation of heat exchangers with particularly low washout effect of water-soluble components and are specifically suitable for measuring emissions. Most notably, the washout of SO_2 is low. These coolers can therefore be used for so-called automated measuring systems (AMS) per DIN EN 15267-3.

- Low washout effects
- Two separate temperature settings
- Two-stage cooling option
- Duran glass or PVDF heat exchanger
- Nominal cooling capacity 256 Btu/h (104 °F version) or 294 Btu/h (140 °F version)
- Max. ambient temperature 140 °F
- Dew point stability 0.2 °F
- Status display and output
- Optional 4 - 20 mA or Modbus RTU signal output
- Optional CE mark or FM approval
- Moisture detector, filter and condensate pump optional

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Internet: www.buhlertech.com

Overview

TC-Double+ coolers were designed specifically for high cooling capacities, high ambient temperatures and to cool in two cycles to minimise wash out effects. The two cooling blocks can be set do different temperatures.

Any other use of this cooler is determined by the type of built-in passive pre-cooling, i.e. the first cooling level is not controlled electronically.

The Peltier coolers are distinguished according to cooling capacity/operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications	
Operating temperature	104 °F	122 °F
2 heat exchangers in series	TC-Double+ 6111	TC-Double+ 6112

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector,
- sample gas pump.

In addition, we offer different signal outputs:

- Status output
- Analog output, 4...20 mA, incl. status output,
- Modbus RTU digital output, incl. status output

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperatures in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. This applies to the outlet dew point setting on one hand and to the low and excess temperature warning thresholds on the other hand. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via the add-on peristaltic pump.

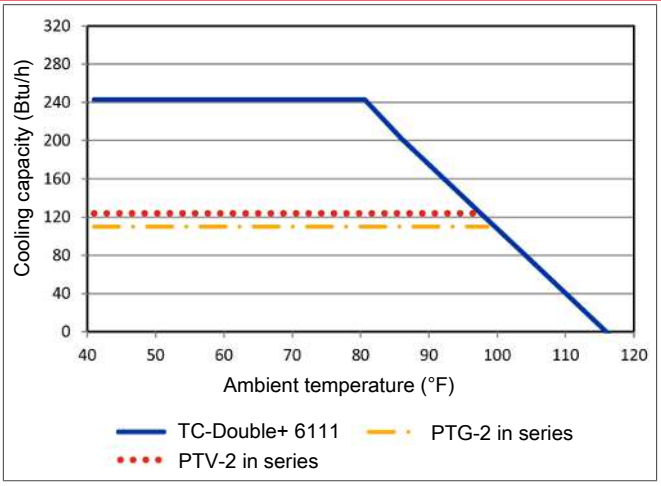
In addition, a fine filter can be attached to the cooler, which an optional moisture detector can be integrated into. The glass dome allows the dirt level of the filter element to easily be determined. The moisture detector can also be installed separately and is generally easy to remove. This may be required if water enters the cooler due to a malfunction and the peristaltic pump can no longer remove it.

A gas pump can be attached to the TC-Double+ and controlled. These are also available with bypass valve to regulate the flow rate.

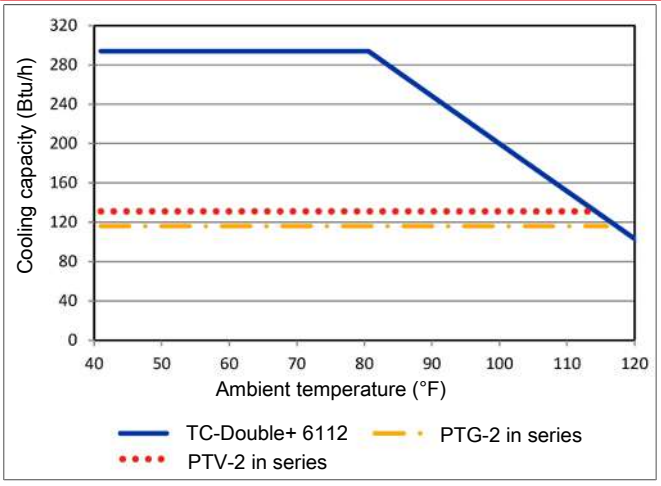
Performance curves

The TC-Double+ 6111 is designed for ambient temperatures of up to 104 °F. The cooling capacity is adequate up to this temperature. The TC-Double+ 6112 on the other hand can be used in higher temperatures up to nominal 140 °F. Please note the available cooling capacity.

Typ TC-Double+ 6111



Typ TC-Double+ 6112



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 122 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of τ_e = 122 °F and ϑ_G = 158 °F. Indicated is the maximum flow v_{max} in Nl/h of cooled air, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	2x PTG-2 2x PTG-2-I	2x PTV-2 2x PTV-2-I [2]
Materials in contact with media	Glass PTFE	PVDF
Flow rate v_{max} [1]	4.2 lpm	4.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F
Max. Cooling capacity Q_{max}	218 Btu/h	204 Btu/h
Gas pressure p_{max}	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm) total	0.29 psi	0.29 psi
Dead volume V_{tot} total	3.6 cu.in.	7 cu.in.
Gas connections (metric)	GL 14 (6 mm) [3]	DN 4/6
Gas connections (US)	GL 14 (1/4") [3]	1/4"-1/6"
Condensate out connections (metric)	GL 25 (12 mm) [3]	G3/8
Condensate out connections (US)	GL 25 (1/2") [3]	NPT 3/8"

[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter

Gas Cooler Technical Data

Gas Cooler Technical Data				
Ready for operation	after max. 10 minutes			
Ambient temperature	41 °F to 140 °F			
Gas output dew temperature, preset: adjustable:	 41 °F 36 °F...68 °F			
IP rating	IP 20			
Housing	Stainless steel, brushed			
Packaging dimensions	approx. 16.8 x 11.8 x 11.5 in			
Weight incl. heat exchanger	approx. 13.8 lb approx. 33 lb at full expansion stage			
Electrical data	Unit without add-on		Unit with add-on (peristaltic pump + gas pump)	
	230 V AC	**115 V AC**	**230 V AC**	**115 V AC**
	+5/-10%	+5/-10%	+-5%	+-5%
	50/60 Hz	50/60 Hz	50 Hz	60 Hz
	1.6 A	3.2 A	2.1 A	4.1 A
	278 W / 350 VA	296 W / 370 VA	390 W / 487 VA	377 W / 472 VA
Recommended fuse (characteristic: delayed action)	2.5 A	4 A	2.5 A	5 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free			
Electrical Connections	Plug per EN 175301-803			
Gas connections	Heat exchange see table "Heat Exchanger Overview" Filter, moisture detector adapter, gas pump, G1/4 or NPT 1/4" or metric/US tube or pipe			
Parts in contact with media Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton			
FM no.:	3062014			

Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Digital interface technical data	
Signal	Modbus RTU (RS-485)
Connection	M12x1 connector, DIN EN 61076-2-101

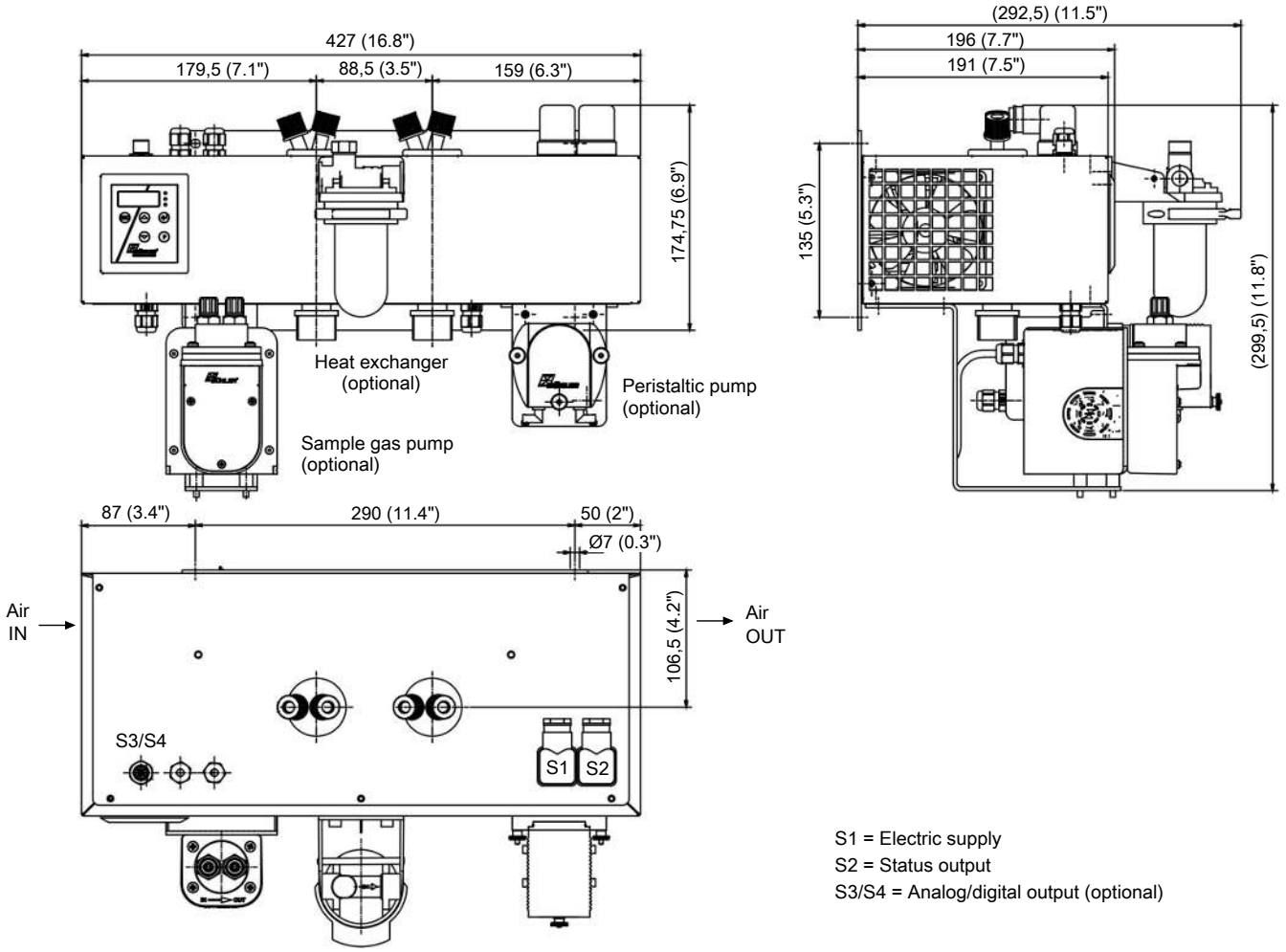
Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

CPdouble Peristaltic Pump Technical Data	
Ambient temperature	32 °F to 131 °F
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Degree of protection	IP 44
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

Technical Data Sample Gas Pump P1	
Ambient temperature	32 °F to 122 °F
Operating pressure	max. 18.8 psi abs.
Nominal outlet	4.6 lpm (at p = 14.5 psi abs.)
Materials in contact with media vary by configuration	PTFE, PVDF, 1.4571, 1.4401, Viton, PFA

AGF-PV-30-F2 Filter Technical Data	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	58 psi
Filter surface	9.3 in^2
Filter fineness	2 µm
Dead volume	3.47 cu. in.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with media) Viton sintered PTFE

Dimensions (inch)



S1 = Electric supply
S2 = Status output
S3/S4 = Analog/digital output (optional)

Ordering instructions

Gas cooler model with two heat exchangers in series

The item number is a code for the configuration of your unit. Please use the following model code:

4496	6	1	1	X	X	X	1	X	X	X	X	X	X	0	0	0	0	Product Characteristics
																		Gas cooler model
				1														TC-Double+ 6111: Ambient temperature 104 °F
				2														TC-Double+ 6112: Ambient temperature 140 °F
																		Certifications
					0													Standard applications – CE
					1													for common locations - FM
																		Supply voltage
						1												115 V AC, 50/60 Hz
						2												230 V AC, 50/60 Hz
																		Heat exchanger
							1	2	2									Duran glass, PTG-2, metric
							1	2	7									Duran glass, PTG-2-I, US
							1	3	2									PVDF, PTV-2, metric
							1	3	7									PVDF, PTV-2-I, US
																		Condensate drain [1]
										0								without condensate drain
										2								CPdouble with hose nipple, angled
										4								CPdouble with screw connection [2]
																		Sample gas pumps [1] [3]
											0							without sample gas pump
											1							P1, PVDF
											2							P1, with bypass valve
																		Humidity sensor/filter [1] [2]
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with PVDF adapter [3]
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
																		Signal outputs
														0	0			status output only
														1	0			Analog output, 4...20 mA incl. status output
														2	0			Modbus RTU digital output incl. status output [4]

[1] With this option, the maximum ambient temperature is limited to 122 °F.

[2] Metric or US connection, per heat exchanger.

[3] Also available in stainless steel.

[4] Option only available for CE version.

Consumables and accessories

Item no.	Description
4510008	Automatic condensate drain AK 5.2 (pressure operation only)
4510028	Automatic condensate drain AK 5.5 (pressure operation only)
4410004	Automatic condensate drain AK 20 (pressure operation only)
4410001	Automatic condensate drain 11 LD V 38 (pressure operation only)
41030050	Replacement filter element F2; 5-pack
9144050038	Cable for cooler temperature analog output 4 m
4410005	Condensate trap GL1, 0.4 L
44920035012	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple
44920035016	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (metric)
44920035017	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (US)
4228003	Bellow for P1 pump
9009398	O-ring for bypass P1 pump
4228066	Set inlet/outlet valves 158 °F for P1 pump

Sample gas cooler TC-Double+ X2

In emission measurement, process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations as well as measurements in small combustion plants or exhaust gas analysis in automotive engineering.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

Many applications require equipment which can be used in explosive areas. This is where the TC-Double+ X2 series provides solutions for Zone 2 or Class I, Division 2.

- ATEX and IECEx Zone 2 approval
- FM C-US approval for Class I, Division 2
- Low wash out effects
- One gas path
- Duran glass or PVDF heat exchanger
- Rated power 256/294 Btu/h, 104 °F/140 °F version
- Max. ambient temperature 140 °F
- Dew point stability 0.2 °F
- Status display and output
- Moisture detector connection, analog output, filter, and peristaltic pump optional

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
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e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

TC-Double+ X2 coolers were designed specifically for high cooling capacities, high ambient temperatures and to cool in two cycles to minimise wash out effects. The two cooling blocks can be set do different temperatures.

Any other use of this cooler is determined by the type of built-in passive pre-cooling, i.e. the first cooling level is not controlled electronically.

The Peltier coolers are distinguished according to cooling capacity/operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications	
Operating temperature	104 °F	122 °F
2 heat exchangers in series	TC-Double+ 6111 X2	TC-Double+ 6112 X2

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector,
- Sample gas pump.

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperatures in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. This applies to the outlet dew point setting on one hand and to the low and excess temperature warning thresholds on the other hand. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via the add-on peristaltic pump.

In addition, a fine filter can be attached to the cooler, which an optional moisture detector can be integrated into. The glass dome allows the dirt level of the filter element to easily be determined. The moisture detector can also be installed separately and is generally easy to remove. This may be required if water enters the cooler due to a malfunction and the peristaltic pump can no longer remove it.

A gas pump can be attached to the TC-Double+ and controlled. These are also available with bypass valve to regulate the flow rate.

Gas Cooler Technical Data

Gas Cooler Technical Data				
Ready for operation	after max. 10 minutes			
Ambient temperature	41 °F to 140 °F			
Gas output dew temperature, preset: adjustable:	 41 °F 36 °F...68 °F			
IP rating	IP 20			
Housing	Stainless steel, brushed			
Packaging dimensions	approx. 16.8 x 11.8 x 11.5 in			
Weight incl. heat exchanger	approx. 13.8 lb approx. 33 lb at full expansion stage			
Electrical data	Unit without add-on		Unit with add-on (peristaltic pump + gas pump)	
	230 V AC	**115 V AC**	**230 V AC**	**115 V AC**
	+5/-10%	+5/-10%	+-5%	+-5%
	50/60 Hz	50/60 Hz	50 Hz	60 Hz
	1.6 A	3.2 A	2.1 A	4.1 A
	278 W / 350 VA	296 W / 370 VA	390 W / 487 VA	377 W / 472 VA
Recommended fuse (characteristic: delayed action)	2.5 A	4 A	2.5 A	5 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free			
Electrical Connections	Plug per EN 175301-803			
Gas connections	Heat exchange see table "Heat Exchanger Overview" Filter, moisture detector adapter, gas pump, G1/4 or NPT 1/4" or metric/US tube or pipe			
Parts in contact with media Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton			
Markings:	FM18ATEX0012X: II 3 G Ex ec nC IIC T4 Gc IECEx FMG 18.0005X: Ex ec nC IIC T4 Gc FM18US0021X/FM18CA0010X: CL I DIV 2 GP ABCD RU C-DE.HA65.B.00608/20			

Technical Data - Options

Analogue Output Cooler Temperature Technical Data

Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Technical Data FF-3-N Moisture Detector

Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Technical Data peristaltic pump CPdouble X2

Ambient temperature	32 °F to 122 °F
Flow rate	0.005 lpm (50 Hz)/0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Degree of protection	IP 44
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

Technical Data Sample Gas Pump P1.3

Ambient temperature	32 °F to 122 °F
Operating pressure	max. 18.8 psi abs.
Nominal outlet	4.6 lpm (at p = 14.5 psi abs.)
Materials in contact with media vary by configuration	PTFE, PVDF, 1.4571, 1.4401, Viton

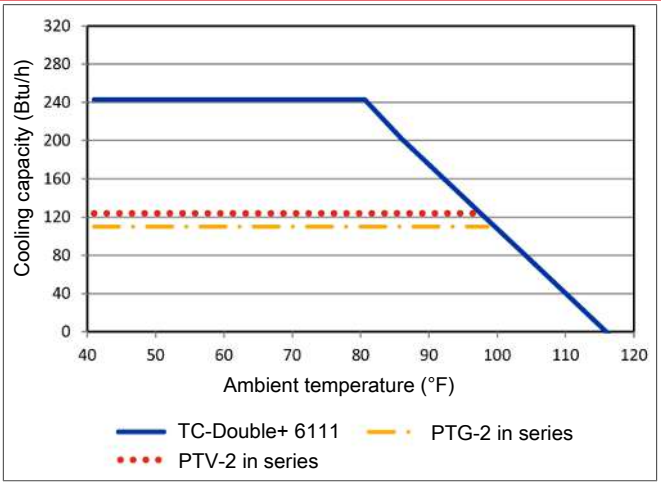
AGF-PV-30-F2 Filter Technical Data

Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	58 psi
Filter surface	9.3 in^2
Filter fineness	2 µm
Dead volume	3.47 cu. in.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with media) Viton sintered PTFE

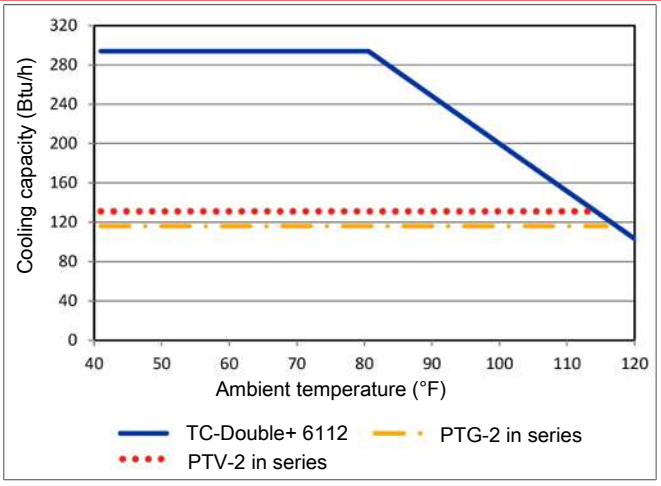
Performance curves

The TC-Double+ 6111 (X2) is designed for ambient temperatures of up to 104 °F. The cooling capacity is adequate up to this temperature. The TC-Double+ 6112 (X2) on the other hand can be used in higher temperatures up to nominal 140 °F. Please note the available cooling capacity.

Model TC-Double+ 6111 (X2)



Model TC-Double+ 6112 (X2)



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 122 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of τ_e = 122 °F and ϑ_G = 158 °F. Indicated is the maximum flow v_{max} in Nl/h of cooled air, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

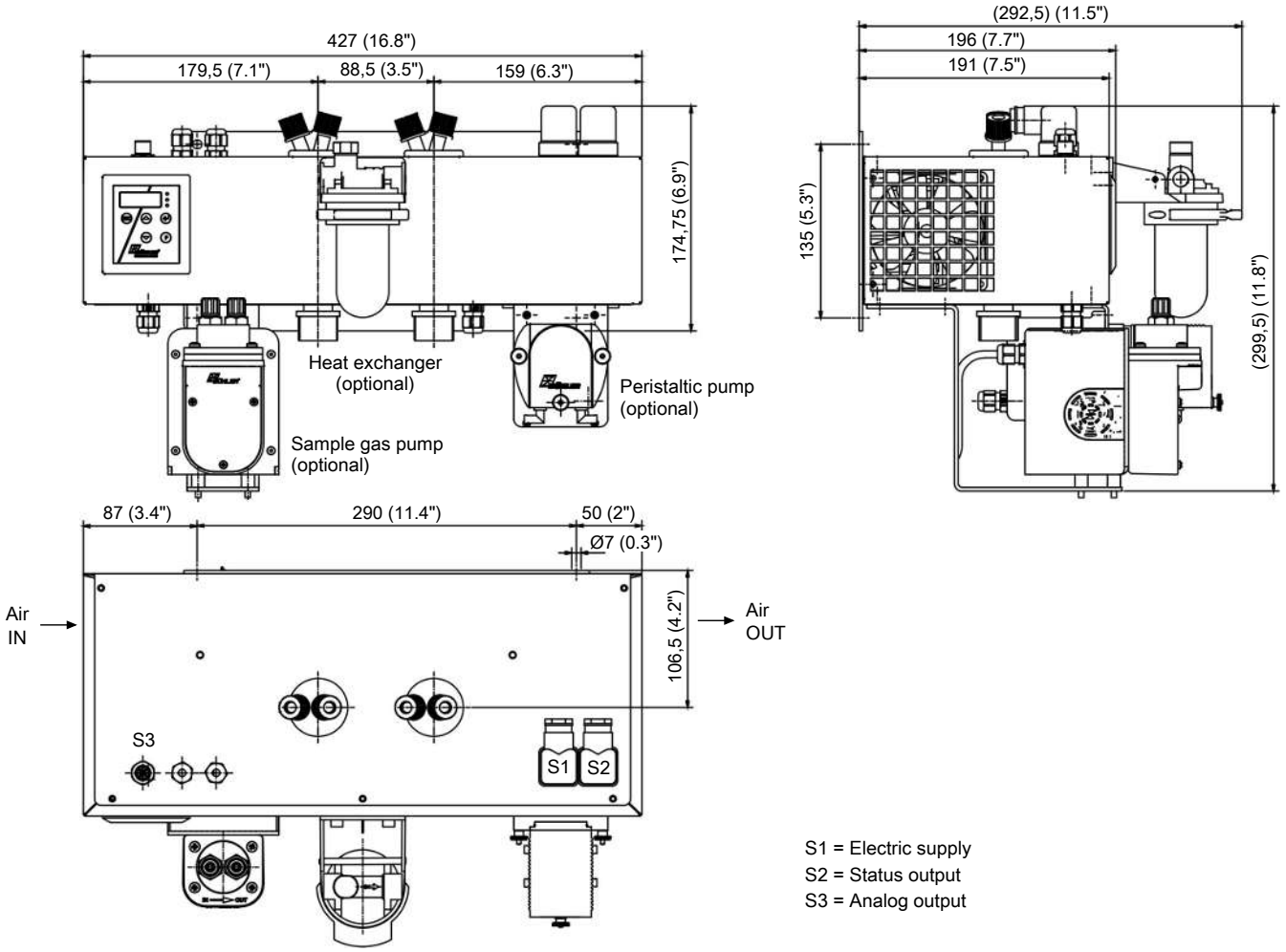
Heat exchanger	2x PTG-2 2x PTG-2-I	2x PTV-2 2x PTV-2-I [2]
Materials in contact with media	Glass PTFE	PVDF
Flow rate v_{max} [1]	4.2 lpm	4.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F
Max. Cooling capacity Q_{max}	218 Btu/h	204 Btu/h
Gas pressure p_{max}	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm) total	0.29 psi	0.29 psi
Dead volume V_{tot} total	3.6 cu.in.	7 cu.in.
Gas connections (metric)	GL 14 (6 mm) [3]	DN 4/6
Gas connections (US)	GL 14 (1/4") [3]	1/4"-1/6"
Condensate out connections (metric)	GL 25 (12 mm) [3]	G3/8
Condensate out connections (US)	GL 25 (1/2") [3]	NPT 3/8"

[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter

Dimensions (inch)



Ordering instructions

Gas cooler model with two heat exchangers in series

The item number is a code for the configuration of your unit. Please use the following model code:

4496	6	1	1	X	2	X	1	X	X	X	X	X	X	0	0	0	0	Product Characteristics
																		Gas cooler model
				1														TC-Double+ 6111 X2 Ambient temperature 104 °F
				2														TC-Double+ 6112 X2 Ambient temperature 140 °F
																		Certifications
					2													for explosive areas
																		Supply voltage
						1												115 V AC, 50/60 Hz
						2												230 V AC, 50/60 Hz
																		Heat exchanger
							1	2	2									Duran glass, PTG-2, metric
							1	2	7									Duran glass, PTG-2-I, US
							1	3	2									PVDF, PTV-2, metric
							1	3	7									PVDF, PTV-2-I, US
																		Condensate drain [1]
										0								without condensate drain
										2								CPdouble X2 with hose nipple, angled
										4								CPdouble X2 with screw connection [2]
																		Sample gas pumps [1] [3]
											0							without sample gas pump
											1							P1.3, PVDF
											2							P1.3, with bypass valve
																		Humidity sensor/filter [1] [2]
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with PVDF adapter [4]
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
																		Signal outputs
														0	0			status output only
														1	0			Analog output, 4...20 mA additional

[1] With this option, the maximum ambient temperature is limited to 122 °F.

[2] Metric or US connection, per heat exchanger.

[3] Factory installed tubing for suction operation.

[4] Also available in stainless steel.

Consumables and accessories

Item no.	Description
4510008	Automatic condensate drain AK 5.2 (pressure operation only)
4510028	Automatic condensate drain AK 5.5 (pressure operation only)
4410004	Automatic condensate drain AK 20 (pressure operation only)
4410001	Automatic condensate drain 11 LD V 38 (pressure operation only)
41030050	Replacement filter element F2; 5-pack
9144050038	Cable for cooler temperature analog output 4 m
4410005	Condensate trap GL1, 0.4 L
44920035012	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple
44920035016	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (metric)
44920035017	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple and screw connection (US)
4228003	Bellow for P1 pump
9009398	O-ring for bypass P1 pump
4228066	Set inlet/outlet valves 158 °F for P1 pump

Sample gas cooler TC-Kit

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The small TC-Kit sample gas cooler offers a variety of options for installation in gas analysis systems.

- Compact design for installation in a gas cooling system
- Effective heat release through external fans and cooling ribs
- Version 24 V, optionally 230 V/115 V
- Protection class IPxxC, with tight installation IP54
- One or two gas paths
- Stainless steel, glass or PVDF heat exchanger
- Adjustable outlet dew point and alarm thresholds
- Nominal capacity 104 Btu/
- Dew point stability ±0.2 °F
- MCD400 display module for separate installation
- Used in **DNV-GL and LR type-tested** conditioning unit
- Compliance with requirements of **MARPOL MEPC.259(68) of IMO** confirmed

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Overview

The TC-Kit series consists of various models which can be classified by the number of heat exchangers.

This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications
Operating temperature	131 °F
1 heat exchanger	TC-Kit 6312
2 heat exchangers	TC-Kit 6322

Additional components which every conditioning system should feature can optionally be connected:

- Peristaltic pump for condensate separation*,
- Moisture detector,
- Sample gas pump*,
- Power supply module 230/115 V,
- Alarm output*,
- Analog output
- Controller for heated line**.

* Expansion module (option 10 or 11) required.

** Controller (option 01 or 11) required.

This allows for various configurations of cooler and options. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 to 68 °F) (factory setting 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory settings for both values are 3 K.

The flashing display as well as a red LED on the display module along with the status relay indicate the conditions are below or above the configured warning range (e.g. after switching on).

The outputs are:

A potential-free status output. The relay is activated when the block temperature is within the target range. The output also serves as collective alarm for device faults, moisture ingress, etc.

A switched output for connecting a gas pump. The output uses the same relay as the status output. This output can only be used for pumps designed for 24 VDC operating voltage.

Another relay output is available for switching up to two peristaltic pumps. The pumps are supplied with the mains voltage and can be shut off via the device menu for maintenance purposes.

The TC-Kit can optionally be configured for connecting a heated line, which can be either self-regulating or a heated line regulated by the cooler.

Operation via 115 VAC/230 VAC and using the regulator for a heated line requires the optional expansion module.

Gas cooler technical data

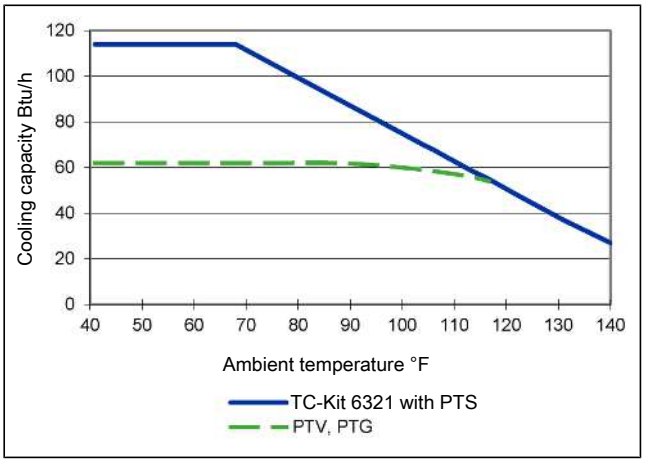
Gas cooler			
Ready for operation	after max. 10 minutes		
Ambient temperature	41 °F to 131 °F		
Gas output dew point preset: adjustable:	 41 °F 36 °C...68 °F		
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) 2 Hz-13.2 Hz Amplitude ± 1.0 mm 13.2 Hz -100 Hz 0.7g acceleration		
Protection rating	IPxxC, with tight installation IP54		
Rack material (outdoors):	Stainless steel, aluminium		
Packaging dimensions	approx. 8.5 x 7.9 x 14.2 in		
Weight without heat exchanger	approx. 8.4 lb (switched-mode power supply + controller) approx. 7.5 lb (at 24 V DC)		
Electrical power input	Base version	Optional switching power supply	
	24 V DC	230 V AC	115 V AC
	5 A	0.6 A	1.2 A
	120 W	110 W/140 VA	
Status output switching capacity (optional)	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free		
Electrical Connections	Cable clamp (for 24 V DC) or blade receptacle (for 115/230 V AC)		
Gas connections	Heat exchanger see table "Heat exchanger overview"		
Parts in contact with mediums	Heat exchanger see table "Heat exchanger overview"		

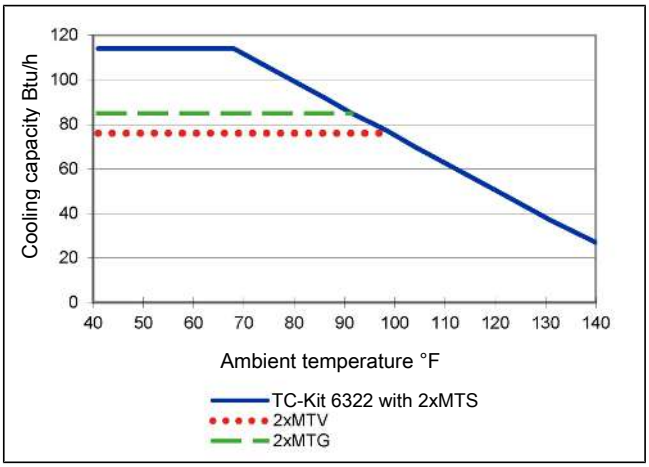
Technical Data - Options

Technical data controller for heated line	
Temperature, preset: adjustable:	 212 °F 104 °F .. 392 °F
Motor power:	max. 1600 W (230 V)/800 W (115 V)
Sensor type:	Pt100, 2-wire
Connection:	693 series socket, 7-pin

Outlet

One heat exchanger		Two heat exchangers	
Model TC-Kit 6312		**Model TC-Kit 6322**	
Rated cooling capacity (at 77 °F)	104 Btu/h	Rated cooling capacity (at 77 °F)	104 Btu/h
max. ambient temperature	131 °F	max. ambient temperature	131 °F
Dew point fluctuations		Dew point fluctuations	
static	± 0.1 K	static	± 0.1 K
in the entire specification range	± 1.5 K	in the entire specification range	± 1.5 K
		Temperature difference between heat exchangers	< 0.5 K





Note: The limit curves for the heat exchangers exchanger PTG, MTG, PTV or MTV apply to a dew point of 122 °F.

The cooling capacity curves of the TC-Kit apply to ideal installation in a housing. Depending how it is installed, the value may deviate from the cooling capacity curve.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

Heat exchanger	PTS PTS-I [2]	PTG PTG-I	PTV PTV-I [2]	MTS [3] MTS-I [2] [3]	MTG [3] MTG [3]	MTV [3] MTV-I [2] [3]
Materials in contact with media	Stainless steel	Glass PTFE	PVDF	Stainless steel PVDF	Glass PTFE	PVDF
Flow rate v_{max} [1]	7.5 lpm	4.2 lpm	4.2 lpm	5 lpm	3.5 lpm	3.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	149 °F	149 °F	149 °F	149 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F	284 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	142 Btu/h	85 Btu/h	85 Btu/h	90 Btu/h	76 Btu/h	62 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	29 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.15 psi	0.15 psi	0.15 psi	0.29 psi	0.28 psi	0.26 psi
Dead volume V_{tot}	1.8 cu. in.	1.8 cu. in.	3.48 cu. in.	1.2 cu. in.	1.1 cu. in.	1 cu. in.
Gas connections (metric)	6 mm	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm)	DN 4/6
Gas connections (US)	1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	G1/4	GL18 (8 mm)	G1/4
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	NPT 1/4"	GL18 (8 mm)	NPT 1/4"

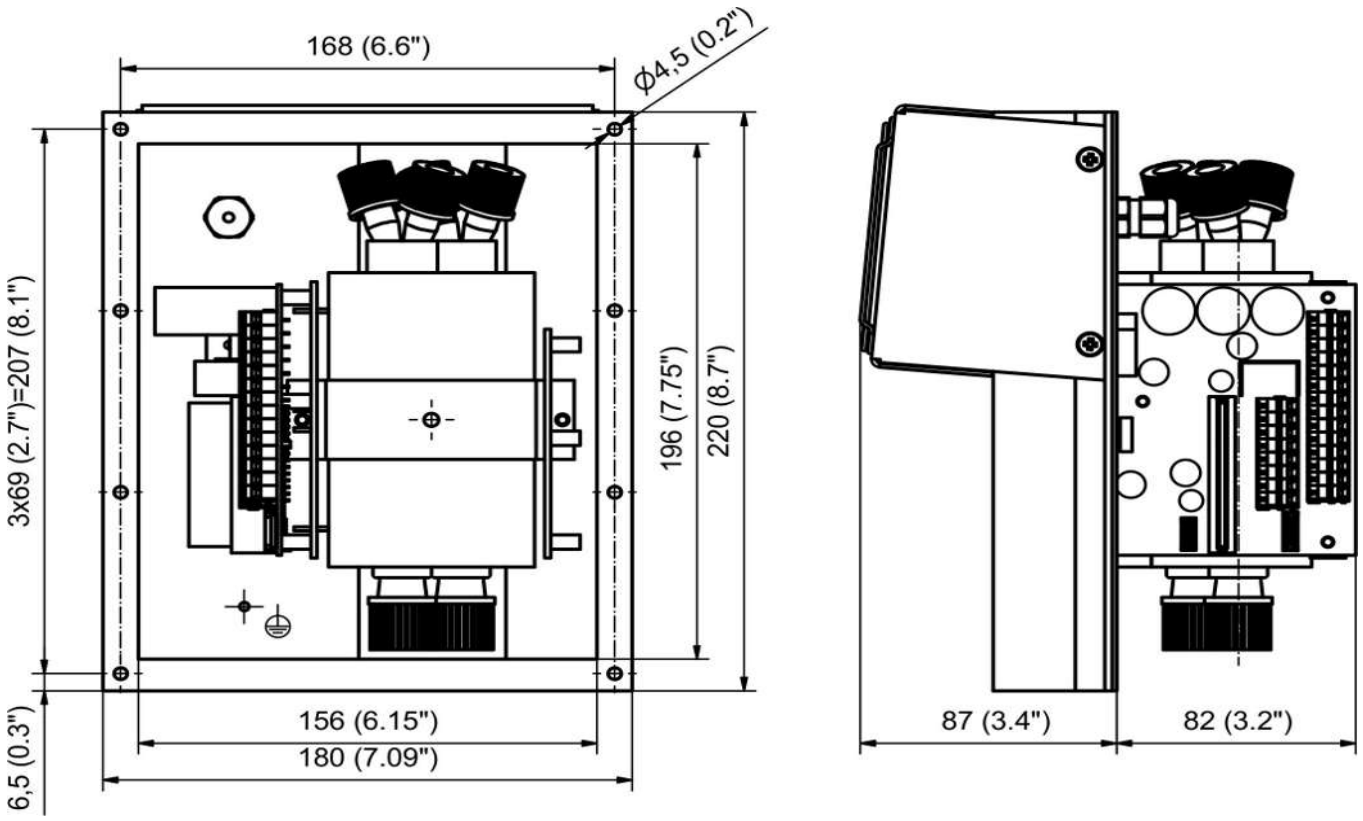
[1] Max. cooling capacity of the cooler must be considered.

[2] Models marked I have NPT threads or US tubes, respectively.

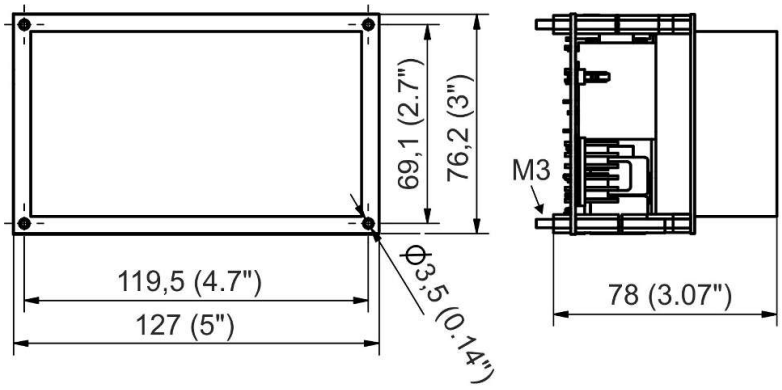
[3] Passive discharge via automatic condensate drains or traps not applicable for MTG heat exchangers. For passive discharge on the MTS and MTV heat exchangers, use a screw connection with a clearance of at least 7 mm (9/32") (see accessories).

[4] Gasket inside diameter.

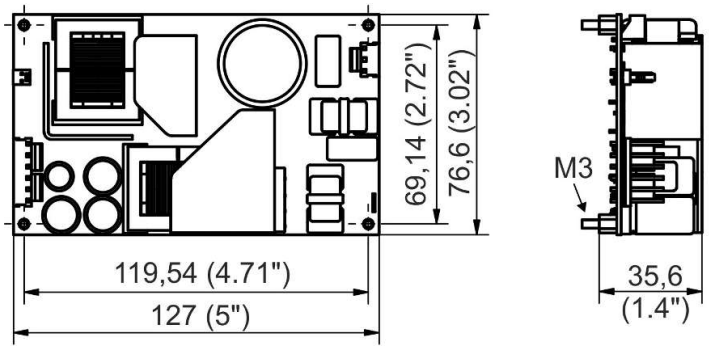
Dimensions basic version



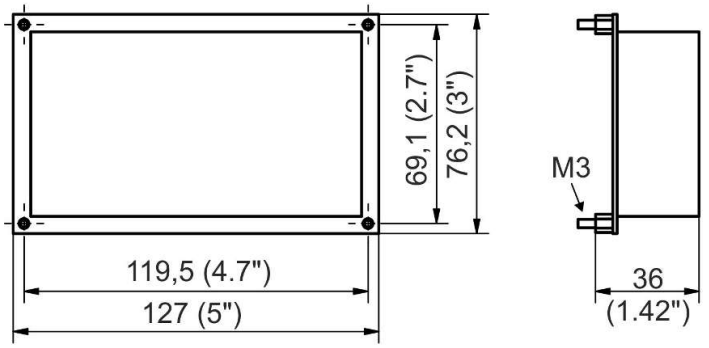
Power supply and expansion module



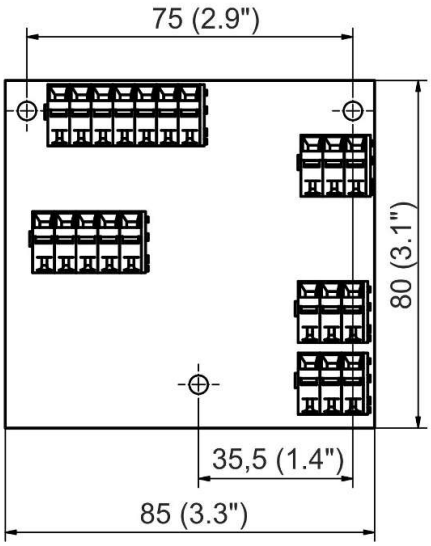
Power supply module



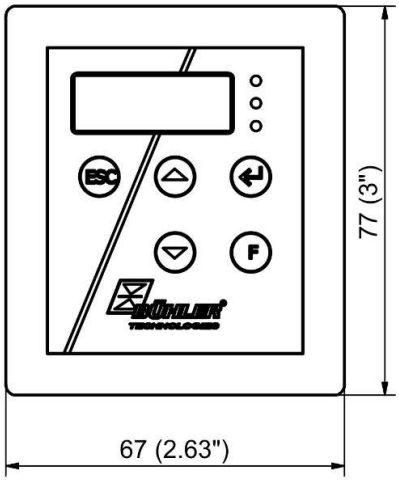
Expansion module (230 V/115 V)



Power board (option expansion module 24 V)



Display unit



Cut-out in front panel 55.5 x 65.4 mm (2.18" x 2.57")

Ordering instructions

Gas cooler models

The item number is a code for the configuration of your unit. Please use the following model code:

4496	2	3	X	2	0	X	X	X	0	Product Characteristics
			1							Gas cooler for 1 heat exchanger
			2							Gas cooler for 2 heat exchangers
										Gas cooler type
				2						TC-Kit: Ambient temperature 131 °F
										Supply voltage
					1					115 VAC, 50/60 Hz (power supply module)
					2					230 VAC, 50/60 Hz (power supply module)
					4					24 VDC
										Options
						0	0			Without option
						0	1			Controller for heated line
						1	0			Expansion module
						1	1			Controller and expansion module

Heat exchanger options

Item no.	Description
4465099	MTS, steel heat exchanger ø20 mm, metric connections
4465099I	MTS-I, steel heat exchanger ø20 mm, US connections
4465299	MTS-WS, steel heat exchanger ø20 mm, horizontal gas inlet/output, metric connections
4465199	MTV, plastic heat exchanger ø20 mm, metric connections
4465199I	MTV-I, plastic heat exchanger ø20 mm, US connections
44651997	MTG, glass heat exchanger ø20 mm, metric and US connections
4447999	PTS, steel heat exchanger ø35 mm, metric connections
4447999I	PTS-I, steel heat exchanger ø35 mm, US connections
4446999	PTV, plastic heat exchanger ø35 mm, metric connections
4446999I	PTV-I, plastic heat exchanger ø35 mm, US connections
4445999	PTG, glass heat exchanger ø35 mm, metric and US connections

Spare parts and accessories

Item no.	Description
see data sheet 450005	Automatic condensate drain
see data sheet 410011	Moisture detector and flow cell, various models
41111000	Moisture detector connection cable, 4 m (13 ft)
9144050082	Moisture detector connection cable, 450 mm (17.7 in)
9144050038	Cable for cooler temperature analog output 4 m (13 ft)
see data sheet 420011	Sample gas pump P1.x
see data sheet 450020	Peristaltic pump CPsingle, CPdouble and replacement hose
see data sheet 440002	Condensate trap
4381045	Screw connection G1/4 – DN 8/12 for passive condensate connection MTS and MTV
4381048	Screw connection NPT 1/4" for passive condensate connection MTS and MTV
449601000	Analog output kit
449600047	Mains supply, M3 plug, cable length 400 mm (15.7 in)
449600049	Status output, M3 plug, cable length 380 mm (15 in)
449601001	Mounting kit 1 for thin housings

Sample gas cooler TC-Kit+

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The TC-Kit+ series features a new generation heat exchangers with a particularly low wash out effect of water-soluble components and are specifically suitable for measuring emissions. Particularly washout of SO_2 is low. These coolers can therefore be used for so-called automated measuring systems (AMS) per EN 15267-4.

- Compact design for installation in a gas cooling system
- Effective heat release through external fans and cooling ribs
- Version 24 V, optionally 230 V/115 V
- Protection class IPxxC, with tight installation IP54
- One gas path
- Optimised glass or PVDF heat exchanger model
- Adjustable outlet dew point and alarm thresholds
- Nominal capacity 104 Btu/h
- Dew point stability ±0.2 °F
- MCD400 display module for separate installation
- Used in **DNV-GL and LR type-tested** conditioning unit
- Compliance with requirements of **MARPOL MEPC.259(68) of IMO** confirmed
- Low wash out effects confirmed by **DNV-GL**

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Overview

The TC-Kit+ series was designed specifically for the requirements in so-called automated measuring systems (AMS) according to EN 15267-4. Dividing the interior and exterior ensures the IP rating required by the standard without requiring ventilation of the interior. The series connection of the heat exchangers will cool in two cycles to minimise wash out effects.

The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications
Operating temperature	131 °F
2 heat exchangers in series	TC-Kit 6322+

Additional components which every conditioning system should feature can optionally be connected:

- Peristaltic pump for condensate separation*,
- Moisture detector,
- Sample gas pump*,
- Power supply module 230/115 V,
- Alarm output*,
- Analog output
- Controller for heated line**.

* Expansion module (option 10 or 11) required.

** Controller (option 01 or 11) required.

This allows for various configurations of cooler and options. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 to 68 °F) (factory setting 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory settings for both values are 3 K.

The flashing display as well as a red LED on the display module along with the status relay indicate the conditions are below or above the configured warning range (e.g. after switching on).

The outputs are:

A potential-free status output. The relay is activated when the block temperature is within the target range. The output also serves as collective alarm for device faults, moisture ingress, etc.

A switched output for connecting a gas pump. The output uses the same relay as the status output. This output can only be used for pumps designed for 24 VDC operating voltage.

Another relay output is available for switching up to two peristaltic pumps. The pumps are supplied with the mains voltage and can be shut off via the device menu for maintenance purposes.

The TC-Kit can optionally be configured for connecting a heated line, which can be either self-regulating or a heated line regulated by the cooler.

Operation via 115 VAC/230 VAC and using the regulator for a heated line requires the optional expansion module.

Gas cooler technical data

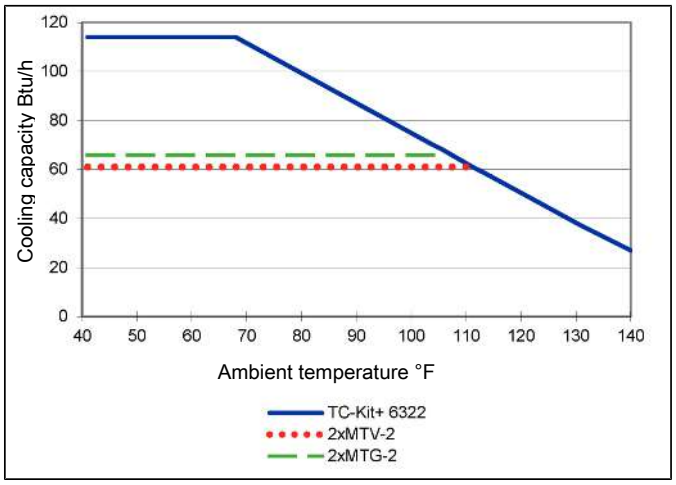
Gas cooler			
Ready for operation	after max. 10 minutes		
Ambient temperature	41 °F to 131 °F		
Gas output dew point preset: adjustable:	 41 °F 36 °C...68 °F		
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) 2 Hz-13.2 Hz Amplitude ± 1.0 mm 13.2 Hz -100 Hz 0.7g acceleration		
Protection rating	IPxxC, with tight installation IP54		
Rack material (outdoors):	Stainless steel, aluminium		
Packaging dimensions	approx. 8.5 x 7.9 x 14.2 in		
Weight without heat exchanger	approx. 8.4 lb (switched-mode power supply + controller) approx. 7.5 lb (at 24 V DC)		
Electrical power input	Base version	Optional switching power supply	
	24 V DC	230 V AC	115 V AC
	5 A	0.6 A	1.2 A
	120 W	110 W/140 VA	
Status output switching capacity (optional)	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free		
Electrical Connections	Cable clamp (for 24 V DC) or blade receptacle (for 115/230 V AC)		
Gas connections	Heat exchanger see table "Heat exchanger overview"		
Parts in contact with mediums	Heat exchanger see table "Heat exchanger overview"		

Technical Data - Options

Technical data controller for heated line	
Temperature, preset: adjustable:	 212 °F 104 °F .. 392 °F
Motor power:	max. 1600 W (230 V)/800 W (115 V)
Sensor type:	Pt100, 2-wire
Connection:	693 series socket, 7-pin

Outlet

Two heat exchangers	
Model TC-Kit 6322+	
Rated cooling capacity (at 77 °F)	104 Btu/h
max. ambient temperature	131 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K
Temperature difference between heat exchangers	< 0.5 K



Note: The limit curves for the heat exchangers MTV-2 and MTG-2 apply to a dew point of 122 °F.

The cooling capacity curves of the TC-Kit+ apply to ideal installation in a housing. Depending how it is installed, the value may deviate from the cooling capacity curve.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

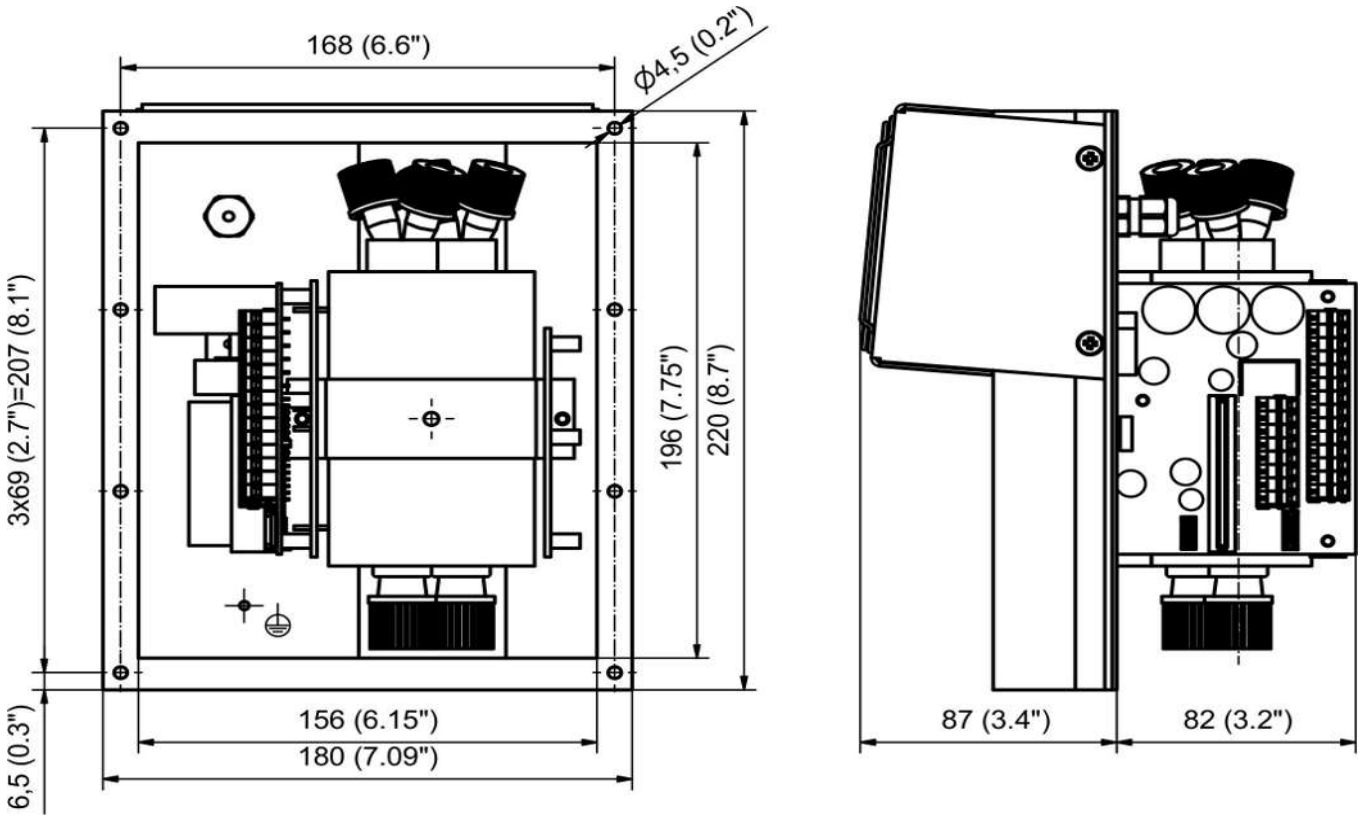
Heat exchanger	2x MTG-2 [3]	2x MTV-2 [3] 2x MTV-2-I [2] [3]
Materials in contact with media	Glass PTFE	PVDF
Flow rate v_{max} [1]	3.5 lpm	3.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F
Max. cooling capacity Q_{max}	76 Btu/h	62 Btu/h
Gas pressure p_{max}	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.28 psi	0.26 psi
Dead volume V_{dead}	2.3 cu. in.	2.1 cu. in.
Gas connections (metric)	GL14 (6 mm)	DN 4/6
Gas connections (US)	GL14 (1/4")	1/4"-1/6"
Condensate out connection (metric)	GL18 (8 mm)	G1/4
Condensate out connection (US)	GL18 (8 mm)	NPT 1/4"

[1] Considering the maximum cooling capacity of the cooler.

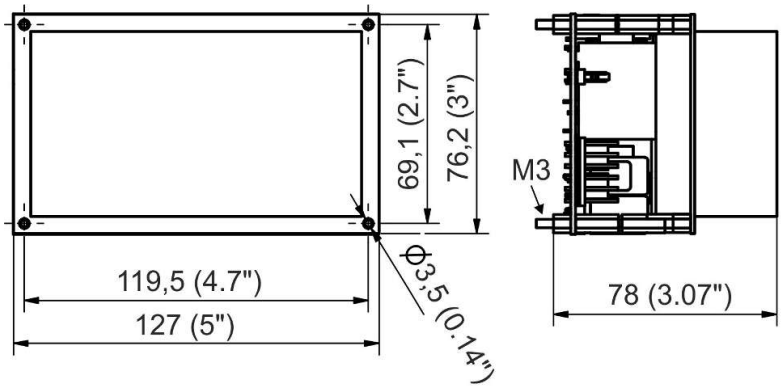
[2] Models marked I have NPT threads or US tubes, respectively.

[3] Passive discharge via automatic condensate drains or traps not applicable for MTG-2 heat exchangers. For passive discharge on the MTV-2 heat exchangers, use a screw connection with a clearance of at least 0.3 in (see accessories).

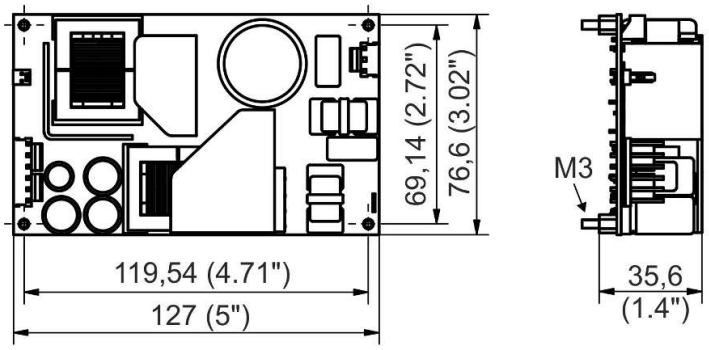
Dimensions basic version



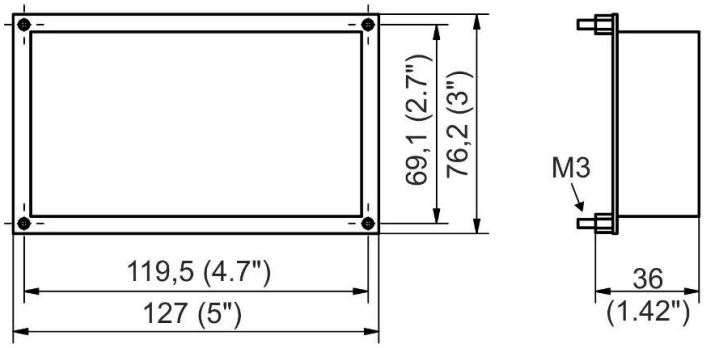
Power supply and expansion module



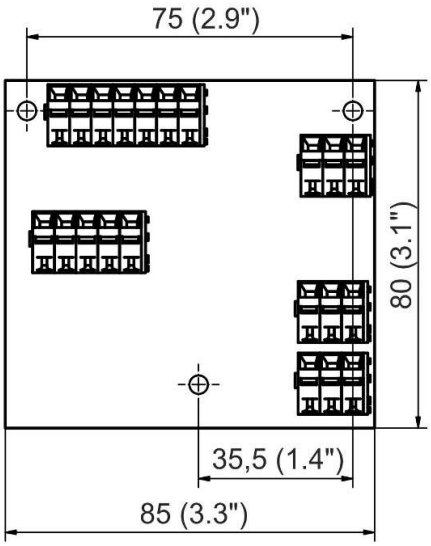
Power supply module



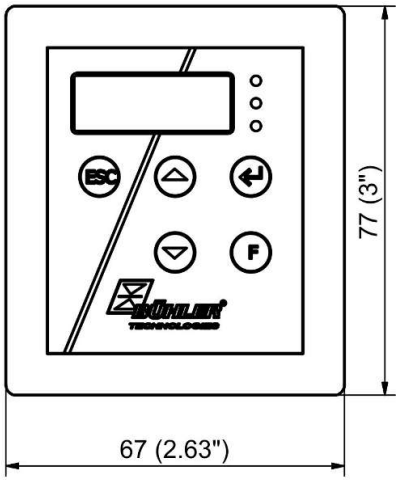
Expansion module (230 V/115 V)



Power board (option expansion module 24 V)



Display unit



Cut-out in front panel 55.5 x 65.4 mm (2.18" x 2.57")

Ordering instructions

Gas cooler model with two heat exchangers in series

The item number is a code for the configuration of your unit. Please use the following model code:

4496	2	3	2	2	0	X	X	X	0	Product Characteristics
			2							Gas cooler for 2 heat exchangers in series
										Gas cooler type
				2						TC-Kit+: Ambient temperature 131 °F
										Supply voltage
					1					115 VAC, 50/60 Hz (power supply module)
					2					230 VAC, 50/60 Hz (power supply module)
					4					24 VDC
										Options
						0	0			Without option
						0	1			Controller for heated line
						1	0			Expansion module
						1	1			Controller and expansion module

Heat exchanger options

Item no.	Description
449601222	MTG-2, plastic heat exchanger ø20 mm, metric connections
449601232	MTV-2, plastic heat exchanger ø20 mm, US connections
449601237	MTV-2-I, glass heat exchanger ø20 mm, metric and US connections

Spare parts and accessories

Item no.	Description
see data sheet 450005	Automatic condensate drain
see data sheet 410011	Moisture detector and flow cell, various models
41111000	Moisture detector connection cable, 4 m (13 ft)
9144050082	Moisture detector connection cable, 450 mm (17.7 in)
9144050038	Cable for cooler temperature analog output 4 m (13 ft)
see data sheet 420011	Sample gas pump P1.x
see data sheet 450020	Peristaltic pump CPsingle, CPdouble and replacement hose
see data sheet 440002	Condensate trap
4381045	Screw connection G1/4 – DN 8/12 for passive condensate connection MTS and MTV
4381048	Screw connection NPT 1/4" for passive condensate connection MTS and MTV
449601000	Analog output kit
449600047	Mains supply, M3 plug, cable length 400 mm (15.7 in)
449600049	Status output, M3 plug, cable length 380 mm (15 in)
449601001	Mounting kit 1 for thin housings

BÜHLER TECHNOLOGIES

Gas Analysis

Cooling unit CU-EMA+

The CU-EMA+ cooler unit is designed specifically for maritime applications. It is certified for **operation on ships and offshore units** and is type approved by **DNV-GL** and **Lloyd's Register**. The special design features allow the CU-EMA+ cooler unit to also be used in high vibration environments (e.g. on ships) up to an acceleration of 0.7 g.

The **Annex VI of the MARPOL convention** governs the prevention of air pollution from ships. To ensure compliance with sulphur oxides limits, e.g. desulphurisation units (SO_x scrubbers) are used on ships. The TC-Kit+ cooler used in the CU-EMA+ impresses when used in systems for monitoring this sulphur emission due to the **particularly low wash out effects of sulphur dioxide (SO_2),** which has also been established by the DNV-GL.

The innovative design allows the CU-EMA+ **to be installed close to the sample gas** sampling point. No further heated line is required from this point to the additional conditioning. This reduces costs and makes the CU-EMA+ not only interesting for use on ships, but also for stationary systems, e.g. for measuring flue gas emissions in power plants.

Type tested for use on ships according to **LR** and **DNV-GL**
Certified for high vibration environments up to 0.7 g
Use near the sampling point eliminates the use of heated lines
Low wash out effects confirmed by **DNV-GL**
2 heat exchangers (glass or PVDF) in series
Adjustable outlet dew point and alarm thresholds
Protection class IP44
Optional port for test gas and instrument air
Optional connection for heated line

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e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The CU-EMA+ cooler was designed specifically for the requirements of gas conditioning for continuously measuring emissions in maritime applications. Dividing the unit into an internal and external section achieves the IP rating required under the standard without requiring venting the interior. The series connection of the heat exchangers will cool in two cycles to minimise wash out effects.

The exact item number of the model defined by you is determined by the model code in the category ordering information.

The gas cooler comes standard with peristaltic pump and moisture detector. Additional components which every conditioning system should feature can optionally be connected:

- Connection for adding instrument air to purge the system,
- Solenoid valve for adding test gas,
- Heated line connection and regulation,
- metric/US style external connections.

Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

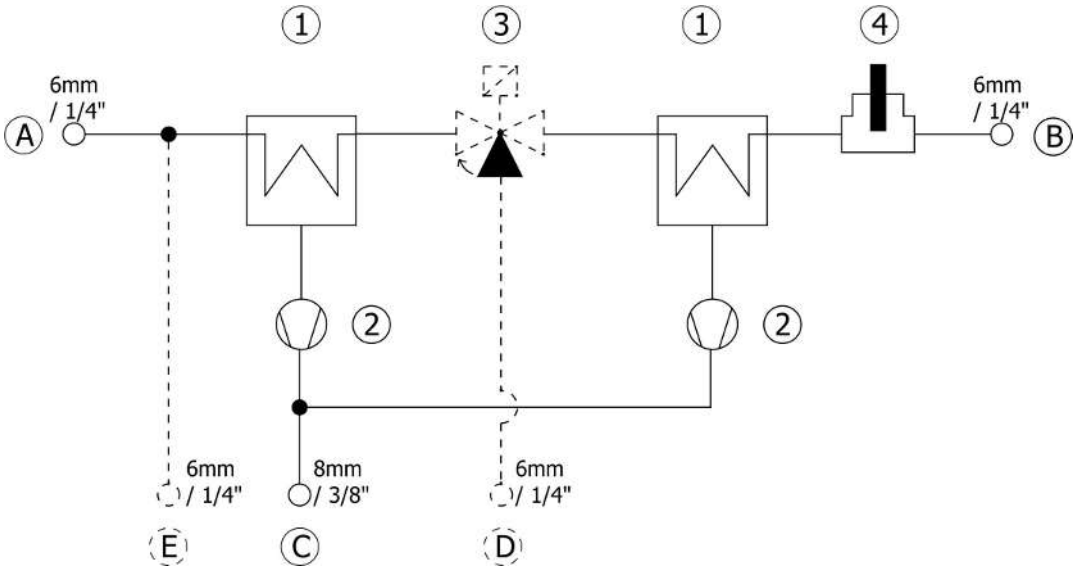
The sample gas cooler is controlled by a microprocessor.

The programmable display shows the block temperature in the selected display unit (°C/°F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 to 68 °F) (factory setting 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting. For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory settings for both values are 3 K.

The flashing and an LED on the display unit plus the potential-free contact indicate the warning range has been overrun or underrun (e.g. after switching on) plus the potential-free contact.

Flow Diagram



A	Sample gas input	1	Cooler unit
B	Sample gas output	2	Condensate pumps
C	Condensate output	3	Solenoid valve for adding test gas (optional)
D	Test gas input (optional)	4	Moisture detector
E	Instrument air input (optional)		

Technical Data

Technical Data	
Type tested:	**DNV GL** rules for classification Ships, offshore units, and high speed and light craft Certificate no.: TAA00002RE **Lloyd's Register** Type Approval System, Test Specification Number 1 - March 2019 Certificate no.: LR2008137TA
Ambient categories as per DNVGL-CG-0339:	Temperature: A Humidity B Vibration A EMC A Housing: B
Environmental categories as per LR:	ENV1, ENV2
Switch cabinet	
Dimensions (h x w x d):	19.7 x 19.7 x 11.8 in
Material	Sheet steel, RAL 7035, single door
Degree of protection	IP44
Weight	68.3 lb
Climatic conditions	
Ambient temperatures:	41 °F ... 122 °F
Storage temperatures:	-4 °F ... 104 °F
Cooler Data	
Ready for operation	after max. 10 minutes
Gas output dew temperature preset: adjustable:	41 °F 36 °C...68 °F
Static dew point stability: throughout the specification range:	+- 0.1 K +- 1.5 K
Inlet dew point max.:	158 °F Gas input temperature on heat exchanger max. 284 °F
Rated cooling capacity (at 77 °F):	104 Btu/h
Other data	
Gas connections:	see flow diagram
Parts in contact with media:	PVDF, stainless steel, PTFE, Norprene, Viton, epoxy resin
Gas path media pressure:	max. 4.4 psi(g) (also observe the permissible pressures of the upstream and down-stream components)
Electrical data	
Supply:	115 VAC/230 VAC, 50/60 Hz, back-up fuse/MCB with 16 A, RCD with tripping current 30 mA (if applicable depending on electrical system), cable clamps, cable cross-section 1.5...2.5 mm^2 shielded
Cooler: (power supply + peristaltic pump)	230 VAC. 300 VA
Status contact cooler, moisture and optional regulated heated line	max. 230 VAC, 24 VDC, 2 A, 50 VA, cable clamps, cable cross-section 0.75...2.5 mm^2 shielded
Max. additional consumers (e.g. heated probe)	115 VAC/230 VAC, 800 VA, cable clamps, cable cross-section 1.5...2.5 mm^2
Transfer clamps (e.g. status contact heated probe)	Cable clamps, cable cross-section 0.75...2.5 mm^2

Technical Data - Options

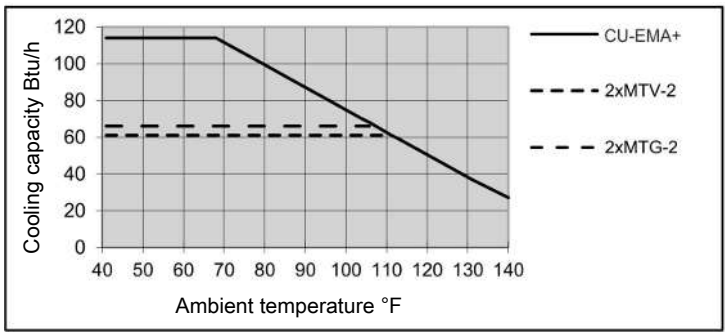
Controller for heated line	
Temperature, preset: adjustable:	 356 °F 104 °F ... 392 °F
Flow:	max. 115 VAC/230 VAC 1600 VA cable clamps, cable cross-section 1.5...2.5 mm²
Sensor type:	Pt100, 2-wire
Connection:	Cable clamps, cable cross-section 0.5...2.5 mm²

Self-regulating heated line	
Flow:	max. 115 VAC/230 VAC 1600 VA cable clamps, cable cross-section 1.5...2.5 mm²

Test gas solenoid valve	
Flow:	Activated with customer power via 230 VAC relay (Attention: cannot be activated with 115 VAC) or 24 VDC, cable clamps, cable cross-section 0.75...2.5 mm²

Outlet

Two heat exchangers	
Model CU-EMA+	
Rated cooling capacity (at 77 °F)	104 btu/h
max. ambient temperature	131 °F
Dew point fluctuations static in the entire specification range	 ± 0.1 K ± 1.5 K
Temperature difference between heat exchangers	< 0.5 K



Remark: The limit curves for the heat exchangers MTV-2 and MTG-2 apply at a dew point of 122 °F. Depending on the installation version, the cooling capacity curve may vary.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

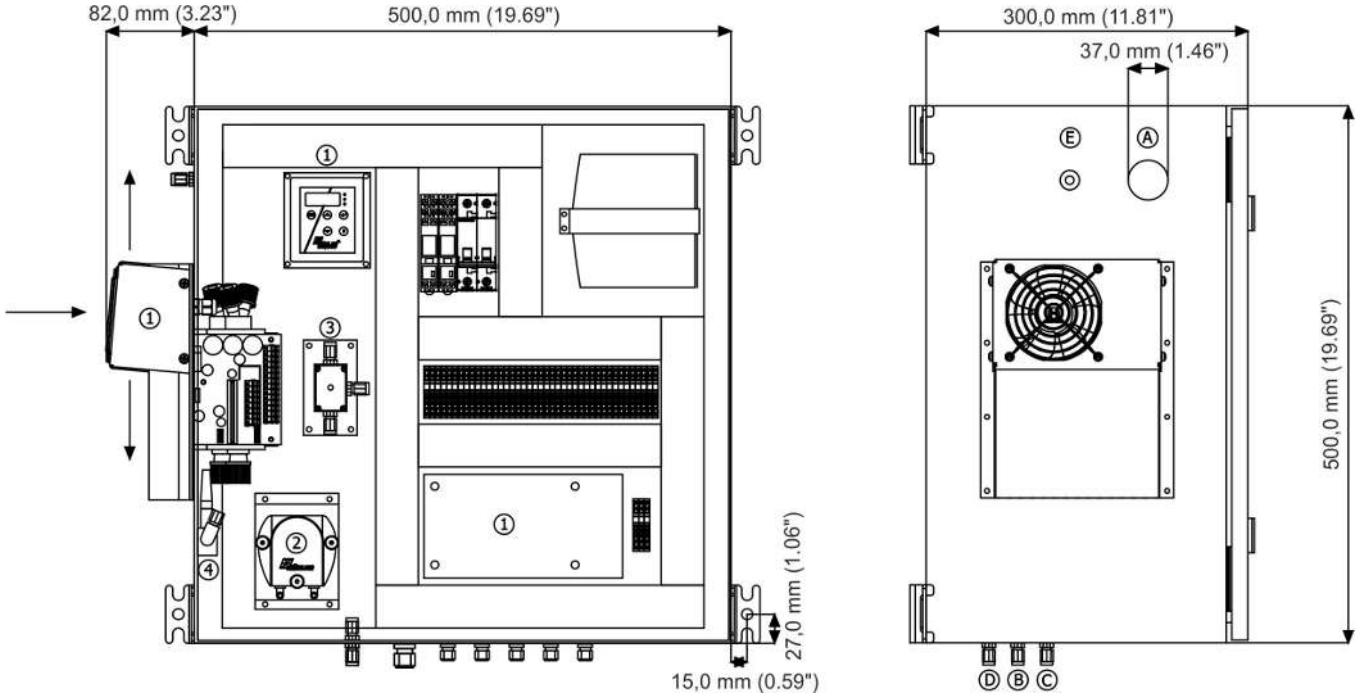
Heat exchanger	2x MTG-2	2x MTV-2 2x MTV-2-I [2]
Materials in contact with media	Glass PTFE	PVDF
Flow rate v_{max} [1]	3.5 lpm	3.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F
Max. Cooling capacity Q_{max}	76 Btu/h	62 Btu/h
Gas pressure p_{max}	44 psi	29 psi
Pressure drop Δp (v=150 L/h)	0.27 psi	0.26 psi
Dead volume V_{tot}	2.3 cu. in.	2.2 cu. in.
Gas connections (metric)	GL14 (6 mm) [3]	DN 4/6
Gas connections (US)	GL14 (1/4") [3]	1/4"-1/6"
Condensate out connection (metric)	GL18 (8 mm) [3]	G1/4
Condensate out connection (US)	GL18 (8 mm) [3]	NPT 1/4"

[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter

Dimensions



1	Sample gas cooler and analyser	A	Sample gas input (6 mm / 1/4")
2	Peristaltic Pump	B	Sample gas output (6 mm / 1/4")
3	Solenoid valve for adding test gas (optional)	C	Condensate output (6 mm / 3/8")
4	Moisture detector	D	Test gas input (optional) (6 mm / 1/4")
		E	Instrument air input (optional) (6 mm / 1/4")

Ordering instructions

Cooler with Two In-Line Heat Exchangers

The item number is a code for the configuration of your unit. Please use the following model code:

4496	2	8	2	2	0	X	1	X	X	2	0	0	X	0	0	X	X	X	Product Characteristics
																			Cooler (with 2 in-line heat exchangers)
				2															CU-EMA+: Ambient temperature 122 °F
																			Certifications
					0														Standard applications – CE
																			Supply voltage
						1													115 VAC, 50/60 Hz
						2													230 VAC, 50/60 Hz
																			Heat exchanger
							1	2	2										Glass, 2 x MTG-2, metric
							1	2	7										Glass, 2 x MTG-2-I, US
							1	3	2										PVDF, 2 x MTV-2, metric
							1	3	7										PVDF, 2 x MTV-2-I, US
																			Peristaltic Pumps
										2	0								CPdouble with hose nipple, angled
																			Moisture detector
												0	0	0	0				without moisture detector
												0	1	0	0				1 moisture detector with adapter
																			Options
																0	0		Without option
																0	1		Instrument air purging connection
																1	0		Solenoid valve for test gas
																1	1		Instrument air purging connection and solenoid valve for test gas
																			Heated line
																		0	no heated line
																		1	ready for self-regulating heated line
																		2	-
																		3	-
																		4	-
																		5	ready for regulated heated line
																		6	**5 m** regulated heated line *
																		7	**8 m** regulated heated line *
																		8	**10 m** regulated heated line
																		9	**15 m** regulated heated line

*for 115 VAC only these lengths available

Spare parts and accessories

Item no.	Description
44922420102	Peristaltic pump CPdouble and replacement tube
41111000	Moisture detector and flow cell, various models
9148000182	Solenoid valve, 24 VDC
9120020143	230 VAC relay for controlling the solenoid valves
9120020139	24 VDC relay for controlling the solenoid valve
9110000008	Microfuse 500 mA delayed action, 5x20 mm
9110000032	Microfuse 63 mA delayed action, 5x20 mm
9110000067	Microfuse 8 A delayed action, 5x20 mm

Gas Analysis

ModbusRTU

Sample gas cooler RC 1.1

Many gas analysis processes require extracting sample gas from the process. This also extracts process-related contamination such as particles or moisture. These can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser. The sample gas cooler reduces the gas temperature to below the dew point for this purpose, causing moisture to drop out, which is then discharged as condensate.

In addition to the status output to monitor the sample gas cooler function, we offer an optional 4 – 20 mA analog output or digital interface. The process control can access the process and diagnostic data via the Modbus RTU interface as well as configure the device settings.

The RC 1.1 is a compressor sample gas cooler designed for high cooling output and high ambient temperatures. Depending on the application, it can be configured with one or two gas paths. This makes it a vital cooling component in sophisticated analysis systems.

- Compact design: Pre-installed and ready to connect
- Choose from one or two gas paths
- Heat exchanger made from stainless steel, Duran glass and PVDF
- Adjustable outlet dew point and alarm thresholds
- Cooling block temperature display
- Status display and output
- Rated cooling power 341 Btu/h
- Constant dew point stability ± 0.2 °F
- Optional 4 - 20 mA or Modbus RTU signal output
- Moisture detector, filter and condensate pump optional
- Successor to the EGK 1/2 and EGK 1SD

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
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e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The RC 1.1 series was designed specifically for high cooling capacities and high ambient temperatures.

The compressor coolers are distinguished by two types based on the cooling nests. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the ordering information category.

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation
- Filter
- Moisture detector

In addition, we offer different signal outputs:

- Status output
- Analog output, 4...20 mA, incl. status output,
- Modbus RTU digital output, incl. status output

This allows for various configurations of the cooler and its options. Here the approach is to simplify the creation of a complete system in a cost-efficient way using pre-installed components with hoses connected. We also prioritised easy access to wear parts and consumables.

Gas cooler technical data

Gas cooler technical data			
Ready for operation	after max. 15 minutes		
Rated cooling capacity (at 77 °F)	341 Btu/h		
ambient temperature	41 °F to 122 °F		
Gas outlet dew point preset: adjustable:	 41 °F 37 °F to 68 °F		
Dew point fluctuations static: in the entire specification range:	 ± 0.1 K ± 1.5 K		
IP rating	IP 20		
Housing	Stainless steel		
Packaging dimensions	approx. 16.5 x 17.3 x 13.8 in		
Weight incl. heat exchanger	approx. 35.2 lb		
Electric supply	115 V, 60 Hz or 230 V, 50/60 Hz ± 5% Plug per DIN EN 175301-803		
Electrical data		230 V	115 V
	Typical power input:	396 VA	402 VA
	max. operating current:	2.5 A	5 A
Alarm output switching connection	max. 250 V, 2 A, 50 VA Connector per DIN EN 175301-803		
Installation	stand-alone or wall-mounted		

Technical Data - Options

Technical Data Peristaltic Pumps CPsingle / CPdouble	
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Condensate outlet	Hose nipple Ø6 mm (0.24 in) Screw connection 4/6 (metric), 1/6”-1/4” (US)
Protection class	IP 40
Materials Hose: Connections:	 Norprene (Standard), Marprene, Fluran PVDF

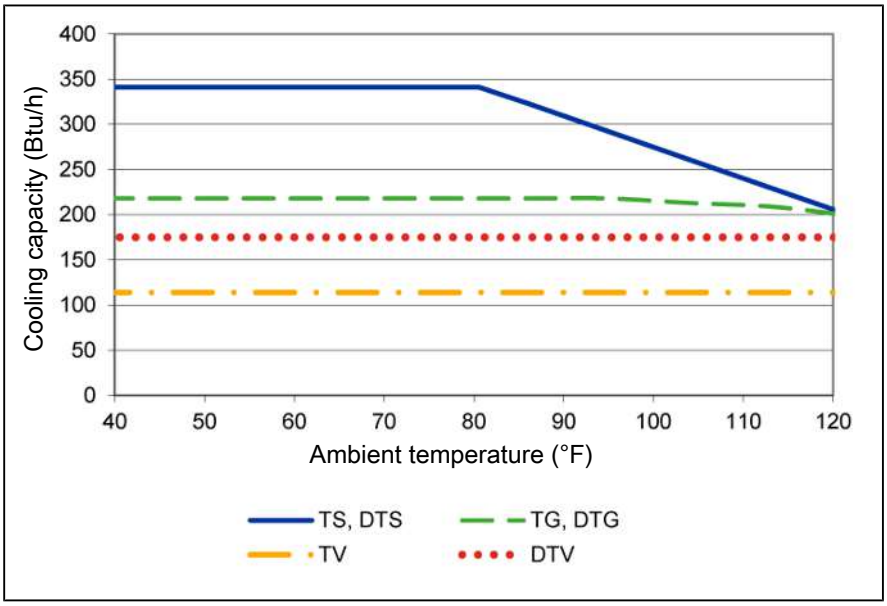
Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Digital interface technical data	
Signal	Modbus RTU (RS-485)
Connection	M12x1 connector, DIN EN 61076-2-101

Technical Data Filter AGF-PV-30-F2-L	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	58 psi
Filter surface	19.4 in^2
Filter fineness	2 µm
Dead volume	6.59 cu. in.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with mediums) Viton sintered PTFE

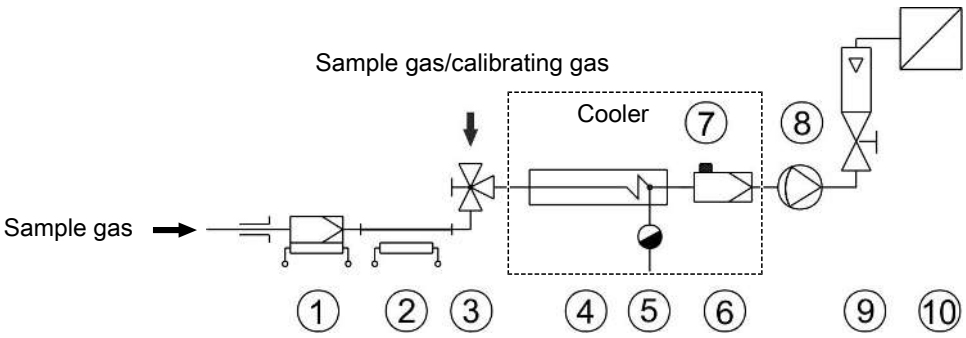
Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Performance data



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 149 °F.

Diagram typical installation



1	Sample gas probe	2	Sample gas line
3	Reversing tap	4	Sample gas cooler
5	Automatic condensate drain or peristaltic pump	6	Fine mesh filter
7	Moisture detector	8	Sample gas pump
9	Flow meter	10	Analyser

See data sheets for individual component types and data.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, (inlet) dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 149 °F and ϑ_G = 194 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the TG heat exchanger the parameter triple τ_e = 149 °F, ϑ_G = 194 °F and v = 4.7 lpm may also be used in place of τ_e = 122 °F, ϑ_G = 176 °F and v = 6.3 lpm.

Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	TS TS-I [2]	TG TG	TV TV-I [2]	DTS (DTS-6 [3]) DTS-I (DTS-6-I [3]) [2]	DTG DTG	DTV [3] DTV-I [2] [3]
Materials in contact with media	Stainless steel	Glass PTFE	PVDF	Stainless steel	Glass PTFE	PVDF
Flow rate v_{max} [1]	8.9 lpm	4.7 lpm	2.6 lpm	2 x 4.2 lpm	2 x 2.3 lpm	2 x 2 lpm
Inlet dew point $\tau_{e,max}$ [1]	175 °F	175 °F	149 °F	175 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F	356 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	427 Btu/h	218 Btu/h	114 Btu/h	427 Btu/h	218 Btu/h	175 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	44 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.12 psi	0.12 psi	0.1 psi each	0.1 psi each	0.22 psi each
Dead volume V_{tot}	4.2 cu. in.	2.9 cu. in.	7.9 cu. in.	1.7 / 1.5 cu. in.	1.7 / 1.5 cu. in.	1.3 / 1.3 cu. in.
Gas connections (metric)	G1/4	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	NPT 1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")[4]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	Tube 10 mm (6 mm)	GL18 (10 mm) [4]	DN 5/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	Tube 3/8" (1/4")	GL18 (3/8") [4]	3/16"-5/16"

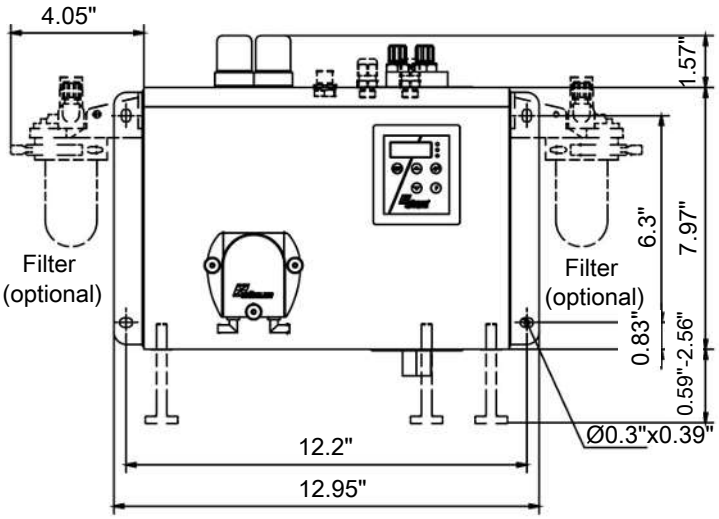
[1] Max. cooling capacity of the cooler must be considered

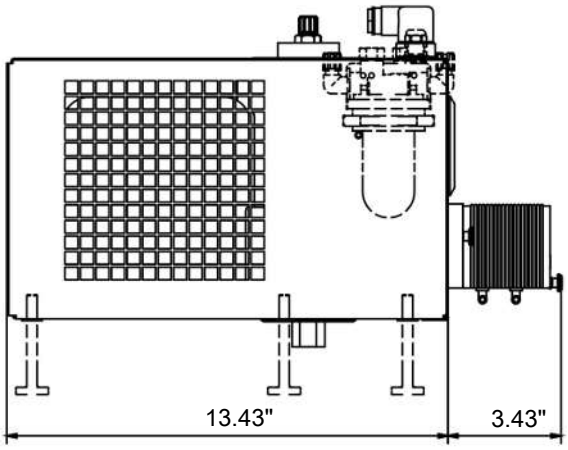
[2] Models marked I have NPT threads or US tubes, respectively.

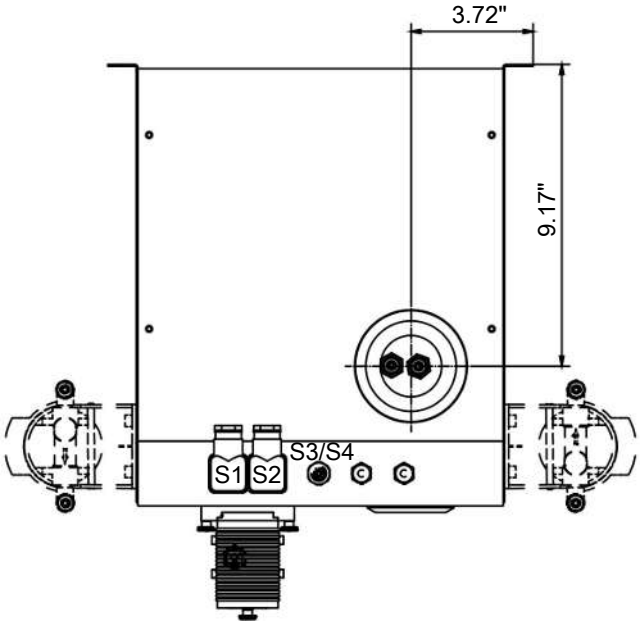
[3] Condensate drain only possible with condensate pump

[4] Gasket inside diameter

Dimensions







S1 = Electric supply

S2 = Alarm contact

S3/S4 = Analog/digital output (optional)

Ordering instructions

Gas cooler

The item number is a code for the configuration of your unit. Please use the following model code:

4596	2	1	1	0	X	X	X	X	X	0	X	X	X	0	0	0	0	0	Product Characteristics
																			Voltage
					1														115 V, 60 Hz
					2														230 V, 50/60 Hz
																			Heat exchanger
						1	1	0											1 gas path, stainless steel/ (TS), metric
						1	1	5											1 gas path, stainless steel/ (TS-I), US
						1	2	0											1 gas path, glass/ (TG), metric
						1	2	5											1 gas path, glass/ (TG), US hoses
						1	3	0											1 gas path, PVDF/ (TV), metric
						1	3	5											1 gas path, PVDF/ (TV-I), US
						2	6	0											2 gas paths, stainless steel/ (DTS), metric
						2	6	1											2 gas paths, stainless steel/ (DTS-6) [1], metric
						2	6	5											2 gas paths, stainless steel/ (DTS-I), US
						2	6	6											2 gas paths, stainless steel/ (DTS-6-I) [1], US
						2	7	0											2 gas paths, glass/ (DTG), metric
						2	7	5											2 gas paths, glass/ (DTG-I), US hoses
						2	8	0											2 gas paths, PVDF/ (DTV) [1], metric
						2	8	5											2 gas paths, PVDF/ (DTV-I) [1], US
									0	0									**Condensate drain** [2]
									0	0									without condensate drain
									1	0									CPsingle with adapter, angled [3]
									2	0									CPdouble with adapter, angled [3]
									3	0									CPsingle with screw connection, metric/US [3]
									4	0									CPdouble with screw connection, metric/US [3]
																			Filter/moisture detector
											0	0							without filter, without moisture detector
											0	1							without filter, 1 moisture detector
											0	2							without filter, 2 moisture detectors
											0	3							Moisture detector in stainless steel adapter
											0	4							2 moisture detectors in stainless steel adapter
											1	0							1 filter, without moisture detector
											1	1							1 filter, 1 moisture detector
											1	2							1 filter, 2 moisture detectors
											2	0							2 filters, without moisture detector
											2	1							2 filters, 1 moisture detector
											2	2							2 filters, 2 moisture detectors
																			Signal outputs
													0	0					status output only
													1	0					Analog output, 4..20 mA, incl. status output
													2	0					Modbus RTU digital output, incl. status output

[1] Condensate outlets only suitable for connecting peristaltic pumps.

[2] Peristaltic pumps also available for separate installation, see data sheet 450020.

[3] Supply voltage corresponds with that of the main unit.

Spare Parts and Accessories

Item no.	Description
41020050	Filter element F2-L; unit 2 count (for type RC 1.1)
41030050	Filter element F2; unit 5 count (for type RC 1.2+)
4410001	Automatic condensate drain 11 LD V 38
4410004	Automatic condensate drain AK 20, PVDF
4410005	Condensate trap GL 1; glass, 0.4 L
4410019	Condensate trap GL 2; glass, 1 L
459600026	Adapter plate EGK 1/2 to RC 1.1 and RC 1.2+
see data sheet 410001	Fine mesh filter AGF-PV-30
see data sheet 450020	Peristaltic Condensate Pumps CPsingle, CPdouble

ModbusRTU

H_2/O_2 ready

Sample gas cooler RC 1.1 with -H2/-O2 heat exchanger

When powerful cooling is required, the RC 1.1 compressor sample gas cooler with -H2/-O2 heat exchanger is the ideal solution for reliable cooling of hydrogen (H_2) and oxygen (O_2) in extractive gas analysis. Green hydrogen produced by electrolysis using renewable energy sources is the key to a sustainable, emission-free future in the energy industry.

The safe, reliable cooling of the sample gas is decisive for gas analytics in the electrolyser (e.g. for LEL monitoring), as a higher moisture content is to be expected with some processes. The moisture in the process gas can damage the sensitive measuring cells in the analyser, so the gas temperature is kept below gas dew point at all times, thus causing the moisture to be emitted. The condensate is discharged via an automatic condensate drain.

As well as material-refining measures to prevent hydrogen-induced component damage, the heat exchangers for the H_2 series are subjected to a leak test using helium. For the O_2 version, special cleaning processes are used to remove particles, oils and fats from parts coming into contact with media. The contamination limits are based on the internationally used and applicable guideline EIGA Doc 33/18 “Cleaning of Equipment for Oxygen Service”.

- For applications with high-purity hydrogen or oxygen
- Cleaning standard is based on EIGA Doc 33/18 as regards the absence of particles, oils and fats for heat exchangers with the O_2 version
- Materials in contact with media are suitability-tested for high H_2 and O_2 concentrations
- Heat exchanger leak tests using helium are performed on the H_2 series as standard
- Nominal cooling capacity 341 Btu/h
- Constant dew point stability ± 0.2 °F
- Adjustable outlet dew point and alarm thresholds
- Cooling block temperature display
- Optional 4 - 20 mA or Modbus RTU signal output

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Internet: www.buhlertech.com

Overview

The RC 1.1 with -H2/-O2 heat exchanger series was specially developed for use with high-purity hydrogen and oxygen.

We also offer different signal outputs:

- Status output,
- Analog output, 4...20 mA, incl. status output,
- Modbus RTU digital output, incl. status output.

Gas cooler technical data

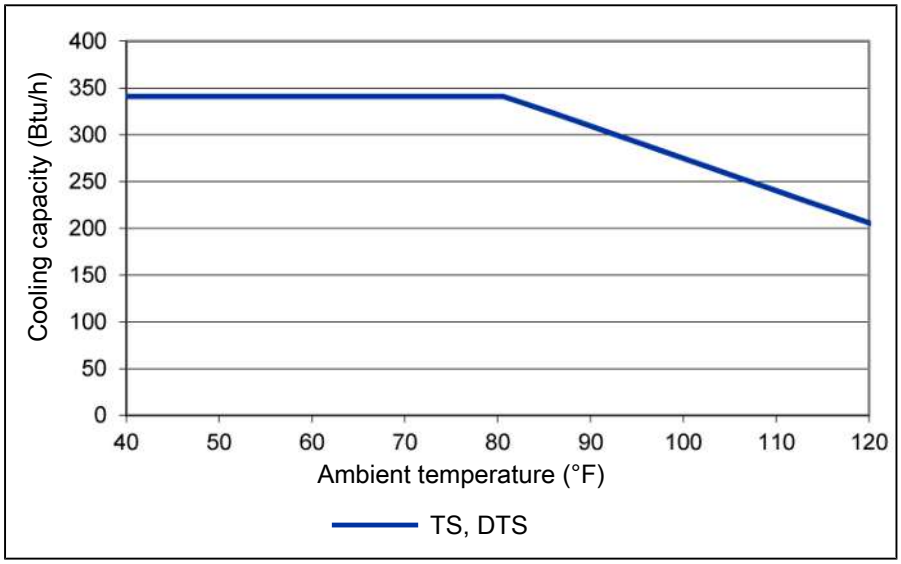
Gas cooler technical data			
Ready for operation	after max. 15 minutes		
Rated cooling capacity (at 77 °F)	341 Btu/h		
ambient temperature	41 °F to 122 °F		
Gas outlet dew point preset: adjustable:	 41 °F 37 °F to 68 °F		
Dew point fluctuations static: in the entire specification range:	 ± 0.1 K ± 1.5 K		
IP rating	IP 20		
Housing	Stainless steel		
Packaging dimensions	approx. 16.5 x 17.3 x 13.8 in		
Weight incl. heat exchanger	approx. 35.2 lb		
Electric supply	115 V, 60 Hz or 230 V, 50/60 Hz ± 5% Plug per DIN EN 175301-803		
Electrical data		230 V	115 V
	Typical power input:	396 VA	402 VA
	max. operating current:	2.5 A	5 A
Alarm output switching connection	max. 250 V, 2 A, 50 VA Connector per DIN EN 175301-803		
Installation	stand-alone or wall-mounted		

Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Digital interface technical data	
Signal	Modbus RTU (RS-485)
Connection	M12x1 connector, DIN EN 61076-2-101

Performance data



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 149 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, (inlet) dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 149 °F and ϑ_G = 194 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the TG heat exchanger the parameter triple τ_e = 149 °F, ϑ_G = 194 °F and v = 4.7 lpm may also be used in place of τ_e = 122 °F, ϑ_G = 176 °F and v = 6.3 lpm.

Please contact our experts for clarification or refer to our design program.

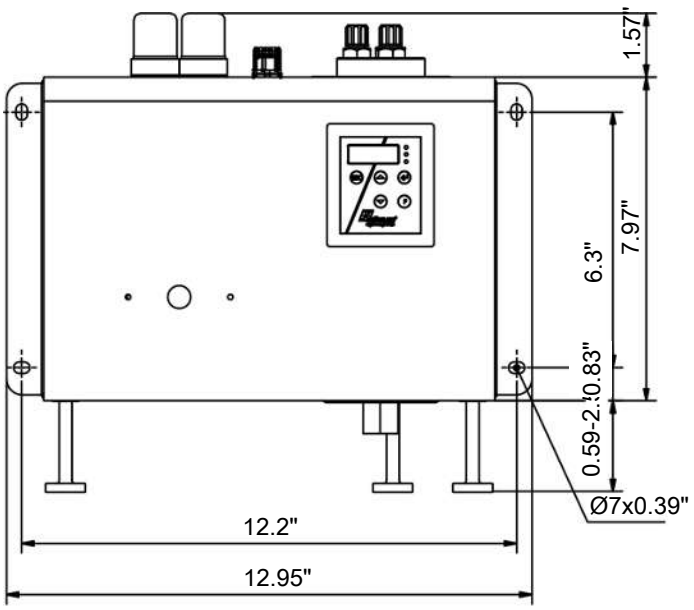
Heat exchanger overview

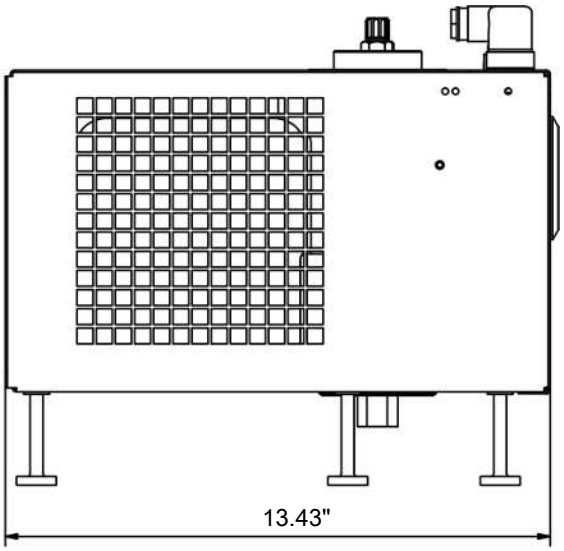
Heat exchanger	TS-H2/-O2 TS-I-H2/-O2 [2]	DTS-H2/-O2 DTS-I-H2/-O2 [2]
Materials in contact with media	Stainless steel	Stainless steel
Flow rate v_{max} [1]	8.9 lpm	2 x 4.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	175 °F	175 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	356 °F
Max. cooling capacity Q_{max}	427 Btu/h	427 Btu/h
Gas pressure p_{max}	22 psi	22 psi
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.1 psi each
Dead volume V_{dead}	4.2 cu. in.	1.7/1.5 cu. in.
Gas connections (metric)	G1/4	6 mm tube
Gas connections (US)	NPT 1/4"	1/4" tube
Condensate out connection (metric)	G3/8	Tube 10 mm (6 mm)
Condensate out connection (US)	NPT 3/8"	3/8" tube

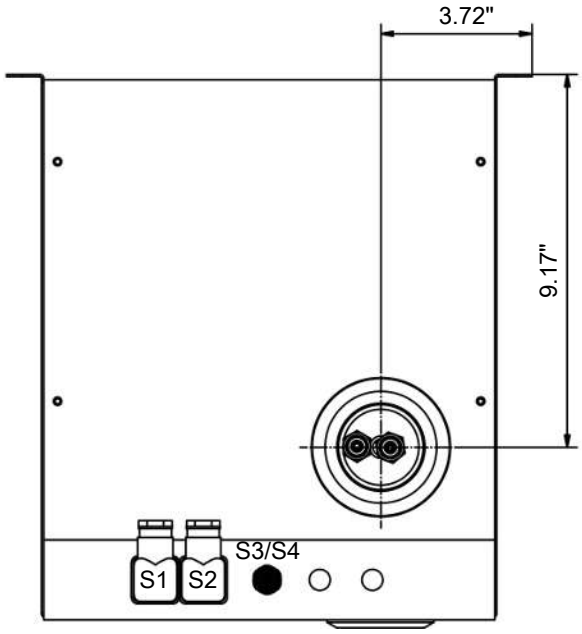
[1] Max. cooling capacity of the cooler must be considered.

[2] Models marked I have NPT threads or US tubes.

Dimensions







S1 = Electric supply

S2 = Alarm contact

S3 = Analog/digital output (optional)

Ordering instructions

Gas cooler for H2/O2 applications

The item number is a code for the configuration of your unit. Please use the following model code:

4596	2	1	1	0	X	X	X	X	0	0	0	X	0	0	0	0	0	X	Product Characteristics
																			Supply voltage
					1														115 V, 60 Hz
					2														230 V, 50/60 Hz
																			Heat exchanger
						1	1	0										-O2	Stainless steel, TS-O2, metric
						1	1	5										-O2	Stainless steel, TS-I-O2, US
						1	1	0										-H2	Stainless steel, TS-H2, metric
						1	1	5										-H2	Stainless steel, TS-I-H2, US
						2	6	0										-O2	Stainless steel, DTS-O2, metric
						2	6	5										-O2	Stainless steel, DTS-I-O2, US
						2	6	0										-H2	Stainless steel, DTS-H2, metric
						2	6	5										-H2	Stainless steel, DTS-I-H2, US
																			Signal outputs
									0	0									status output only
									1	0									Analog output, 4..20 mA, incl. status output
									2	0									Modbus RTU digital output, incl. status output

Spare parts and accessories for cooler with -H2/-O2 heat exchanger

Item no.	Description
4410001 (see data sheet 450005)	Automatic condensate drain 11 LD V 38 [1]
4410001-O2 (see data sheet 450005)	Automatic condensate drain 11 LD V 38 optimised for oxygen
see data sheet 400016	Stainless steel pipe fittings for high-purity oxygen applications

[1] For use with high hydrogen concentrations max. 22 psi overpressure.

ModbusRTU

Sample gas cooler RC 1.2+

Many gas analysis processes require extracting sample gas from the process. This also extracts process-related contamination such as particles or moisture. These can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser. The sample gas cooler reduces the gas temperature to below the dew point for this purpose, causing moisture to drop out, which is then discharged as condensate.

In addition to the status output to monitor the sample gas cooler function, we offer an optional 4 – 20 mA analog output or digital interface. The process control can access the process and diagnostic data via the Modbus RTU interface as well as configure the device settings.

The RC 1.2+ features a new generation heat exchangers with a particularly low wash out effect of water-soluble components and are specifically suitable for measuring emissions. Most notably, the washout of SO_2 is low. RC 1.2+ coolers can therefore be used for so-called automated measuring systems (AMS) per EN 15267-3.

- Low wash out effects
- Suitable for AMS as per EN 15267-3
- Compact design: Pre-installed and ready to connect
- One gas path with two in-line heat exchangers
- Duran glass and PVDF heat exchanger
- Adjustable outlet dew point and alarm thresholds
- Cooling block temperature display
- Rated cooling power 370 Btu/h
- Constant dew point stability ± 0.2 °F
- Status display and output
- 4 – 20 mA or Modbus RTU signal output optional
- Moisture detector, filter and condensate pump optional

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Overview

The RC 1.2+ series was designed specifically for the requirements in so-called automated measuring systems (AMS) according to EN 15267-3. The series connection of the heat exchangers will cool in two cycles to minimise wash-out effects.

The compressor coolers are distinguished by two types based on the cooling nests. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the ordering information category.

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation
- Filter
- Moisture detector

In addition, we offer different signal outputs:

- Status output
- Analog output, 4...20 mA, incl. status output,
- Modbus RTU digital output, incl. status output

This allows for various configurations of the cooler and its options. Here the approach is to simplify the creation of a complete system in a cost-efficient way using pre-installed components with hoses connected. We also prioritised easy access to wear parts and consumables.

Technical Data

Gas Cooler Technical Data			
Ready for operation:	after max. 15 minutes		
Rated cooling capacity (at 77 °F):	370 Btu/h		
Ambient temperature:	41 °F to 122 °F		
Gas outlet dew point preset: adjustable:	 41 °F 37 °F to 68 °F		
Dew point fluctuations static: in the entire specification range:	 ± 0.1 K ± 1.5 K		
IP rating:	IP 20		
Housing:	Stainless steel		
Weight incl. heat exchanger:	approx. 34.2 lb		
Electric supply:	115 V, 60 Hz or 230 V, 50/60 Hz ± 5% Plug per DIN EN 175301-803		
Electrical data:		230 V	115 V
	Typical power input:	396 VA	402 VA
	max. operating current:	2.5 A	5 A
Alarm output switching connection:	250 V, 2 A, 50 VA Plug per DIN EN 175301-803		
Packaging dimensions:	approx. 16.5 in x 17.3 in x 13.8 in		

Technical Data - Options

Technical Data CPdouble Condensate Pump	
Flow rate:	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Inlet vacuum:	max. 11.6 psi
Inlet pressure:	max. 14.5 psi
Output pressure:	14.5 psi
Hose:	4 x 1.6 mm (0.04 in)
Protection class:	IP 40
Materials	
Hose:	Norprene (standard), Marprene, Fluran
Connections:	PVDF

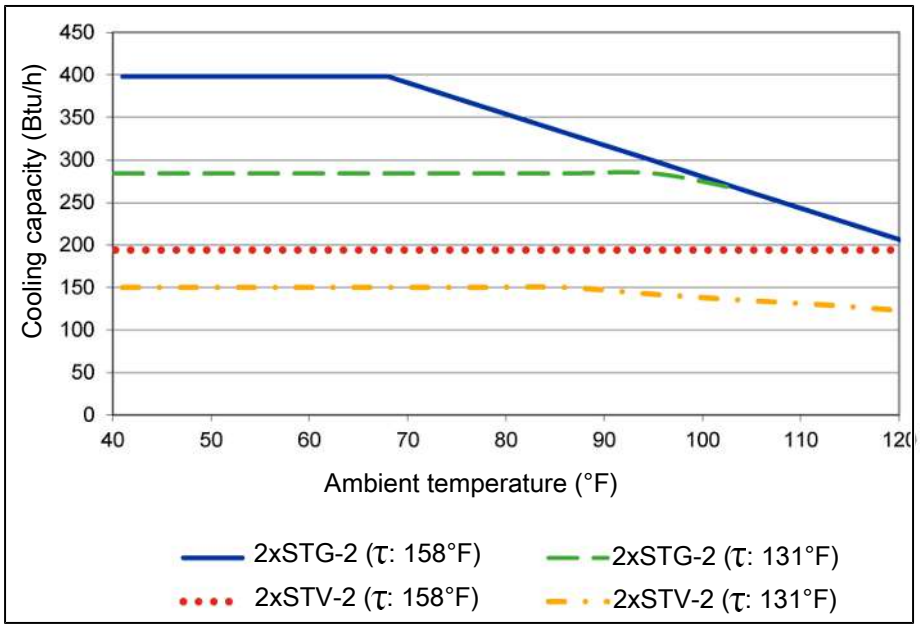
Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Digital interface technical data	
Signal	Modbus RTU (RS-485)
Connection	M12x1 connector, DIN EN 61076-2-101

Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

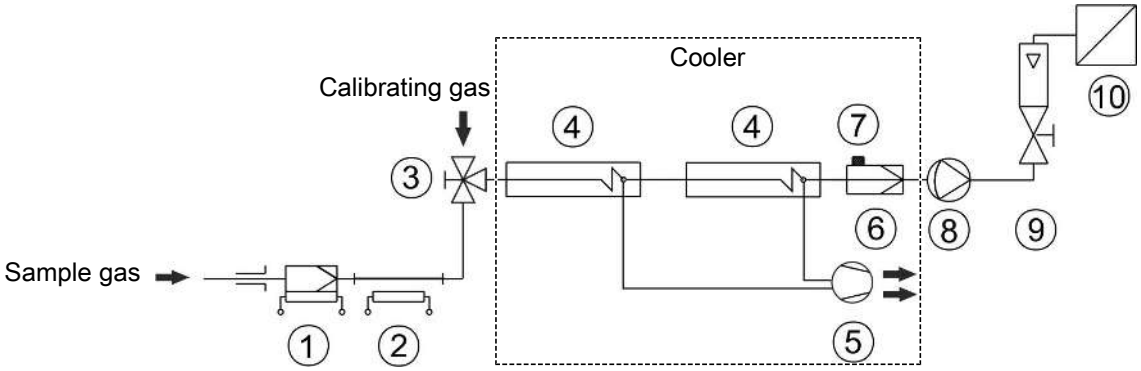
AGF-PV-30-F2 Filter Technical Data	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	58 psi
Filter surface	9.3 in^2
Filter fineness	2 µm
Dead volume	3.47 cu. in.
Materials	
Filter:	PVDF, Duran glass (parts in contact with media)
Seal:	Viton
Filter element:	sintered PTFE

Performance data



Note: The limit curves of the heat exchangers apply to different dew points (τ), see legend.

Diagram typical installation



1	Sample gas probe	6	Fine mesh filter
2	Sample gas line	7	Moisture detector
3	Reversing tap	8	Sample gas pump
4	Sample gas cooler	9	Flow meter
5	Condensate Pump	10	Analyser

See data sheets for individual component types and data.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a standard operating point of τ_e = 158 °F and ϑ_G = 230 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, with the STG heat exchanger in place of τ_e = 158 °F, ϑ_G = 230 °F and v = 5.3 lpm the parameter triple τ_e = 122 °F, ϑ_G = 221 °F and v = 7 lpm may also be used.

Please contact our experts for clarification or refer to our design program.

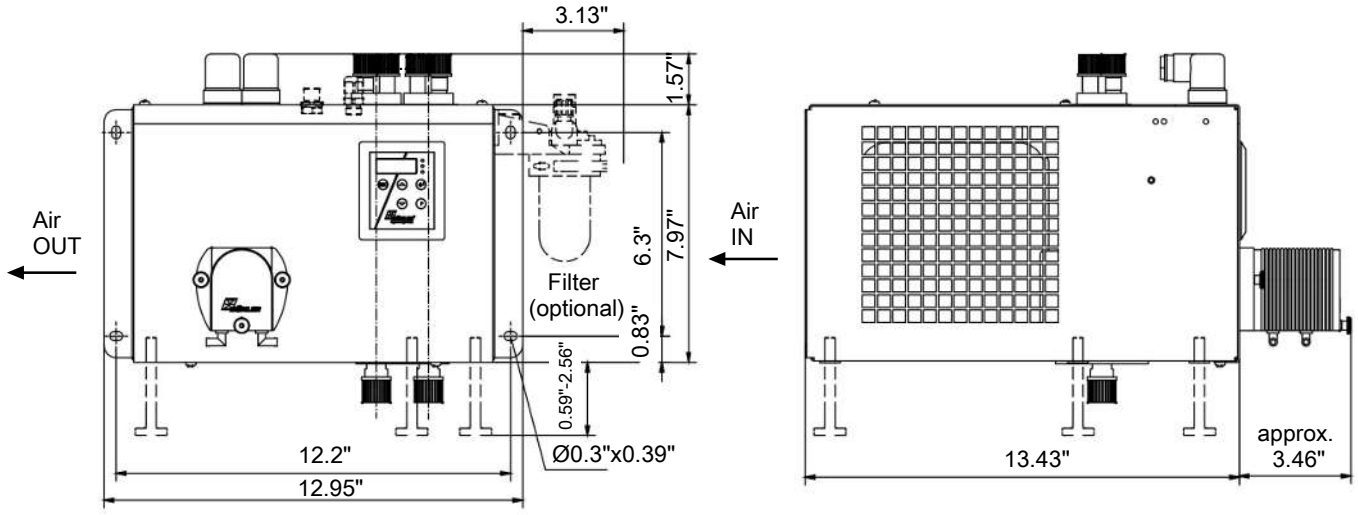
Heat exchanger overview

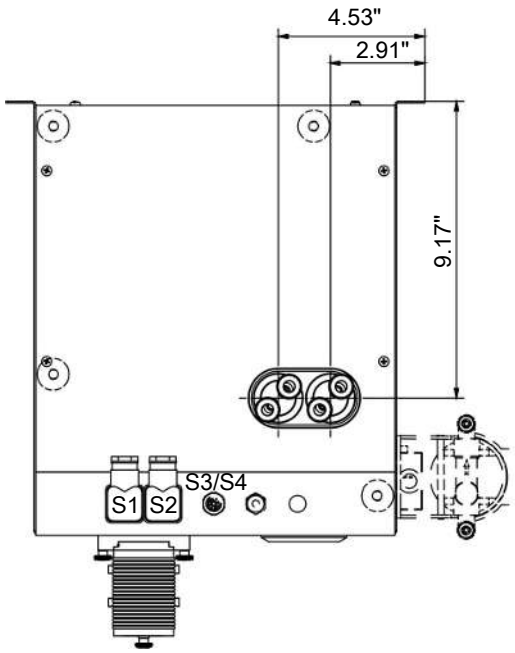
Heat exchanger	2x STG-2	2x STV-2
Materials in contact with media	Glass PTFE	PVDF
Flow rate v_{max} [1]	5.3 lpm	5 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	248 °F	248 °F
Gas pressure p_{max}	44 psi	44 psi
Pressure drop Δp (v=150 L/h)	0.04 psi	0.04 psi
Max. cooling capacity Q_{max}	327 Btu/h	188 Btu/h
Dead volume V_{dead}	2.9 cu. in.	2.5 cu. in.
Gas connections (metric)	GL 14 (6 mm) [2]	DN 4/6
Gas connections (US)	GL 14 (1/4") [2]	1/4"-1/6"
Condensate out connection (metric)	GL 18 (10 mm) [2]	G1/4
Condensate out connection (US)	GL 18 (10 mm) [2]	NPT 1/4"

[1] Considering the maximum cooling capacity of the cooler

[2] Gasket inside diameter

Dimensions





S1 = Electric supply
S2 = Alarm contact
S3/S4 = Analog/digital output (optional)

Ordering instructions

Gas cooler

The item number is a code for the configuration of your unit. Please use the following model code:

4596	2	1	2	0	X	X	X	X	X	0	X	X	X	0	0	0	0	0	Product Characteristics
																			Voltage
					1														115 V, 60 Hz
					2														230 V, 50/60 Hz
																			Heat exchanger
						1	2	2											1 gas path/ 2 heat exchangers, glass/ (STG-2), metric
						1	2	7											1 gas path/ 2 heat exchangers, glass/ (STG-2), US
						1	3	2											1 gas path/ 2 heat exchangers, PVDF/ (STV-2), metric
						1	3	7											1 gas path/ 2 heat exchanger, PVDF/ (STV-2), US
																			Condensate drain [1]
									0	0									without condensate drain
									2	0									CPdouble with hose nipple, angled [2]
									4	0									CPdouble with screw connection, metric/US [2]
																			Filter and moisture detector
											0								without filter
											1								1 filter
																			Moisture detector
												0							without moisture detector
												1							1 moisture detector
												3							Moisture detector in stainless steel adapter
												4							2 moisture detectors in stainless steel adapter
																			Signal outputs
													0	0					status output only
													1	0					Analog output, 4..20 mA, incl. status output
													2	0					Modbus RTU digital output, incl. status output

[1] Condensate pumps also available for separate installation, see data sheet 450020.

[2] The supply voltage corresponds with that of the main unit.

Spare Parts and Accessories

Item no.	Description
41020050	Filter element F2-L; unit 2 count (for type RC 1.1)
41030050	Filter element F2; unit 5 count (for type RC 1.2+)
4410001	Automatic condensate drain 11 LD V 38
4410004	Automatic condensate drain AK 20, PVDF
4410005	Condensate trap GL 1; glass, 0.4 L
4410019	Condensate trap GL 2; glass, 1 L
459600026	Adapter plate EGK 1/2 to RC 1.1 and RC 1.2+
see data sheet 410001	Fine mesh filter AGF-PV-30
see data sheet 450020	Peristaltic Condensate Pumps CPsingle, CPdouble

Gas Analysis

Sample gas cooler EGK 1/2

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

EGK 1/2 is a compressor sample gas cooler for up to 2 gas paths and is an essential component for sophisticated analysis systems.

- Compact installation
- One or two gas paths
- Heat exchanger made from stainless steel, Duran glass and PVDF
- Bühler constant control system
- Self-monitoring
- Cooling block temperature display
- Status alarm
- Rated cooling power 303 Btu/h
- Dew point stability ±0.2 °F
- CFC-free

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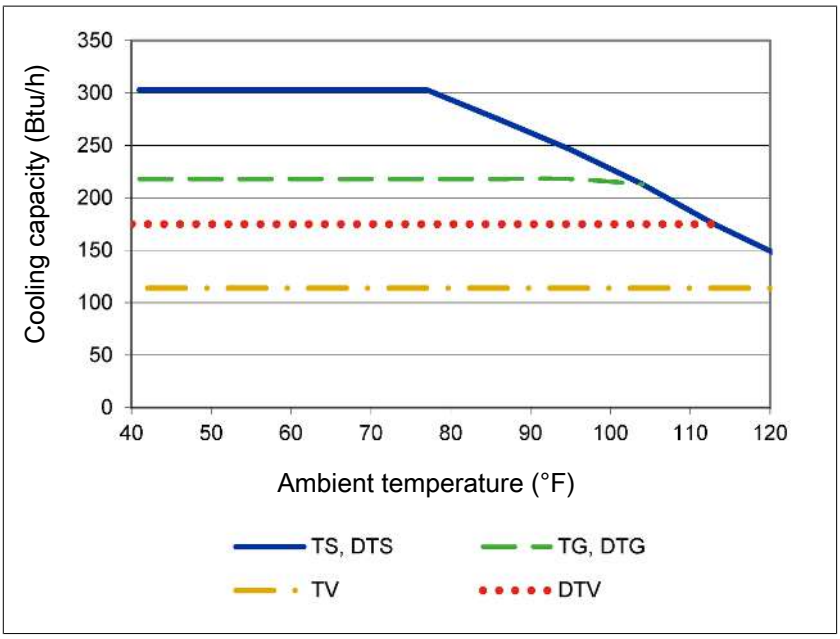
Performance data



Remark: The limit curves for the heat exchangers exchanger apply to a dew point of 149 °F.

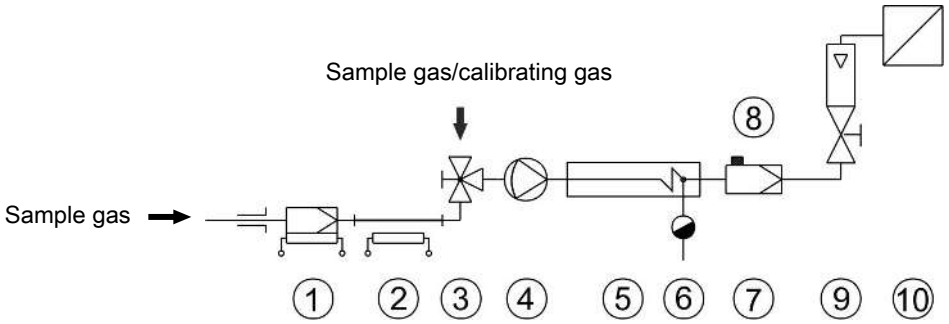
Gas cooler technical data

Gas Cooler Technical Data			
Ready for operation	after max. 15 minutes		
Rated cooling capacity (at 77 °F)	303 Btu/h		
Ambient temperature	41 °F to 122 °F		
Gas outlet dew point, preset	approx. 41 °F		
Dew point fluctuations static: in the entire specification range:	 ± 0.1 K ± 1.5 K		
IP rating	IP 20		
Housing	Stainless steel		
Packaging dimensions	approx. 15.4 x 11.8 x 15.7 in		
Weight incl. heat exchanger	approx. 33 lb		
Electric supply	115 V, 60 Hz or 230 V, 50 Hz Plug per EN 175301-803		
Electrical data		230 V	115 V
	Typical power input:	140 VA	155 VA
	max. operating current:	1.6 A	3.2 A
Alarm output switching connection	max. 250 V, 2 A, 50 VA Terminal plug per DIN 43650		
Installation	stand-alone or wall-mounted		

Technical Data - Options

CPsingle Peristaltic Pumps Technical Data	
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Protection class	IP 40
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

Diagram typical installation



1	Sample gas probe	2	Sample gas line
3	Reversing tap	4	Sample gas pump
5	Sample gas cooler	6	Automatic condensate drain or peristaltic pump
7	Fine mesh filter	8	Moisture detector
9	Flow meter	10	Analyser

See data sheets for individual component models and data.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, (inlet) dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 149 °F and ϑ_G = 194 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the TG heat exchanger the parameter triple τ_e = 149 °F, ϑ_G = 194 °F and v = 4.7 lpm may also be used in place of τ_e = 122 °F, ϑ_G = 176 °F and v = 6.3 lpm.

Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	TS TS-I [2]	TG TG	TV TV-I [2]	DTS (DTS-6 [3]) DTS-I (DTS-6-I [3]) [2]	DTG DTG	DTV [3] DTV-I [2] [3]
Materials in contact with media	Stainless steel	Glass PTFE	PVDF	Stainless steel	Glass PTFE	PVDF
Flow rate v_{max} [1]	8.9 lpm	4.7 lpm	2.6 lpm	2 x 4.2 lpm	2 x 2.3 lpm	2 x 2 lpm
Inlet dew point $\tau_{e,max}$ [1]	175 °F	175 °F	149 °F	175 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F	356 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	427 Btu/h	218 Btu/h	114 Btu/h	427 Btu/h	218 Btu/h	175 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	44 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.12 psi	0.12 psi	0.1 psi each	0.1 psi each	0.22 psi each
Dead volume V_{tot}	4.2 cu. in.	2.9 cu. in.	7.9 cu. in.	1.7 / 1.5 cu. in.	1.7 / 1.5 cu. in.	1.3 / 1.3 cu. in.
Gas connections (metric)	G1/4	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	NPT 1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")[4]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	Tube 10 mm (6 mm)	GL18 (10 mm) [4]	DN 5/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	Tube 3/8" (1/4")	GL18 (3/8") [4]	3/16"-5/16"

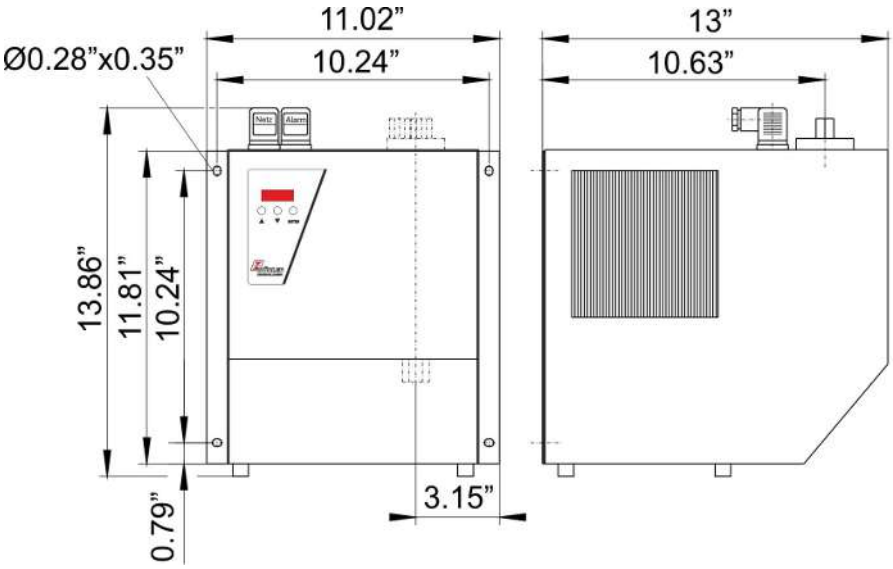
[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Condensate drain only possible with condensate pump

[4] Gasket inside diameter

Dimensions



Ordering instructions

Gas cooler

The item number is a code for the configuration of your unit. Please use the following model key:

Please note: Every individual gas path must be equipped with peristaltic pump or condensate drain.

4562	X	X	X	X	X	0	0	0	Product Characteristics
									Voltage
	1								115 V metric screw connections
	2								230 V metric screw connections
	3								115 V US screw connections
	4								230 V US screw connections
									Gas path / Material / Version
		0	0	0					without heat exchanger
		1	1	0					1 gas path / single stainless steel heat exchanger / (TS and TS-I)
		1	2	0					1 gas path / single glass heat exchanger / (TG)
		1	3	0					1 gas path / single PVDF heat exchanger / (TV and TV-I)
		2	6	0					2 gas paths / dual stainless steel heat exchanger / (DTS and DTS-I)
		2	6	1					2 gas paths / dual stainless steel heat exchanger / (DTS-6 and DTS-6-I) [1]
		2	7	0					2 gas paths / dual glass heat exchanger / (DTG)
		2	8	0					2 gas paths / dual PVDF heat exchanger / (DTV and DTV-I) [1]
									Condensate drain [2]
					0				without condensate drain
					3				Peristaltic pump(s) CPsingle with hose connection 90° angle [3]
					4				Peristaltic pump(s) CPsingle with screw-in hose connection [3]

[1] Condensate outlets only suitable for connecting peristaltic pumps.

[2] Peristaltic pumps also available for separate installation, see data sheet 450020.

[3] Each gas path equipped with a peristaltic pump. The supply voltage corresponds with that of the main unit.

Consumables and accessories

Item no.	Description
4410001	Automatic condensate drain 11 LD V 38
4410004	Automatic condensate drain AK 20, PVDF
4410005	Condensate trap GL 1; glass, 0.4 L
4410019	Condensate trap GL 2; glass, 1 L
44921220102	CPsingle peristaltic condensate pump with angled hose nipple
44921220104	CPsingle peristaltic condensate pump with screw-in hose connection (metric)
44921220105	CPsingle peristaltic condensate pump with screw-in hose connection (US)

Sample gas cooler EGK 1SD

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The EGK 1SD is a medium duty compressor sample gas cooler. It can be wall-mounted or used as a table-top cooler with up to two gas paths.

- Compact installation
- One or two gas paths
- Heat exchanger made from stainless steel, Duran glass or PVDF
- Bühler constant control system
- Self-monitoring
- Cooling block temperature display
- Status alarm
- Rated cooling power 303 Btu/h
- Dew point stability ± 0.2 F
- CFC-free
- FM approved

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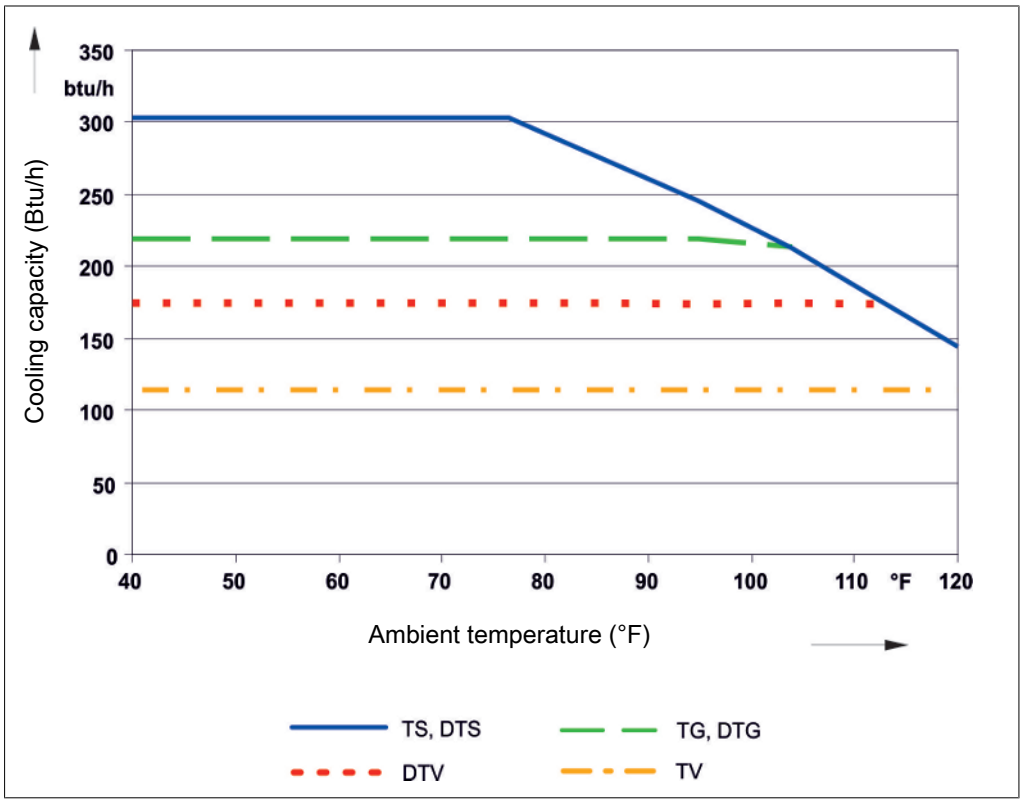
Internet: www.buhlertech.com

Performance data

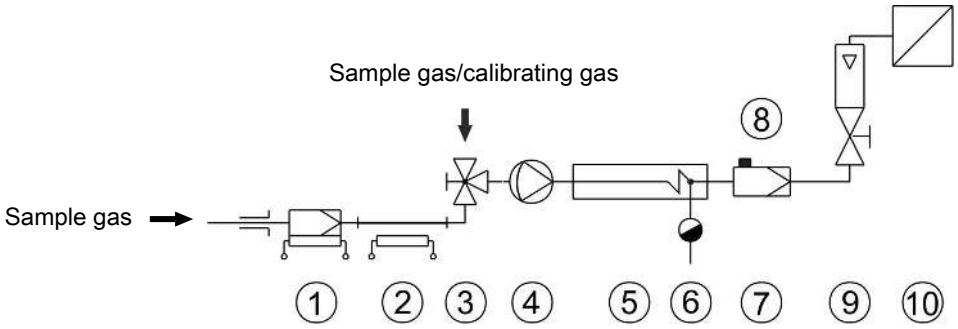


Remark: The limit curves for the heat exchangers exchanger apply to a dew point of 149 °F.

Technical Data

Gas Cooler Technical Data			
Ready for operation:	after max. 15 minutes		
Rated cooling capacity (at 77 °F):	303 Btu/h		
Ambient temperature:	41 °F to 122 °F		
Gas outlet dew point, preset:	41 °F		
Dew point fluctuations static: in the entire specification range:	 ± 0.1 K ± 1.5 K		
IP rating:	IP 20		
Housing:	Stainless steel		
Weight incl. heat exchanger:	approx. 33 lb		
Electric supply:	115 V, 60 Hz or 230 V, 50 Hz Plug per EN 175301-803		
Electrical data:		230 V	115 V
	Typical power input:	140 VA	155 VA
	max. operating current:	1.6 A	3.2 A
Alarm output switching connection:	250 V, 2 A, 50 VA Plug per EN 175301-803		
Packaging dimensions:	approx. 16.5 in x 17.3 in x 13.8 in		
FM approval no.:	3040918		

Diagram typical installation



1	Sample gas probe	2	Sample gas line
3	Reversing tap	4	Sample gas pump
5	Sample gas cooler	6	Automatic condensate drain or peristaltic pump
7	Fine mesh filter	8	Moisture detector
9	Flow meter	10	Analyser

See data sheets for individual component models and data.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, (inlet) dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 149 °F and ϑ_G = 194 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the TG heat exchanger the parameter triple τ_e = 149 °F, ϑ_G = 194 °F and v = 4.7 lpm may also be used in place of τ_e = 122 °F, ϑ_G = 176 °F and v = 6.3 lpm.

Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	TS TS-I [2]	TG TG	TV TV-I [2]	DTS (DTS-6 [3]) DTS-I (DTS-6-I [3]) [2]	DTG DTG	DTV [3] DTV-I [2] [3]
Materials in contact with media	Stainless steel	Glass PTFE	PVDF	Stainless steel	Glass PTFE	PVDF
Flow rate v_{max} [1]	8.9 lpm	4.7 lpm	2.6 lpm	2 x 4.2 lpm	2 x 2.3 lpm	2 x 2 lpm
Inlet dew point $\tau_{e,max}$ [1]	175 °F	175 °F	149 °F	175 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F	356 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	427 Btu/h	218 Btu/h	114 Btu/h	427 Btu/h	218 Btu/h	175 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	44 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.12 psi	0.12 psi	0.1 psi each	0.1 psi each	0.22 psi each
Dead volume V_{tot}	4.2 cu. in.	2.9 cu. in.	7.9 cu. in.	1.7 / 1.5 cu. in.	1.7 / 1.5 cu. in.	1.3 / 1.3 cu. in.
Gas connections (metric)	G1/4	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	NPT 1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")[4]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	Tube 10 mm (6 mm)	GL18 (10 mm) [4]	DN 5/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	Tube 3/8" (1/4")	GL18 (3/8") [4]	3/16"-5/16"

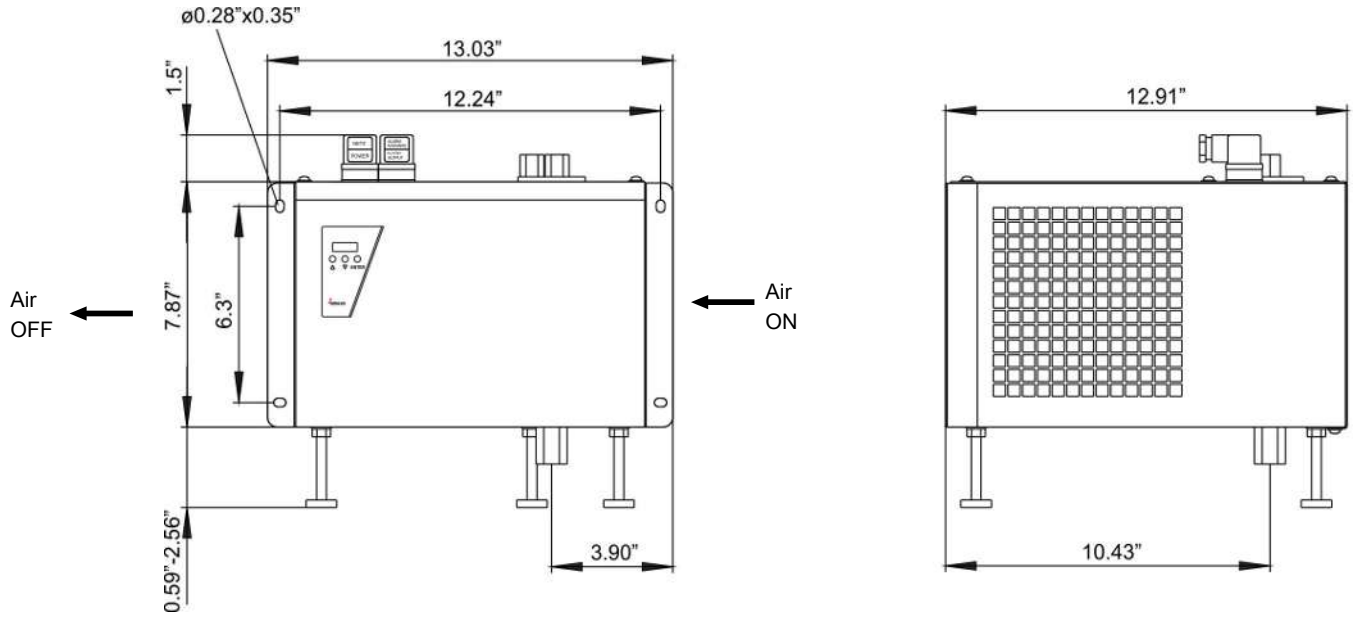
[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Condensate drain only possible with condensate pump

[4] Gasket inside diameter

Dimensions



Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

Please note: Every individual gas path must be equipped with peristaltic pump or condensate drain.

4561	X	X	X	X	0	0	0	0	Product Characteristics
									Voltage
	1								115 V metric screw connections
	2								230 V metric screw connections
	3								115 V US screw connections
	4								230 V US screw connections
									Gas path / Material / Version
		0	0	0					without heat exchanger
		1	1	0					1 gas path / single stainless steel heat exchanger / (TS or TS-I)
		1	2	0					1 gas path / single glass heat exchanger / (TG)
		1	3	0					1 gas path / single PVDF heat exchanger / (TV or TV-I)
		2	6	0					2 gas paths / dual stainless steel heat exchanger / (DTS or DTS-I)
		2	6	1					2 gas paths / dual stainless steel heat exchanger / (DTS-6 or DTS-6-I) [1]
		2	7	0					2 gas paths / dual glass heat exchanger / (DTG)
		2	8	0					2 gas paths / dual PVDF heat exchanger / (DTV or DTV-I) [1]
									Condensate drain[2]
					0	0	0	0	

[1] Condensate outlets only suitable for connecting peristaltic pumps.

[2] Peristaltic pumps available for separate installation.

Spare parts and accessories

Item no.	Description
4410001	Automatic condensate drain 11 LD V 38
4410004	Automatic condensate drain AK 20, PVDF
4410005	Condensate trap GL 1; glass, 0.4 L
4410019	Condensate trap GL 2; glass, 1 L
see data sheet 450020	CPsingle, CPdouble peristaltic condensate pumps

Gas cooler series EGK 2-19

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The compact system EGK 2-19 is a 19" rack with sample gas cooler and condensate drain, particle filter and moisture detector for up to two gas paths.

- Compact design: fully assembled and ready to connect
- Low maintenance costs based on easy accessibility
- One or two gas paths
- Heat exchanger made from stainless steel, Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Self-monitoring
- Status outputs
- Ambient temperatures up to 122 °F
- Rated cooling power 303 Btu/h
- Dew point stability ±0.2 F
- Available as 19" rack or for wall-mounting

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Internet: www.buhlertech.com

Description

Concept

The EGK 2-19 concept is firstly based on a cooler for one or two heat exchangers.

In addition, other components which every conditioning system should feature can optionally be integrated:

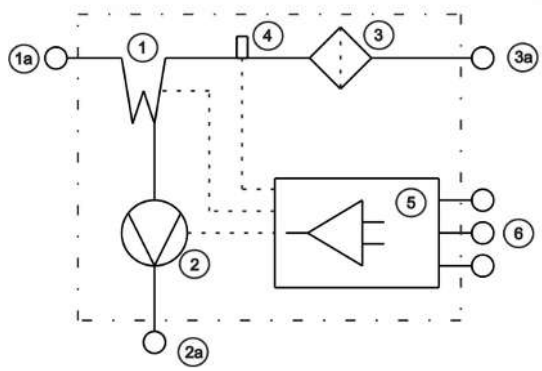
- Peristaltic pump for condensate separation
- Filter
- Moisture detector

This therefore allows for virtually any configuration of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to consumables, consequently located at the front.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if water enters the cooler due to a malfunction and the peristaltic pump can no longer remove it.

Description of a fully equipped gas path



No.	Description
1a	Heat exchanger inlet
1	Heat exchanger
2	Peristaltic pump
2a	Peristaltic pump outlet
3	Fine mesh filter
3a	Filter outlet
4	Moisture detector
5	Control
6	Electrical connections

The gas to be conditioned is fed directly into the inlet of the heat exchanger (1, 1a). A hose is pre-installed between the heat exchanger outlet and the fine mesh filter (3). Sample gas is continued directly from the outlet of this filter via hose fitting (3a).

Condensate is removed by the peristaltic pump (2), the inlet of which is directly connected to the heat exchanger via hose.

A moisture detector (4) may be installed directly into the filter, which is analysed by electronics (5). This eliminates the need to purchase additional controllers.

Control (5)

The control features a microprocessor-controlled Bühler Constant Regulation at its core.

The display with control keys at the front displays the cooler temperature as well as all operating statuses.

Use the keys to set various parameters such as outlet dew point, alarm limits or the sensitivity of moisture detectors.

Electrical connections (6)

All signals output by the electronics can be accessed via Phoenix plug at the top of the cooler. The electric supply is also a plug connection. This means no fixed wiring is required.

Gas cooler technical data

Gas Cooler Technical Data			
Ready for operation	after max. 15 minutes		
Rated cooling capacity (at 77 °F)	303 Btu/h		
Ambient temperature	41 °F to 122 °F		
Gas outlet dew point, preset	41 °F		
Dew point fluctuations static: in the entire specification range:	 ± 0.1 K ± 1.5 K		
Temperature difference between heat exchangers	< 0.5 K		
Max. inlet temperature	see table "Heat Exchanger Overview"		
Max. pressure	see table "Heat Exchanger Overview" Limitations due to filter or peristaltic pump (see Technical Data - Options)		
IP rating	IP 20		
Housing	Stainless steel		
Packaging dimensions	approx. 21.9 x 16.9 x 13.4 in		
Weight incl. heat exchanger	approx. 33 lb approx. 42 lb at full expansion stage		
Electric supply	115 V, 60 Hz or 230 V, 50 Hz Plug per EN 175301-803		
Electrical data		230 V	115 V
	Typical power input:	140 VA	155 VA
	max. operating current:	1.6 A	3.2 A
Alarm output switching connection	max. 250 V, 2 A Phoenix plug		
Gas connections	Heat exchanger see table "Heat exchanger overview" Filter DN 4/6 or 1/4"-1/6"		
Condensate outlet	Hose nipple Ø5 mm (0.2 in)		
Parts in contact with mediums Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton		

Technical Data - Options

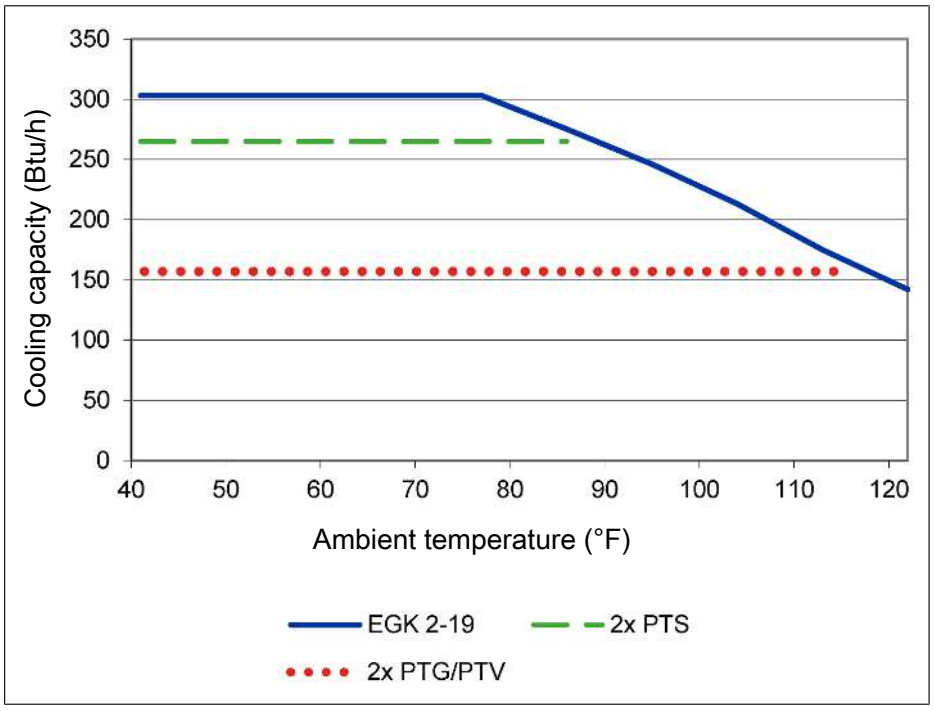
Technical data analogue output cooler temperature	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 122 °F cooler temperature Phoenix Plug

Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

CPsingle Peristaltic Pumps Technical Data	
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Protection class	IP 40
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

Technical Data Filter AGF-FA-5	
max. operating pressure with filter	29 psi
Filter surface	6.5 in^2
Filter fineness	2 µm
Dead volume	1.74 cu. in.
Materials Filter: Seal: Filter element:	 PTFE, PVDF, Duran glass (parts in contact with mediums) Viton sintered PTFE

Performance data



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 104 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

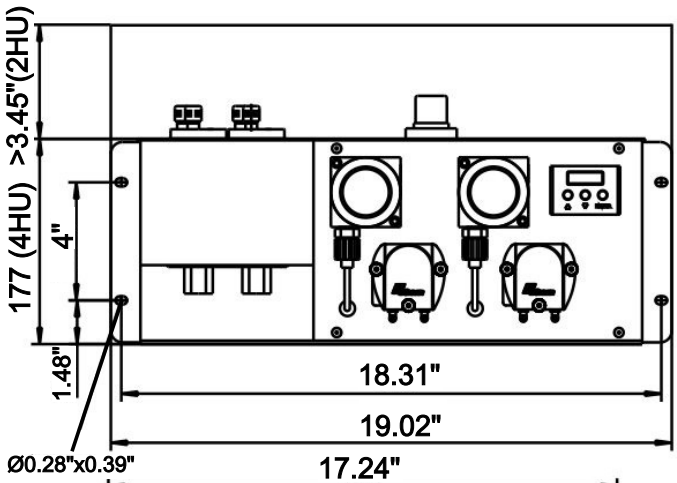
Heat exchanger	PTS PTS-I [2]	PTG	PTV PTV-I [2]
Materials in contact with media	Stainless steel	Glass PTFE	PVDF
Flow rate v_{max} [1]	8.3 lpm	4.7 lpm	4.7 lpm
Inlet dew point $\tau_{e,max}$ [1]	150 °F	150 °F	150 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	142 Btu/h	85 Btu/h	85 Btu/h
Gas pressure p_{max}	2320 psi	43 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	.15 psi	.15 psi	.15 psi
Dead volume V_{tot}	1.8 cu. in.	1.8 cu. in.	3.5 cu. in.
Gas connections (metric)	6 mm	GL 14 (6 mm) [3]	DN 4/6
Gas connections (US)	1/4"	GL 14 (1/4") [3]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [3]	G3/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [3]	NPT 3/8"

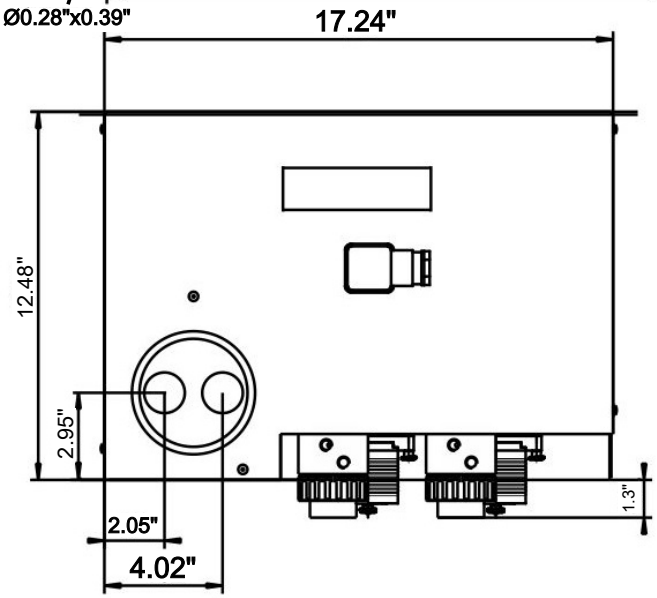
[1] Max. cooling capacity of the cooler must be considered

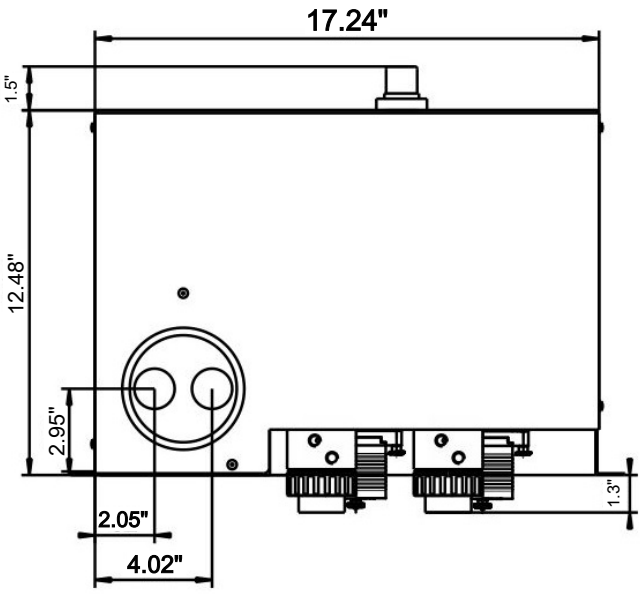
[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter

Dimensions (inch)







Ordering instructions

Gas cooler models with one heat exchanger

The item number is a code for the configuration of your unit. Please use the following model key:

452	X	X	X	X	X	X	X	X	0	Product characteristic
										Gas cooler models (with 1 heat exchanger)
	0									Wall mounting
	1									19" rack installation
										Supply voltage
		1								115 V metric screw connections
		2								230 V metric screw connections
		3								115 V US screw connections
		4								230 V US screw connections
										Heat exchanger
			0	0						without heat exchanger
			1	1						Single stainless steel heat exchanger / (PTS and PTS-I)
			1	2						Single glass heat exchanger / (PTG)
			1	3						Single PVDF heat exchanger / (PTV and PTV-I)
										Condensate drain
					0					without condensate drain
					1					1 CPsingle peristaltic pump with 90° angle hose connection [1]
					3					1 CPsingle peristaltic pump with straight hose connection [1]
										Filter
						0				Without filter
						1				1 filter installed
										Moisture detector [2]
							0			Without moisture detector
							1			1 moisture detector installed
										Optional [2]
								0		Without option
								1		With 4 - 20 mA analogue output for temperature

[1] Each heat exchanger is equipped with one peristaltic pump. The supply voltage corresponds with that of the main unit.

[2] The “moisture detector” option includes the option “4 - 20 mA analogue output”.

Gas cooler models with two heat exchangers

The item number is a code for the configuration of your unit. Please use the following model key:

452	X	X	X	X	X	X	X	X	0	Product characteristic
										Gas cooler models (with 2 heat exchangers)
	0									Wall mounting
	1									19" rack installation
										Supply voltage
		1								115 V metric screw connections
		2								230 V metric screw connections
		3								115 V US screw connections
		4								230 V US screw connections
										Heat exchanger
			0	0						without heat exchanger
			2	1						2 single stainless steel heat exchangers / (PTS and PTS-I)
			2	2						2 single glass heat exchangers / (PTG)
			2	3						2 single PVDF heat exchangers / (PTV and PTV-I)
										Condensate drain
					0					Without condensate drain
					2					2 CPsingle peristaltic pumps with 90° angle hose connection [1]
					4					2 CPsingle peristaltic pumps with straight hose connection [1]
										Filter
						0				Without filter
						1				1 filter installed
						2				2 filters installed
										Moisture detector [2]
							0			Without moisture detector
							1			1 moisture detector installed (only possible with 1 filter)
							2			2 moisture detectors installed (only possible with 2 filter)
										Optional [2]
								0		Without option
								1		With 4 - 20 mA analogue output for temperature

[1] Each heat exchanger is equipped with one peristaltic pump. The supply voltage corresponds with that of the main unit.

[2] The “moisture detector” option includes the option “4 - 20 mA analogue output”.

Spare parts and accessories

Item no.	Description
41151050	Filter element FE-4; Unit 8 count
4101003	O-ring for filter AGF-FA-5, Unit 8 count, sintered PTFE

Gas cooler series EGK 2-19+

In emission measurement, process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations as well as measurements in small combustion plants or exhaust gas analysis in automotive engineering.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The EGK 2-19+ series features a new generation heat exchangers with a particularly low wash out effect of water-soluble components and are specifically suitable for measuring emissions. Particularly the wash out effect of SO_2 is low. These coolers can therefore be used for so-called automated measuring systems (AMS) per EN 15267-3.

- Compact design: fully assembled and ready to connect
- Low maintenance costs based on easy accessibility
- One gas path
- Optimised heat exchanger type 2 in Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Self-monitoring
- Status outputs
- Ambient temperatures up to 122 °F
- Rated cooling power 303 Btu/h
- Dew point stability ±0.2 F
- Available as 19" rack or for wall-mounting

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Internet: www.buhlertech.com

Description

Concept

The EGK 2-19+ concept is firstly based on a cooler for two in-line heat exchangers.

In addition, other components which every conditioning system should feature can optionally be integrated:

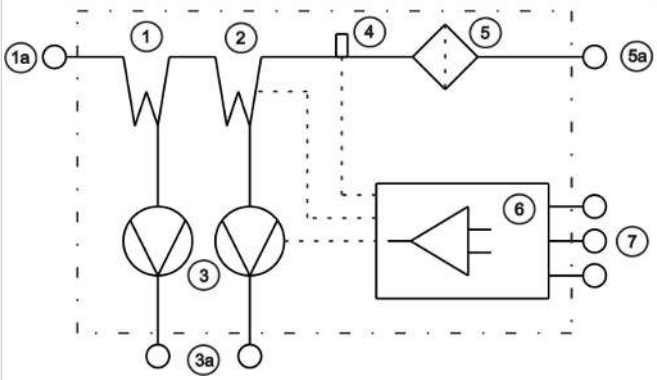
- Peristaltic pump for condensate separation
- Filter
- Moisture detector

This therefore allows for virtually any configuration of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to consumables, consequently located at the front.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if water enters the cooler due to a malfunction and the peristaltic pump can no longer remove it.

Description of a fully equipped gas path



No.	Description
1a	Heat exchanger inlet
1	Heat exchanger (pre-cooling)
2	Heat exchanger (after-cooling)
3	Peristaltic pump
3a	Peristaltic pump outlet
4	Moisture detector
5	Fine mesh filter
5a	Filter outlet
6	Control
7	Electrical connections

The gas to be conditioned is fed directly into the inlet of the heat exchanger (1, 1a). A hose is pre-installed between the heat exchanger (2) outlet and the fine mesh filter (5). Sample gas is continued directly from the outlet of this filter via hose fitting (5a).

Condensate is removed by the peristaltic pumps (3), the inlet of which is directly connected to the heat exchanger via hose.

A moisture detector (4) may be installed directly into the filter, which is analysed by electronics (6). This eliminates the need to purchase additional controllers.

Control (6)

The control features a microprocessor-controlled Bühler Constant Regulation at its core.

The display with control keys at the front displays the cooler temperature as well as all operating statuses.

Use the keys to set various parameters such as outlet dew point, alarm limits or the sensitivity of moisture detectors.

Electrical connections (7)

All signals output by the electronics can be accessed via Phoenix plug at the top of the cooler. The electric supply is also a plug connection. This means no fixed wiring is required.

Gas cooler technical data

Gas Cooler Technical Data			
Ready for operation	after max. 15 minutes		
Rated cooling capacity (at 77 °F)	303 Btu/h		
Ambient temperature	41 °F to 122 °F		
Gas outlet dew point, preset	41 °F		
Dew point fluctuations static: in the entire specification range:	 ± 0.1 K ± 1.5 K		
Temperature difference between heat exchangers	< 0.5 K		
Max. inlet temperature	see table "Heat Exchanger Overview"		
Max. pressure	see table "Heat Exchanger Overview" Limitations due to filter or peristaltic pump (see Technical Data - Options)		
IP rating	IP 20		
Housing	Stainless steel		
Packaging dimensions	approx. 21.9 x 16.9 x 13.4 in		
Weight incl. heat exchanger	approx. 33 lb approx. 41 lb at full expansion stage		
Electric supply	115 V, 60 Hz or 230 V, 50 Hz Plug per EN 175301-803		
Electrical data		230 V	115 V
	Typical power input:	140 VA	155 VA
	max. operating current:	1.6 A	3.2 A
Alarm output switching connection	max. 250 V, 2 A Phoenix plug		
Gas connections	Heat exchanger see table "Heat exchanger overview" Filter DN 4/6 or 1/4"-1/6"		
Condensate outlet	Hose nipple Ø5 mm (0.2 in)		
Parts in contact with mediums Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton		

Technical Data - Options

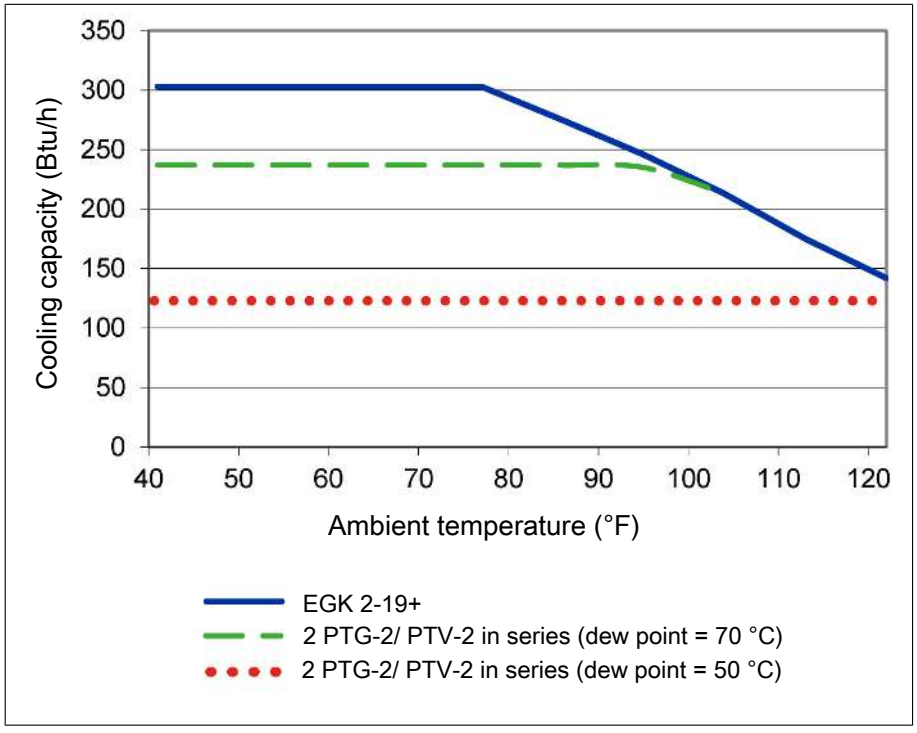
Technical data analogue output cooler temperature	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 122 °F cooler temperature Phoenix Plug

Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

CPsingle Peristaltic Pumps Technical Data	
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Protection class	IP 40
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

Technical Data Filter AGF-FA-5	
max. operating pressure with filter	29 psi
Filter surface	6.5 in^2
Filter fineness	2 µm
Dead volume	1.74 cu. in.
Materials Filter: Seal: Filter element:	 PTFE, PVDF, Duran glass (parts in contact with mediums) Viton sintered PTFE

Performance data



Remark: The limit curves for the heat exchanger apply to a dew point of 158 °F under standard conditions per DIN EN 15267-3:2008-03 and to a dew point of 122 °F under operating conditions.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

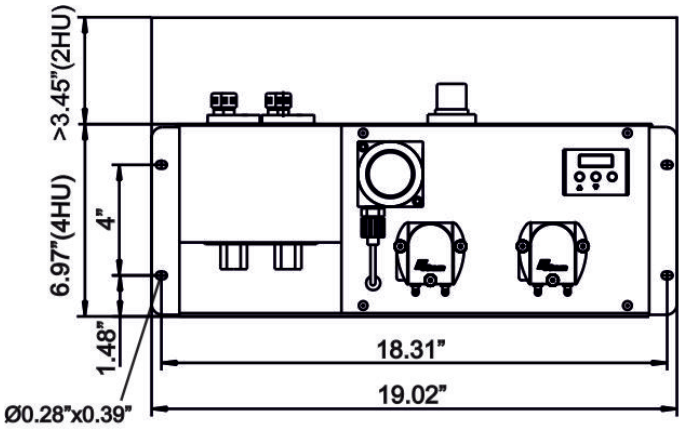
Heat exchanger	2x PTG-2 2x PTG-2-I	2x PTV-2 2x PTV-2-I [2]
Materials in contact with media	Glass PTFE	PVDF
Flow rate v_{max} [1]	4.2 lpm	4.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F
Max. Cooling capacity Q_{max}	218 Btu/h	204 Btu/h
Gas pressure p_{max}	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm) total	0.29 psi	0.29 psi
Dead volume V_{tot} total	3.6 cu.in.	7 cu.in.
Gas connections (metric)	GL 14 (6 mm) [3]	DN 4/6
Gas connections (US)	GL 14 (1/4") [3]	1/4"-1/6"
Condensate out connections (metric)	GL 25 (12 mm) [3]	G3/8
Condensate out connections (US)	GL 25 (1/2") [3]	NPT 3/8"

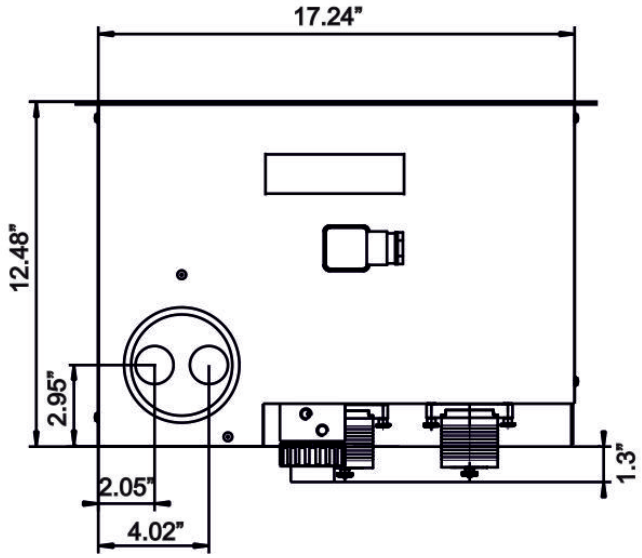
[1] Max. cooling capacity of the cooler must be considered

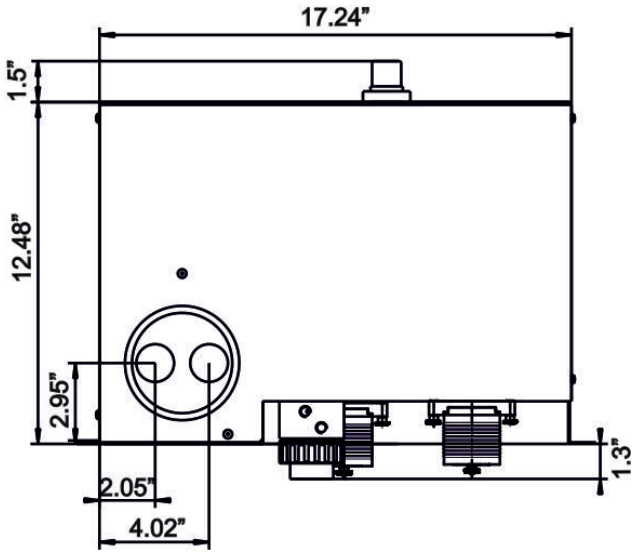
[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter

Dimensions (inch)







Ordering instructions

Gas cooler type with two heat exchangers in series

The item number is a code for the configuration of your unit. Please use the following model key:

452	X	X	X	X	X	X	X	X	0	Product characteristic
										Gas cooler models (with 2 heat exchangers)
	0									Wall mounting
	1									19" rack installation
										Supply voltage
		1								115 V metric screw connections
		2								230 V metric screw connections
		3								115 V US screw connections
		4								230 V US screw connections
										Heat exchanger
			0	0						Without heat exchanger
			1	6						2 single glass heat exchangers/ (2x PTG-2)
			1	7						2 single PVDF heat exchangers/ (2x PTV-2 or PTV-2-I)
										Condensate drain
					0					Without condensate drain
					2					2 CPsingle peristaltic pumps with 90° angle hose connection [1]
					4					2 CPsingle peristaltic pumps with straight hose connection [1]
										Filter
						0				Without filter
						1				1 filter installed
										Moisture detector [2]
							0			Without moisture detector
							1			1 moisture detector installed (only possible with 1 filter)
										Optional [2]
								0		Without option
								1		With 4 - 20 mA analogue output for temperature

[1] Each heat exchanger is equipped with one peristaltic pump. The supply voltage corresponds with that of the main unit.

[2] The “moisture detector” option includes the option “4 - 20 mA analogue output”.

Spare parts and accessories

Item no.	Description
41151050	Filter element FE-4; Unit 8 count
4101003	O-ring for filter AGF-FA-5, Unit 8 count, sintered PTFE

Sample gas cooler EGK 4S

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The EGK 4S is a compressor sample gas cooler for up to 8 separate gas paths and is an essential component in sophisticated analysis systems.

- For 19” rack installation, wall mounting or desktop housing
- Compact size
- Up to 4 stainless steel, glass or PVDF heat exchangers per unit, up to 8 gas paths available upon request
- Electronic control with cooling block temperature display
- Self-monitoring with contact output ± 3 K
- Rated cooling power 760 Btu/h
- Dew point stability ± 0.2 F
- CFC-free

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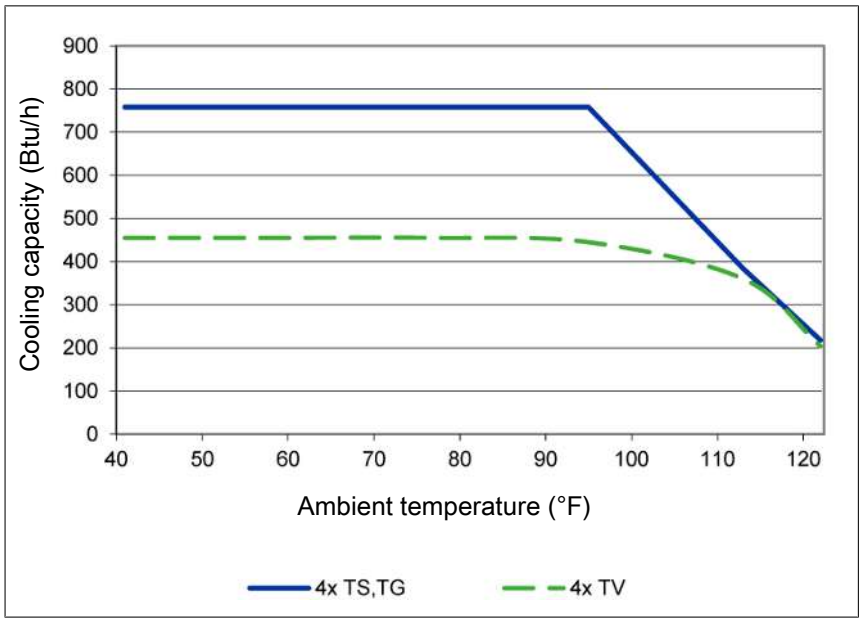
Internet: www.buhlertech.com

Performance Data

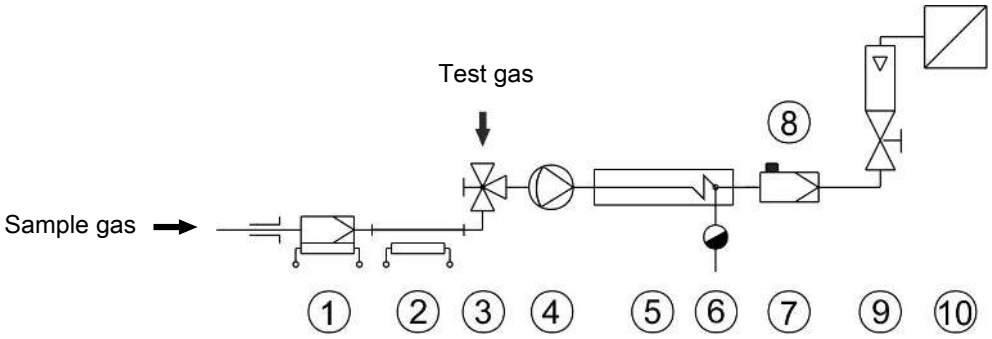


Note: The limit curves for the heat exchangers exchanger apply to a dew point of 149 °F.

Technical Data

Gas Cooler Technical Data			
Ready for operation	after max. 15 minutes		
Rated cooling capacity (at 77 °F)	760 Btu/h		
Ambient temperature	41 °F to 122 °F		
Gas outlet dew point, preset	41 °F		
Dew point fluctuations static: in the entire specification range:	 ± 0.2 K ± 2 K		
IP rating	IP 20		
Housing	Stainless steel		
Packaging dimensions	approx. 20.1 x 14 x 17.7 in		
Weight incl. 4 heat exchangers	max. 71 lb		
Electric supply	115 V, 60 Hz or 230 V, 50 Hz		
Status output switching capacity	250 VAC/150 VDC Changeover contact 2 A, 30 VA		
Electrical data		230 V	115 V
	Typical power input:	240 VA	215 VA
	max. operating current:	2.5 A	4.6 A
Starting current	10 A		
Status output switching capacity	250 VAC/150 VDC Changeover contact 2 A, 30 VA		

Diagram typical installation



1	Sample gas probe	2	Sample gas line
3	Reversing tap	4	Sample gas pump
5	Sample gas cooler	6	Automatic condensate drain
7	Fine mesh filter	8	Moisture detector
9	Flow meter	10	Analyser

See data sheets for individual component models and data.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, (inlet) dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 149 °F and ϑ_G = 194 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the TG heat exchanger the parameter triple τ_e = 149 °F, ϑ_G = 194 °F and v = 4.7 lpm may also be used in place of τ_e = 122 °F, ϑ_G = 176 °F and v = 6.3 lpm.

Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

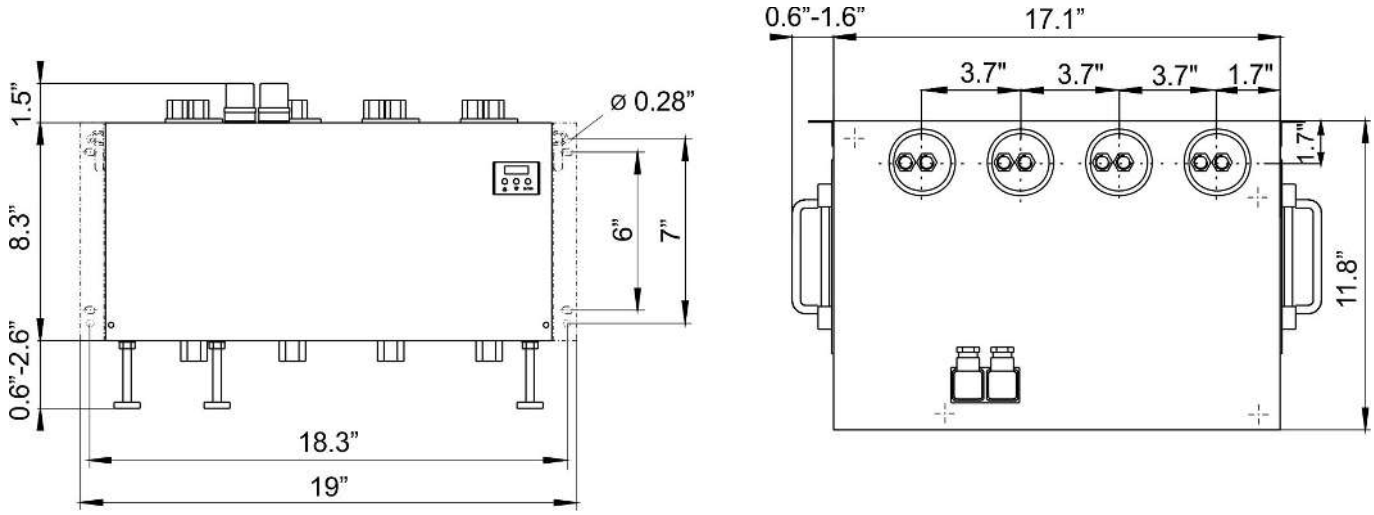
Heat exchanger	TS TS-I [2]	TG TG	TV TV-I [2]
Materials in contact with media	Stainless steel	Glass PTFE	PVDF
Flow v_{max} [1]	8.8 lpm	4.7 lpm	2.6 lpm
Inlet dew point $\tau_{e,max}$ [1]	176 °F	176 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	427 Btu/h	218 Btu/h	114 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	44 psi
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.12 psi	0.12 psi
Dead volume V_{tot}	4.2 cu. in.	2.9 cu. in.	7.9 cu. in.
Gas connections (metric)	G1/4	GL 14 (6 mm) [3]	DN 4/6
Gas connections (US)	NPT 1/4”	GL 14 (1/4") [3]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [3]	G3/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [3]	NPT 3/8"

[1] Max. cooling capacity of the cooler must be considered.

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter.

Dimensions (inch)



Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

457	X	X	X	X	0	0	0	0	X	Product Characteristics
										Gas cooler models
	0									Wall mounting
	1									19" rack installation
										Supply voltage
		1								115 V metric screw connections
		2								230 V metric screw connections
		3								115 V US screw connections
		4								230 V US screw connections
										Gas paths [1]
			0							without heat exchanger
			1							1 gas path
			2							2 gas paths
			3							3 gas paths
			4							4 gas paths
										Heat exchanger
				0	0					without heat exchanger
				1	0					Single stainless steel heat exchanger/ (TS or TS-I)
				2	0					Single glass heat exchanger/ (TG)
				3	0					Single PVDF heat exchanger/ (TV or TV-I)
										Condensate drain [2]
						0				without condensate drain
										Mounting Accessories
							0	0	0	without mounting accessories
							0	0	1	with mounting brackets
							0	0	2	with feet
							0	0	3	with mounting brackets and feet
							0	0	4	with handles
							0	0	5	with mounting brackets and handles
							0	0	6	with feet and handles
							0	0	7	with all mounting accessories

[1] up to 8 gas paths upon request.

[2] Peristaltic pumps must be installed separately or can be mounted to the cooler using a mounting angle. The supply voltage corresponds with that of the main unit. Automatic condensate drains are installed separately.

Spare Parts and Accessories

Item no.	Description
4410001	Automatic condensate drain 11 LD V 38
4410004	Automatic condensate drain AK 20, PVDF
4410005	Condensate trap GL 1; glass, 0.4 L
4410019	Condensate trap GL 2; glass, 1 L
4570008	Mounting angles for up to 4 peristaltic condensate pumps
see data sheet 450020	CPsingle, CPdouble peristaltic condensate pumps

Gas cooler series EGK 10

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The EGK 10 is a compressor high performance cooler with a special heat exchanger. Suitable for wall-mounting or desktop operation.

- Stainless steel heat exchanger
- Rated cooling power 1375 Btu/h
- Use as wall mounting or desktop housing
- Compact size
- Electronic control with cooling block temperature display
- Adjustable outlet dew point and alarm thresholds
- Self-monitoring
- Dew point stability ± 0.2 °F
- CFC-free

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Internet: www.buhlertech.com

Technical Data

Gas Cooler Technical Data

Ready for operation:	after max. 15 minutes		
Rated cooling capacity (at 77 °F):	1375 Btu/h		
Ambient temperature:	41 °F to 122 °F		
Gas outlet dew point preset: adjustable:	 41 °F 36 °F to 68 °F		
Alarm threshold adjustable around dew point upper alarm threshold: lower alarm threshold:	 1 K to 7 K, factory setting 3 K -1 K to -3 K, factory setting: -3 K		
Dew point fluctuations static: in the entire specification range:	 ± 0.2 K ± 3.6 °F		
IP rating:	IP 20		
Housing:	Stainless steel		
Weight incl. heat exchanger:	approx. 70 lb		
Electric supply:	115 V, 60 Hz or 230 V, 50 Hz		
Electrical data:		230 V	115 V
	Typical power input:	300 VA	260 VA
	max. operating current:	3.6 A	6.8 A
Starting current:	12 A (230 V), 28 A (115 V)		
Status output switching capacity:	230 VAC, 150 VDC Changeover contact, 2 A, 30 VA		
Max. pressure p_{max}:	73 psi		
Pressure drop Δp (v = 1500 l/h /25 lpm):	0.35 psi		

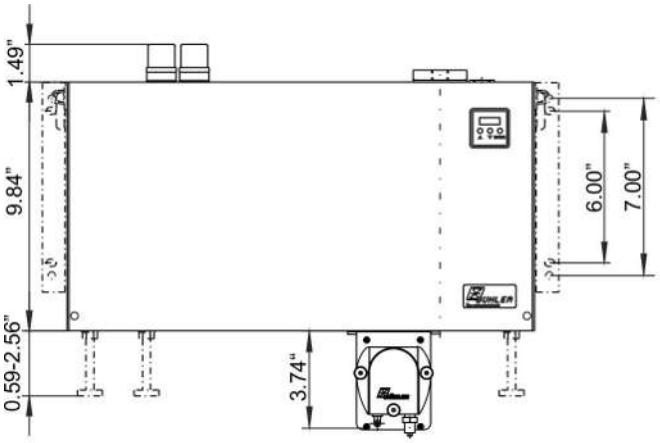
Flow parameter TS10

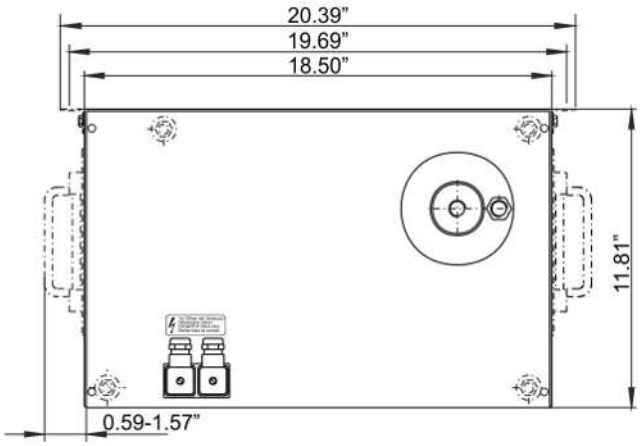
Inlet dew point (humidity)	Ambient temperature	Flow in lpm at a gas inlet temperature of					Condensate per h every 10 lpm
		140 °F	**176 °F**	**212 °F**	**284 °F**	**356 °F**	
104 °F (7 Vol%)	41...122 °F	65	58	52	43	37	2.6 cu. in.
122 °F (12 Vol%)	50...113 °F	55	50	47	41	36	4.4 cu. in.
	41...122 °F	32	29	28	24	22	
131 °F (16 Vol%)	72...95 °F	50	47	44	39	35	5.5 cu. in.
	41...122 °F	25	23	23	20	18	
140 °F (20 Vol%)	72...95 °F	42	39	37	33	31	7.3 cu. in.
	41...122 °F	20	18	17	16	15	
149 °F (25 Vol%)	72...95 °F	-	30	29	27	24	9.7 cu. in.
	41...122 °F	-	14	14	13	12	
158 °F (31 Vol%)	72...95 °F	-	23	21	20	19	13.4 cu. in.
	41...122 °F	-	11	11	10	10	
176 °F (47 Vol%)	72...95 °F	-	12	12	11	10	26.7 cu. in.
	41...122 °F	-	6.0	5.8	5.5	5.3	

Example: The ambient temperature can be maintained in the 72...95 °F range. The gas inlet temperature is 284 °F, the inlet dew point 140 °F.

Use row “inlet dew point” = 140 °F and ambient temperature 72...95 °F to locate the value 33 lpm in column 284 °F. For values between the gas temperature values in the table, use linear calculation between the flow values.

Dimensions





Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

Please note: Every individual gas path must be equipped with peristaltic pump or condensate drain.

4569	X	X	X	X	0	0	0	X	Product Characteristics
									Voltage
	1								115 V
	2								230 V
									Gas path / Material / Version
		0	0	0					without heat exchanger
		1	1	0					Single heat exchanger / stainless steel / TS10 G 3/8"
		1	1	1					Single heat exchanger / stainless steel / TS10 NPT 3/8"
		1	2	1					Single heat exchanger / glass coated inside / TS10 GB NPT 3/8"
									Condensate drain [1]
					0				without condensate drain
									Mounting Accessories
						0	0	0	without mounting accessories
						0	0	1	with mounting accessories
						0	0	2	with feet
						0	0	3	with mounting accessories and feet
						0	0	4	with handles
						0	0	5	with mounting brackets and handles
						0	0	6	with feet and handles
						0	0	7	with all mounting accessories

[1] Peristaltic pumps cannot be mounted to the cooler. Peristaltic pumps only available for separate installation.

Spare Parts and Accessories

Item no.	Description
4410001	Automatic condensate drain 11 LD V 38
4410004	Automatic condensate drain AK 20, PVDF
4410005	Condensate trap GL 1; glass, 0.4 L
4410019	Condensate trap GL 2; glass, 1 L
44921170114	CPsingle 115 V 60 Hz, 1 L/h, metric screw-in connection DN 4/6, for separate installation
44921170115	CPsingle 115 V 60 Hz, 1 L/h, US screw-in connection 1/6"-1/4, for separate installation
44921180114	CPsingle 230 V, 60 Hz, 1 L/h, metric screw-in connection DN 4/6, for separate installation
44921180115	CPsingle 230 V 60 Hz, 1 L/h, US screw-in connection 1/6"-1/4, for separate installation

Gas cooler series EGK 2A Ex

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The EGK 2A Ex is ATEX and IECEx approved and equipped with up to four separate gas paths, making it suitable for operation in explosive zones. It has a digital temperature display and alarm outputs.

- ATEX and IECEx approval for Zone 1
- CFC-free
- Rated cooling power 583 Btu/h
- 1 or 2 heat exchangers plug-in: up to 4 gas paths
- Self-monitoring with temperature alarm output
- Status display and output
- Easy to use and inspect
- Easy to install construction
- Condensate drain inside device available
- Auto-start if refrigerant circuit intact

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Technical Data

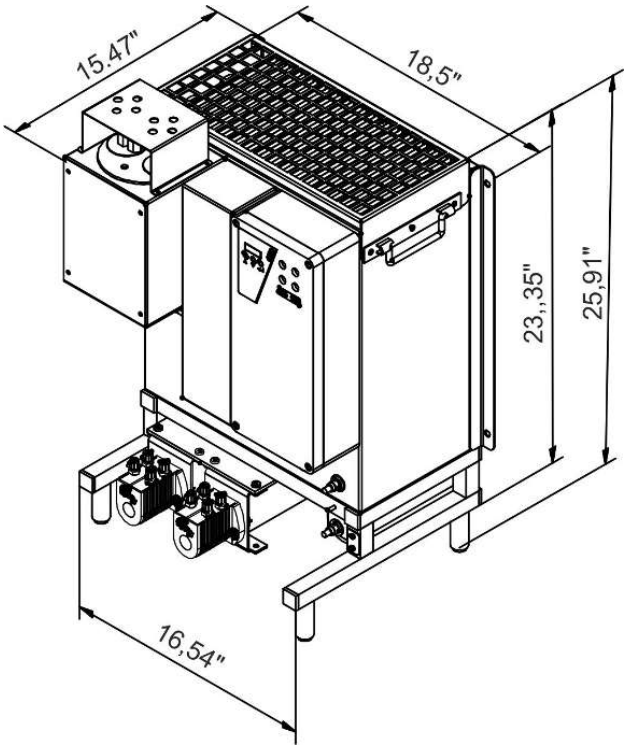
Gas cooler technical data

ATEX approval:	Ⓔx II 2 G Ex pxb eb mb q [ia] IIC T4 Gb
IECEx approval:	Ex pxb eb mb q [ia] IIC T4 Gb
Ready for operation:	after max. 20 minutes
Rated cooling capacity (at 77 °F):	> 583 Btu/h (170 W)
Ambient temperature:	41 °F to 113 °F
Gas outlet dew point preset: adjustable:	 41 °F 36 °F to 68 °F
Alarm threshold adjustable around dew point upper alarm threshold: lower alarm threshold:	 34 °F to 45 °F, factory setting 37 °F 30 °F to 27 °F, factory setting 27 °F
Dew point fluctuations static: in the entire specification range:	 ±0.2 K (with stainless steel), ±0.5 K (with PVDF), ±0.5 K (with glass) ±2 K
Electrical protection class:	IP 54
Housing:	Stainless steel/Polyester
Weight incl. heat exchanger:	approx. 28 lb
Electric supply:	115 V or 230 V, 50/60 Hz, terminals
Power input:	250 VA (230 V) or 300 VA (115 V)
Protection:	Protective motor switch (breaking capacity 1.5 kA or higher) 115 V version: 3.2 A 230 V version: 1.3 A
Status output fuse:	Breaking capacity 1.5 kA or higher. Dimensioned per the status contact switching capacity and customer application (see type examination certificate, item 15.3.1.2).
Potential-free status output ("fail safe"):	230 V/3 A AC 115 V/3 A AC 24 V/1 A DC
Installation:	Stand-alone or wall-mounted
Packaging dimensions:	27.6 x 20.5 x 20.5 in, on pallet (dimensions: 31.5 x 23.6)

Description

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on). If the cooler is stopped or in the event of service, an error code will appear.

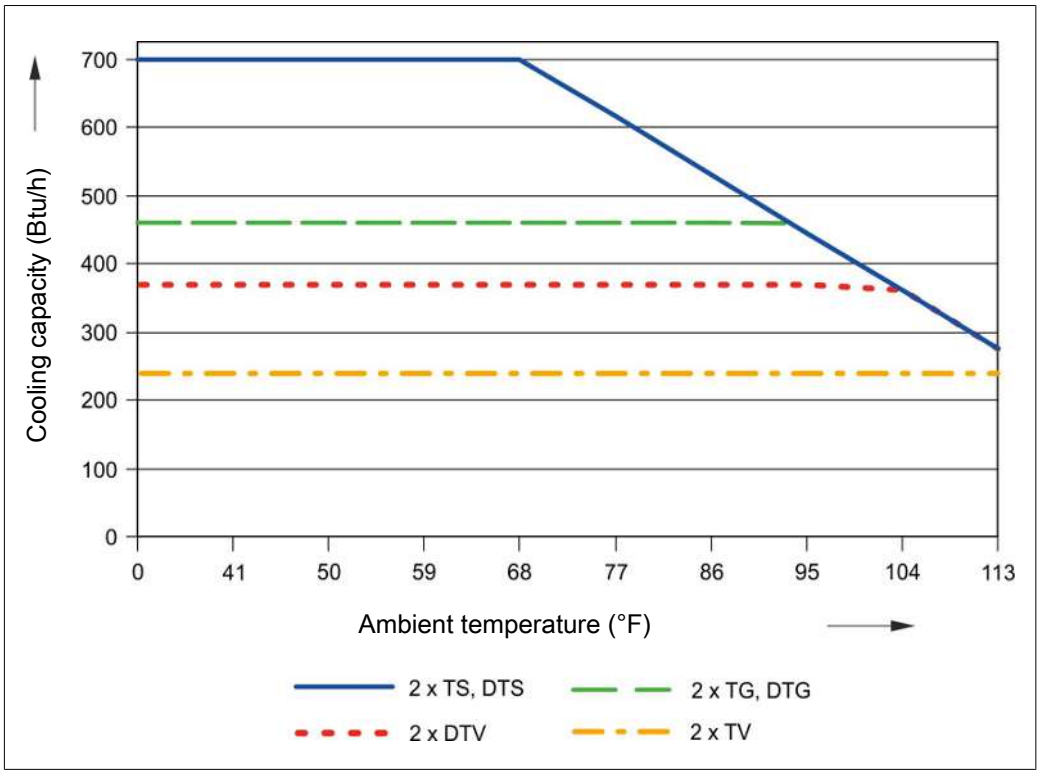
Dimensions



Mounting holes

17.5 x 16.5 x Ø0.4 (wide x high x diameter)

Performance data



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 149 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, (inlet) dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 149 °F and ϑ_G = 194 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the TG heat exchanger the parameter triple τ_e = 149 °F, ϑ_G = 194 °F and v = 4.7 lpm may also be used in place of τ_e = 122 °F, ϑ_G = 176 °F and v = 6.3 lpm.

Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	**TS** **TS-I** [2]	**TG** **TG**	**TV-SS** **TV-SS-I** [2]	**DTS (DTS-6** [3]**)** **DTS-I (DTS-6-I** [3]**)** [2]	**DTG** **DTG**	**DTV** [3] **DTV-I** [2] [3]
Materials in contact with media	Stainless steel	Glass PTFE	PVDF	Stainless steel	Glass PTFE	PVDF
Flow v_{max} [1]	8.8 lpm	4.7 lpm	2.1 lpm	2 x 4.2 lpm	2 x 2.3 lpm	2 x 1.9 lpm
Inlet dew point $\tau_{e,max}$ [1]	176 °F	176 °F	149 °F	176 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$	266 °F (356 °F) [5]	266 °F	266 °F	266 °F (356 °F) [5]	266 °F	266 °F
Max. cooling capacity Q_{max}	427 Btu/h	218 Btu/h	114 Btu/h	427 Btu/h	218 Btu/h	175 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	44 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.12 psi	0.12 psi	0.07 psi each	0.07 psi each	0.22 psi each
Dead volume V_{tot}	4.2 cu. in.	2.9 cu. in.	7.9 cu. in.	1.7/1.5 cu. in	1.7/1.5 cu. in	1.3/1.3 cu. in
Gas connections (metric)	G1/4" i	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	NPT 1/4" i	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4") [4]	1/4"-1/6"
Condensate out connection (metric)	G3/8" i	GL 25 (12 mm) [4]	G3/8" i	Tube 10 mm (6 mm)	GL18 (10 mm) [4]	DN 5/8
Condensate out connection (US)	NPT 3/8" i	GL 25 (1/2") [4]	NPT 3/8" i	Tube 3/8" (1/4")	GL18 (3/8") [4]	3/16"-5/16"

[1] Max. cooling capacity of the cooler must be considered.

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Condensate drain only possible with condensate pump

[4] Gasket inside diameter

[5] With temperature class T3 gases the permissible gas inlet temperature is max. 356 °F.

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:
Please note: Every individual gas path must be equipped with condensate drain.

4590	X	X	X	X	X	X	X	1	Product characteristics (metric connections)
									Voltage [1]
	1								115 V
	2								230 V
									Gas path/material/version
		0	0	0					without heat exchanger
									1 gas path/material/version
		1	1	0					1x single heat exchanger/stainless steel/TS
		1	2	0					1x single heat exchanger/glass/TG
		1	3	0					1x single heat exchanger/PVDF/TV
									2 gas paths/material/version
		2	1	0					2x single heat exchanger/stainless steel/TS
		2	2	0					2x single heat exchanger/glass/TG
		2	3	0					2x single heat exchanger/PVDF/TV
		2	6	0					1x dual heat exchanger/stainless steel/DTS (10 mm)
		2	6	1					1x dual heat exchanger/stainless steel/DTS-6
		2	7	0					1x dual heat exchanger/glass/DTG
		2	8	0					1x dual heat exchanger/PVDF/DTV [2]
									3 gas paths/material/version
		3	1	0					1x single heat exchanger + 1x dual heat exchanger/stainless steel/TS+DTS (10 mm)
		3	1	1					1x single heat exchanger + 1x dual heat exchanger/stainless steel/TS+DTS-6
		3	2	0					1x single heat exchanger + 1x dual heat exchanger/glass/TG+DTG
		3	3	0					1x single heat exchanger + 1x dual heat exchanger/PVDF/TV+DTV [2]
									4 gas paths/material/version
		4	6	0					2x dual heat exchanger/stainless steel/DTS (10 mm)
		4	6	1					2x dual heat exchanger/stainless steel/DTS-6
		4	7	0					2x dual heat exchanger/glass/DTG
		4	8	0					2x dual heat exchanger/PVDF/DTV [2]
									Condensate drain
					0	0	0		without condensate drain
									1 gas path
					1	1	1		1x peristaltic pump CPsingle with adapter [3]
					1	1	3		1x peristaltic pump CPsingle with screw connection [3]
					3	0	0		1x AK20 installed [3]
					4	0	0		1x 11 LD V38 installed
									2 gas paths
					1	2	2		1x peristaltic pump CPdouble with adapter [3]
					1	2	4		1x peristaltic pump CPdouble with screw connection [3]
					3	0	0		2x AK20 installed [3]
					4	0	0		2x 11 LD V38 installed
									3 gas paths
					1	3	2		1x peristaltic pump CPdouble + 1x peristaltic pump CPsingle with adapter [3]
					1	3	4		1x peristaltic pump CPdouble + 1x peristaltic pump CPsingle with screw connection [3]
					3	0	0		3x AK20 installed [3]
					4	0	0		3x 11 LD V38 installed
									4 gas paths
					1	4	2		2x peristaltic pump CPdouble with adapter [3]
					1	4	4		2x peristaltic pump CPdouble with screw connection [3]
					3	0	0		4x AK20 installed [3]
					4	0	0		4x 11 LD V38 installed

4590	X	X	X	X	X	X	X	1	Product characteristics (US connections)
									Voltage [1]
	1								115 V
	2								230 V
									Gas path/material/version
		0	0	0					without heat exchanger
									1 gas path/material/version
		1	1	5					1x single heat exchanger/stainless steel/TS-I
		1	2	5					1x single heat exchanger/glass/TG-I
		1	3	5					1x single heat exchanger/PVDF/TV-I
									2 gas paths/material/version
		2	1	5					2x single heat exchanger/stainless steel/TS-I
		2	2	5					2x single heat exchanger/glass/TG-I
		2	3	5					2x single heat exchanger/PVDF/TV-I
		2	6	5					1x dual heat exchanger/stainless steel/DTS-I (3/8")
		2	6	6					1x dual heat exchanger/stainless steel/DTS-6-I
		2	7	5					1x dual heat exchanger/glass/DTG-I
		2	8	5					1x dual heat exchanger/PVDF/DTV-I [2]
									3 gas paths/material/version
		3	1	5					1x single heat exchanger + 1x dual heat exchanger/stainless steel/TS+DTS-I (3/8")
		3	1	6					1x single heat exchanger + 1x dual heat exchanger/stainless steel/TS+DTS-6-I
		3	2	5					1x single heat exchanger + 1x dual heat exchanger/glass/TG+DTG-I
		3	3	5					1x single heat exchanger + 1x dual heat exchanger/PVDF/TV-I+DTV-I [2]
									4 gas paths/material/version
		4	6	5					2x dual heat exchanger/stainless steel/DTS-I (3/8")
		4	6	6					2x dual heat exchanger/stainless steel/DTS-6-I
		4	7	5					2x dual heat exchanger/glass/DTG-I
		4	8	5					2x dual heat exchanger/PVDF/DTV-I [2]
									Condensate drain
					0	0	0		without condensate drain
									1 gas path
					1	1	1		1x peristaltic pump CPsingle with adapter [3]
					1	1	3		1x peristaltic pump CPsingle with screw connection [3]
					3	0	0		1x AK20 installed [3]
					4	0	0		1x 11 LD V38 installed
									2 gas paths
					1	2	2		1x peristaltic pump CPdouble with adapter [3]
					1	2	4		1x peristaltic pump CPdouble with screw connection [3]
					3	0	0		2x AK20 installed [3]
					4	0	0		2x 11 LD V38 installed
									3 gas paths
					1	3	2		1x peristaltic pump CPdouble + 1x peristaltic pump CPsingle with adapter [3]
					1	3	4		1x peristaltic pump CPdouble + 1x peristaltic pump CPsingle with screw connection [3]
					3	0	0		3x AK20 installed [3]
					4	0	0		3x 11 LD V38 installed
									4 gas paths
					1	4	2		2x peristaltic pump CPdouble with adapter [3]
					1	4	4		2x peristaltic pump CPdouble with screw connection [3]
					3	0	0		4x AK20 installed [3]
					4	0	0		4x 11 LD V38 installed

[1] Cooler operation inside Ex area only permitted with suitable protective motor switch.

[2] Operation with condensate drains and traps not available.

[3] This option limits the approved application of the complete cooler to gas group IIB.

Spare Parts and Accessories

Item no.	Description
9132020009	Protective motor switch for installation outside Ex area 230 V, 50/60 Hz
9132020029	Protective motor switch for installation outside Ex area 115 V, 50/60 Hz
9132020032	Protective motor switch for installation inside Ex area 230 V, 50/60 Hz
9132020035	Protective motor switch for installation inside Ex area 115 V, 50/60 Hz
9110000078	Microfuse 125 mA, interrupt rating 1500 A
9120020139	Relay 24 VDC, 2 changeover contacts
9120020143	Relay 230 VAC, 2 changeover contacts
9146030314	Fuse clip
4410005	Condensate trap GL 1; glass, 0.4 L
4410019	Condensate trap GL 2; glass, 1 L
45099919	Mounting kit for peristaltic pump X1
44920035011	Condensate pump hose, Tygon (Norprene), straight hose nipple
44920035014	Condensate pump hose, Tygon (Norprene), screw connection (metric)
44920035015	Condensate pump hose, Tygon (Norprene), screw connection (US)

Gas Analysis

Sample gas cooler EGK 1 Ex2

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The EGK 1 Ex2 compressor sample gas cooler is ATEX, IECEx and EAC Ex approved and is suitable for operation in explosive zones with up to 2 gas paths.

- Ex approved Zone 2
- EAC Ex approval
- Compact installation
- One or two gas paths
- Heat exchanger made from stainless steel, Duran glass and PVDF
- Bühler constant control system
- Self-monitoring
- Block temperature display
- Status alarm
- Rated cooling power 303 Btu/h
- Dew point stability 0.2 °F
- CFC-free

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
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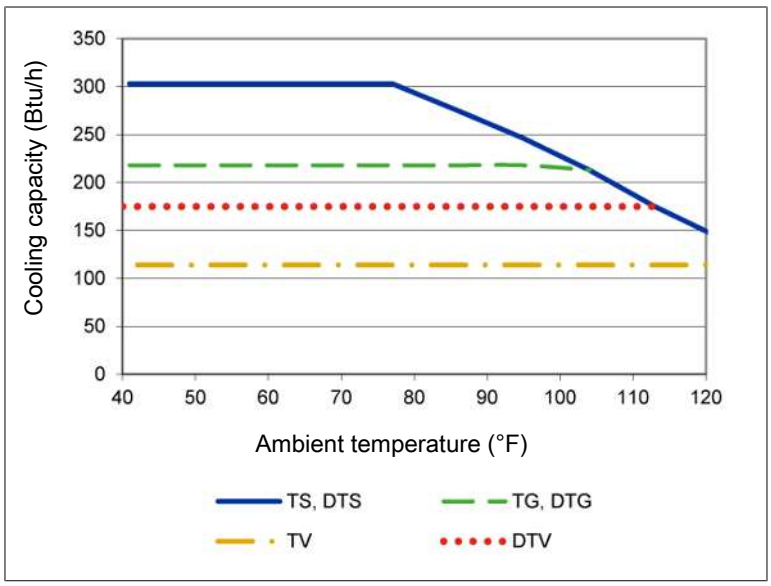
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Please note for this device:

The equipment must be installed in a lockable housing or cabinet that has a degree of protection of at least IP54 and meets the requirements of EN/IEC 60079-0 or alternatively EN/IEC 60079-7 in type of protection 'Ex e' for category 3/EPL Gc (zone 2).

Performance data



Remark: The limit curves for the heat exchangers exchanger apply to a dew point of 149 °F.

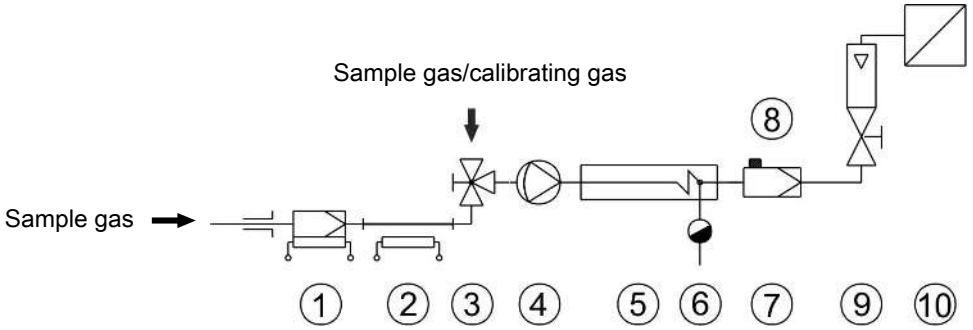
Gas cooler technical data

Gas Cooler Technical Data			
Ready for operation:	after max. 15 minutes		
Rated cooling capacity (at 77 °F):	303 Btu/hr		
Ambient temperature:	41 °F to 122 °F		
Gas outlet dew point preset: adjustable:	 approx. 41 °F 37 °F to 68 °F		
Dew point fluctuations static: in the entire specification range:	 ± 0.1 K ± 1.5 K		
IP rating:	IP 20		
Housing:	Stainless steel		
Packaging dimensions:	approx. 15.4 x 11.8 x 15.7 in		
Weight incl. heat exchanger:	approx. 33.1 lb		
Electric supply:	115 V, 60 Hz or 230 V, 50 Hz Plug per DIN EN 175301-803 EAC Ex version incl. mains and connection cable		
Electrical data:		230 V	115 V
	Typical power input:	140 VA	155 VA
	max. operating current:	1.6 A	3.2 A
	temporary starting currents are significantly higher.		
Status output switching capacity:	max. 250 V, 2 A, 50 VA Connector per DIN EN 175301-803		
Installation:	stand-alone or wall-mounted, dry and dust-free		
Markings:	ATEX: Ⓔx II 3G Ex ec nA nC IIC T4 Gc IECEx: Ex ec nA nC IIC T4 Gc EAC Ex: 2Ex e nA nC IIC T4		
Applied standards:	IEC 60079-0 (Ed. 6.0); IEC 60079-7 (Ed. 5.0); IEC 60079-15 (Ed. 4.0) EN 60079-0:2012+A11:2013; EN 60079-7:2015; EN 60079-15:2010		
IECEx certificate number:	IECEx IBE 17.0023X		
EAC Ex certificate number:	TC RU C-DE.МЮ62.B.05995		

Technical Data - Options

CPsingle Peristaltic Pumps Technical Data	
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Protection class	IP 40
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

Diagram typical installation



1	Sample gas probe	2	Sample gas line
3	Reversing tap	4	Sample gas pump
5	Sample gas cooler	6	Automatic condensate drain or peristaltic pump
7	Fine mesh filter	8	Moisture detector
9	Flow meter	10	Analyser

See data sheets for individual component models and data.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, (inlet) dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 149 °F and ϑ_G = 194 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the TG heat exchanger the parameter triple τ_e = 149 °F, ϑ_G = 194 °F and v = 4.7 lpm may also be used in place of τ_e = 122 °F, ϑ_G = 176 °F and v = 6.3 lpm.

Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	TS TS-I [2]	TG TG	TV TV-I [2]	DTS (DTS-6 [3]) DTS-I (DTS-6-I [3]) [2]	DTG DTG	DTV [3] DTV-I [2] [3]
Materials in contact with media	Stainless steel	Glass PTFE	PVDF	Stainless steel	Glass PTFE	PVDF
Flow rate v_{max} [1]	8.9 lpm	4.7 lpm	2.6 lpm	2 x 4.2 lpm	2 x 2.3 lpm	2 x 2 lpm
Inlet dew point $\tau_{e,max}$ [1]	175 °F	175 °F	149 °F	175 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$	266 °F (356 °F) [5]	266 °F	266 °F	266 °F (356 °F) [5]	266 °F	266 °F
Max. cooling capacity Q_{max}	427 Btu/h	218 Btu/h	114 Btu/h	427 Btu/h	218 Btu/h	175 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	44 psi	25 bar	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.12 psi	0.12 psi	0.1 psi each	0.1 psi each	0.22 psi each
Dead volume V_{dead}	4.2 cu. in.	2.9 cu. in.	7.9 cu. in.	1.7/1.5 cu. in.	1.7/1.5 cu. in.	1.3/1.3 cu. in.
Gas connections (metric)	G1/4	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	NPT 1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")[4]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	Tube 10 mm (6 mm)	GL18 (10 mm) [4]	DN 5/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	Tube 3/8" (1/4")	GL18 (3/8") [4]	3/16"-5/16"

[1] Considering the maximum cooling capacity of the cooler.

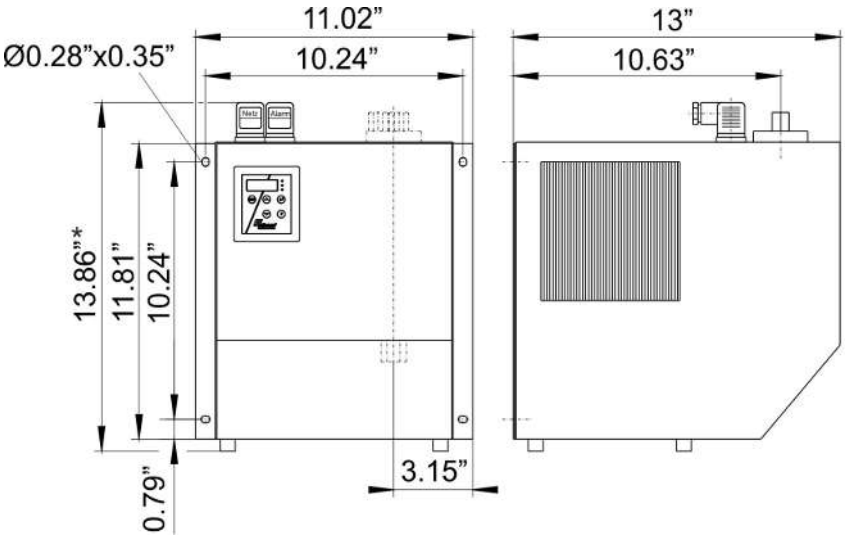
[2] Models marked I have NPT threads or US tubes, respectively.

[3] Condensate drain only possible with condensate pump.

[4] Gasket inside diameter.

[5] With temperature class T3 gases the permissible gas inlet temperature is max. 356 °F.

Dimensions (mm)



* on EAC Ex unit 14.13 inch through connection cable.

Ordering instructions

Gas cooler

The item number is a code for the configuration of your unit. Please use the following model key:

Please note: Every individual gas path must be equipped with peristaltic pump or condensate drain.

4563	211	X	X	X	X	X	X	0	0	0	Product Characteristics
											Certifications
		2									ATEX Zone 2
		5									EAC Ex
											Voltage
			1								115 V, 60 Hz
			2								230 V, 50 Hz
											Heat exchanger
				1	1	0					1 gas path, stainless steel/ (TS), metric
				1	1	5					1 gas path, stainless steel/ (TS-I), US
				1	2	0					1 gas path, glass/ (TG), metric
				1	2	5					1 gas path, glass/ (TG), US hoses
				1	3	0					1 gas path, PVDF/ (TV), metric
				1	3	5					1 gas path, PVDF/ (TV-I), US
				2	6	0					2 gas paths, stainless steel/ (DTS), metric
				2	6	1					2 gas paths, stainless steel/ (DTS-6) [1], metric
				2	6	5					2 gas paths, stainless steel/ (DTS-I), US
				2	6	6					2 gas paths, stainless steel/ (DTS-6-I) [1], US
				2	7	0					2 gas paths, glass/ (DTG), metric
				2	7	5					2 gas paths, glass/ (DTG-I), US hoses
				2	8	0					2 gas paths, PVDF/ (DTV) [1], metric
				2	8	5					2 gas paths, PVDF/ (DTV-I) [1], US
											Condensate drain [2]
							0				without condensate drain
							1				Peristaltic pump CPsingle with hose connection 90° angle [2]
							2				2 peristaltic pumps CPsingle with 90° elbow hose connection [2]
							3				CPsingle peristaltic pump with screw-in hose connection [2]
							4				2 peristaltic pumps CPsingle with screw-in hose connection [2]

[1] Condensate outlets only suitable for connecting peristaltic pumps.

[2] Each gas path equipped with a peristaltic pump. The supply voltage corresponds with that of the main unit.

Consumables and accessories

Item no.	Description
4410 001	Automatic condensate drain 11 LD V 38
4410004	Automatic condensate drain AK 20, PVDF *
4410005	Condensate trap GL 1; glass, 0.4 L *
4410019	Condensate trap GL 2; glass, 1 L *
44920035011	Condensate pump hose, Tygon (Norprene), straight hose nipple
44920035012	Condensate pump hose, Tygon (Norprene), angled hose nipple
44920035013	Condensate pump hose, Tygon (Norprene), straight and angled hose nipple
44920035016	Condensate pump hose, Tygon (Norprene), angled hose nipple and screw connection (metric)
44920035017	Condensate pump hose, Tygon (Norprene), angled hose nipple and screw connection (US)
44921222102	Peristaltic pump CPsingle-OEM-AC X2 with angled hose nipple
44921222104	Peristaltic pump CPsingle-OEM-AC X2 with screw-in hose connection (metric)
44921222105	Peristaltic pump CPsingle-OEM-AC X2 with screw-in hose connection (US)

*approved for non-flammable and flammable gases explosion class IIB.

Peristaltic condensate and metering pumps CPsingle, CPdouble

Condensate accumulates when conditioning gas in gas conditioning. It always accumulates when cooling moist sample gas. On one hand this may occur inadvertently if thermal bridges occur in the sample gas lines. On the other hand the deposit of moisture is necessary to protect the measuring cells in the analyser from damage and/ or stabilise measurements.

Since the sample gas is often conveyed through the analysis system with suction, the condensate must be pumped off to remove it.

So-called peristaltic pumps are particularly suited for this purpose. They systemically protect the sample gas system from external air and based on the hose material used offer high resistance against the often times highly corrosive condensate.

The CPsingle and CPdouble pump series were developed specifically for these severe operating conditions.

- Built-in and housing version
- FM approval optional
- Separate installation possible
- Various flow rates
- Metering pumps with low flow rates
- Easy to replace hoses
- Various hose materials available for demanding applications
- 115/230 V AC or 24 V DC
- Used in **DNV-GL and LR type-tested** conditioning unit
- Can be used in a system to maintain **the IMO MARPOL MEPC.259(68)** .
- Special design for use in high vibration environments

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
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Internet: www.buhlertech.com

Pump models for the USA and Canada 4492***1*** in non-explosive areas

The peristaltic pumps must be installed inside a housing which requires a tool to open and meets the requirements of the overall installation with respect to the housing, layout, space requirement and condensate separation.

Select a housing which meets the requirements of the pump's intended use with respect to mounting, spacing and creepage paths. The housing must be suitable for operating temperatures of 0 °C to min. 52 °C.

It must be fully wired inside the housing. The cables and terminals used must be US-listed or (if applicable) CSA certified. They must be designed for the nominal voltage, the nominal current and an operating temperature range of 0 °C to 52 °C.

Water and contaminants must be prevented from entering the unit.

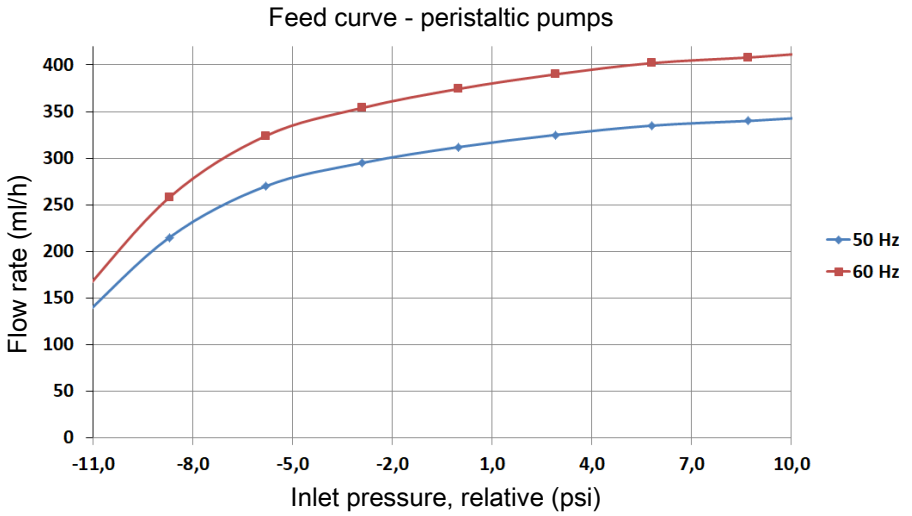
Technical data

Technical Data CPsingle/CPdouble Peristaltic Pumps

Supply voltage/power input: at T_{amb} = 68 °F (20 °C) and under load	230 V 50/60 Hz, 0.028 A 115 V 50/60 Hz, 0.046 A 24 V DC, 0.1 A *	
Flow rate:	0.3 l/h (50 Hz)/0.36 l/h (60 Hz) with standard hose 13 ml/h (50 Hz)/15 ml/h (60 Hz) 61 ml/h (50 Hz)/73 ml/h (60 Hz) 25 ml/min or 1.5 L/h (at 24 V DC)	
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) 2 Hz-13.2 Hz Amplitude ± 1.0 mm 13.2 Hz -100 Hz 0.7g acceleration	
Inlet vacuum:	max. 11.6 psi	
Inlet pressure:	max. 14.5 psi	
Outlet pressure:	14.5 psi	
Weight:	CPsingle-SA: 1.54 lb CPsingle-OEM: 1.04 lb CPsingle-24V: 0.97 lb	CPdouble-SA: 1.63 lb CPdouble-OEM: 1.12 lb CPdouble-24V: 1.08 lb
Protection class:	IP 44 (housing version) IP 40 (built-in version)	
Ambient temperatures:	T_{max} = 131 °F (55 °C)(housing version) T_{max} = 140 °F (60 °C) (built-in version) T_{amb} = 32 ... 122 °F (0 ... 50 °C) (FM versions)	
Cable lengths:	6.6 ft (2 m) (housing version 115/230 V) 19.7 in (500 mm) (Built-in version 115/230 V) 9.8 in (250 mm) (24 V DC)	
Parts in Contact with Mediums Hose: Connections:	 Tygon (Norprene) (standard), Marprene, Fluran PVDF Straight 5 mm (recommended hose 4/6) Elbow 6 mm (recommended hose 5/8) Screw-in connection DN 4/6 or 1/6" – 1/4"	
FM no.:	3058168	

* Lifetime 24 V DC 3000 h

Flow rate



When operating the pumps with 60 Hz, the values increase by 20 %.

Calculating condensate accumulation

Dew point	86	104	122	140	158	176	°F
Moisture content Vol %	4	7	12	20	31	47	Vol %
Moisture accumulation (w) per 100 Nl/h/cooled air	2.2	4	6.5	12	22	44	$\frac{ml}{h}$ per 100 Nl

Total condensate accumulation formula:

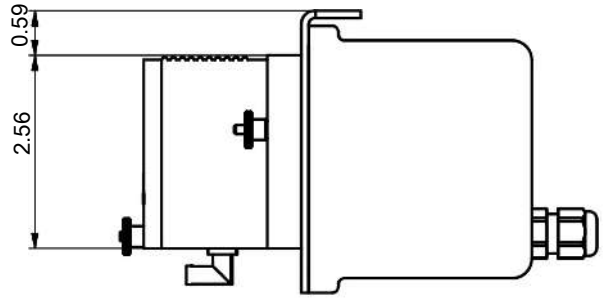
$$w_{tl} = \frac{\text{Cooled air flow}}{100\ \text{Nl/h}} \cdot w\ (\text{inlet dew point})$$

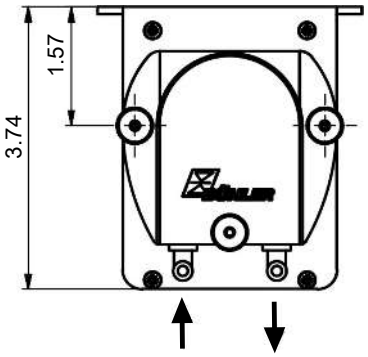
Example: 180 Nl/h behind the cooler; Inlet dew point 122 °F (50 °C).

$$w_{tl} = \frac{180\ \text{Nl/h}}{100\ \text{Nl/h}} \cdot 6.5\ \frac{ml}{h} = 12\ \frac{ml}{h}$$

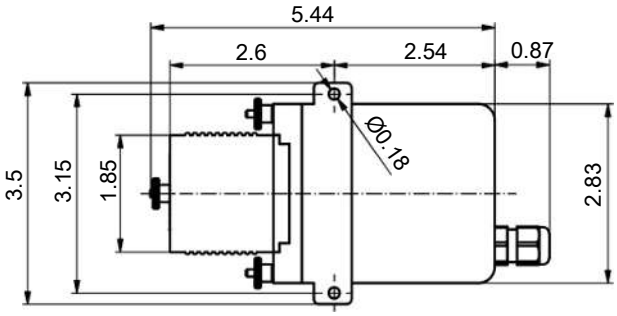
Dimensions of peristaltic pumps 115 / 230 V

Housing versions

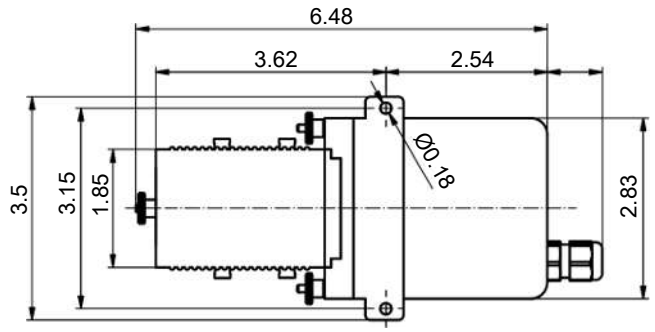




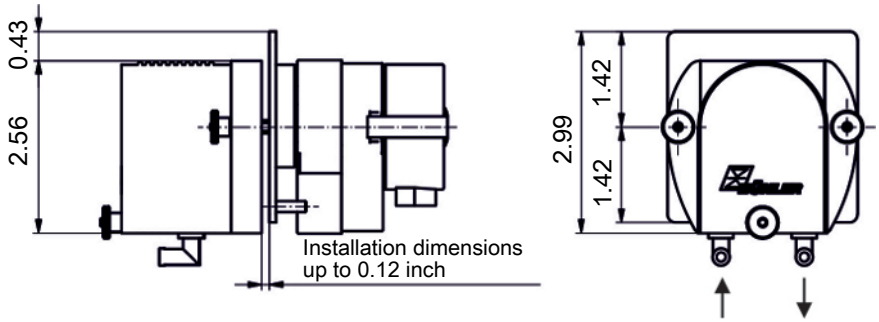
Housing version with 1 gas path



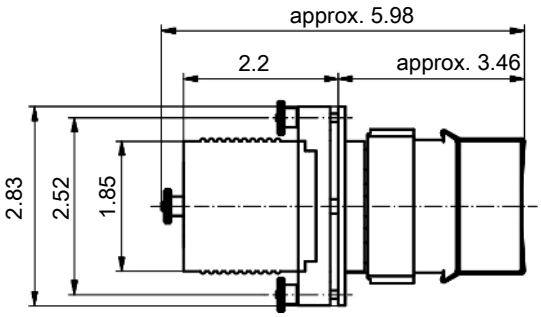
Housing version with 2 gas paths



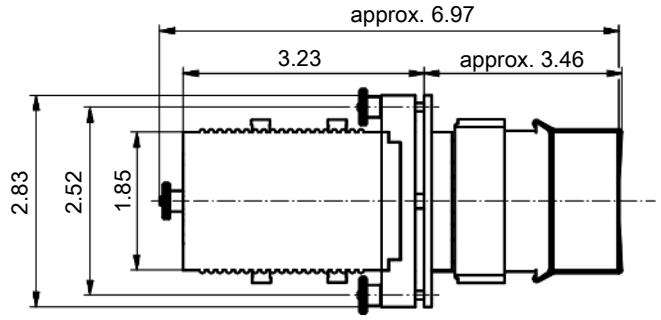
Built-in versions



Built-in version with 1 gas path



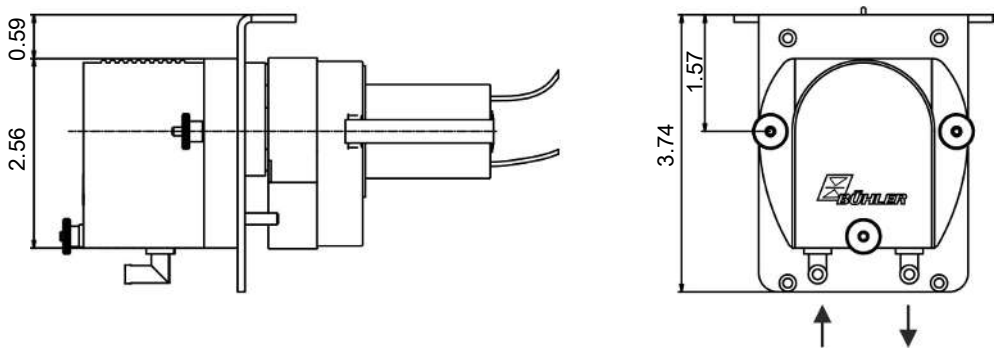
Built-in version with 2 gas paths



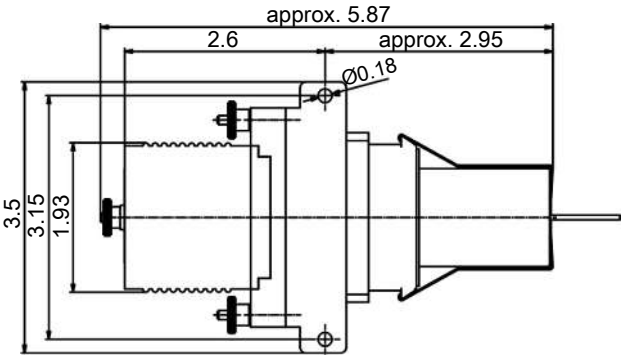
(All dimensions in inch)

Dimensions of peristaltic pumps 24 V

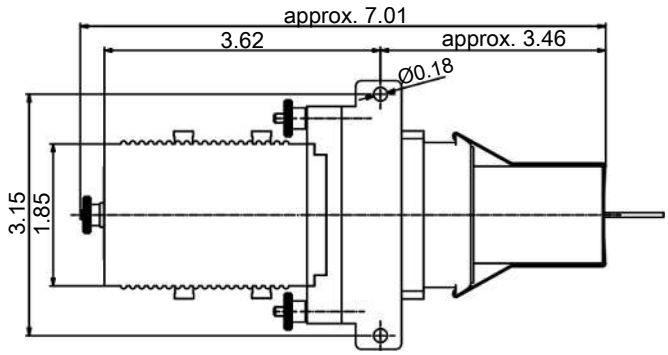
Housing versions



Housing version with 1 gas path

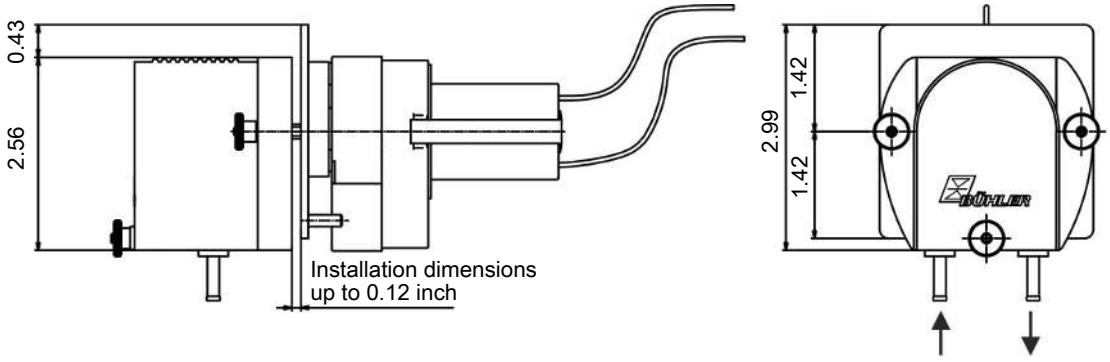


Housing version with 2 gas paths

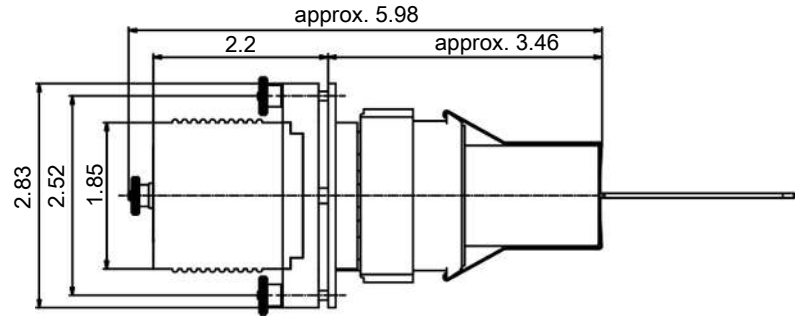


(All dimensions in inch)

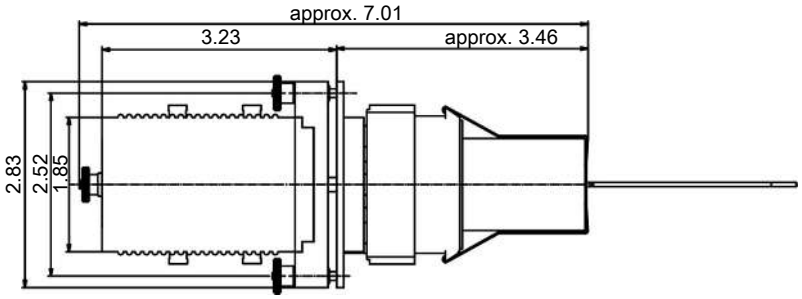
Built-in versions



Built-in version with 1 gas path



Built-in version with 2 gas paths



(All dimensions in inch)

Selection matrix for peristaltic pumps and subsequent add-on cooler

Cooler model	Built-in (OEM)/ Housing version (SA)	Flow rate l/h for 230 V/50 Hz	Single (S)/ Double (D) version
TC-MINI	SA (separate installation only)	0,3	S
TC-Standard (+)	SA	0,3	S or D
TC-Double (+)	SA	0,3	D
TC-MIDI (+)	OEM	0,3	S or D
EGK 1/2	OEM	0,3	S or 2x S
EGK 2-19 (+)	OEM	0,3	S or 2x S
EGK 1SD	SA (separate installation only)	0,3	S or D
EGK 10	SA	1,0	S
TS 10	OEM	1,0	S
RC 1.1	OEM	0,3	S or D
RC 1.2+	OEM	0,3	S or D

Peristaltic pump ordering information

The item number is a code for the configuration of your unit. Please use the following model code:

4492	X	X	X	X	X	X	X	Product Characteristic
								Gas path
	1							Single gas path
	2							Double gas path
								Version
		1						Housing version
		2						Built-in version
								Supply voltage
			2					115/230 V AC
			4					24 V DC
								Area of application
				0				Standard applications – CE
				1				for common locations with FM approval
								Hose material [1) 2)]
					1			Tygon (Norprene)
					2			Fluran
					3			Marprene
								Flow rate/hour
						0		0.3 L/h
						2		13 ml/h (only 115/230 V AC, single gas path)
						3		61 ml/h (only 115/230 V AC, single gas path)
						4		25 ml/min or 1.5 L/h (only 24 V DC, single gas path, for standard applications – CE)
								Hose connection [3)]
							1	straight hose nipple
							2	angled hose nipple
							3	straight and angled hose nipple
							4	Screw connection (metric) DN 4/6
							5	Screw connection (US) 1/6"-1/4"
							6	angled hose nipple and screw connection (metric)
							7	angled hose nipple and screw connection (US)
							8	straight hose nipple and screw connection (metric)
							9	straight hose nipple and screw connection (US)

[1)] Please note hose material information during selection.

[2)] For 1.5 L/h pumps as well as 13 ml/h and 61 ml/h metering pumps the only hose material option is Tygon (Norprene).

[3)] For 1.5 L/h pumps as well as 13 ml/h and 61 ml/h metering pumps the only hose connections choices are "Option 4 and 5".

Information on hose materials

The standard hose in Norprene has excellent mechanical properties with high chemical resistance to many substances.

Marprene offers a long life for many applications with high chemical resistance, particularly when oxidation agents are present. This is therefore the first alternative to the standard Norprene hose.

Fluran is particularly beneficial if the condensate contains oils, petrols and other solvents. The mechanical properties should rather be assessed weaker, so we only recommend this hose material for the specified chemicals.

The flow capacity of Fluran and Marprene hoses is slightly lower.

Other materials are available on request.

Peristaltic condensate and metering pumps CPsingle 11

Condensate accumulates when conditioning gas in gas conditioning. It always accumulates when cooling moist sample gas. On one hand this may occur inadvertently if thermal bridges occur in the sample gas lines. On the other hand the deposit of moisture is necessary to protect the measuring cells in the analyser from damage and/ or stabilise measurements.

Since the sample gas is often conveyed through the analysis system with suction, the condensate must be pumped off to remove it.

So-called peristaltic pumps are particularly suited for this purpose. They systemically protect the sample gas system from external air and based on the hose material used offer high resistance against the often times highly corrosive condensate.

The CPsingle pump series was designed specifically for severe conditions.

- Built-in and housing version
- 115/230 V AC
- Separate installation possible
- Easy to replace hoses

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Technical data

CPsingle 11 Peristaltic Pumps Technical Data	
Nominal voltage / Power input at T_{amb} = 68 °F and under load	230 V 50 Hz 0.025 A 115 V 60 Hz 0.044 A
Flow rate:	0.016 lpm (50 Hz) / 0.02 lpm (60 Hz)
Inlet vacuum:	max. 11.6 psi
Inlet pressure:	max. 14.5 psi
Outlet pressure:	1 bar
Weight:	CPsingle-SA: 1.540,47 lb (0.7 kg) (housing version) CPsingle-OEM: 1.03 lb (0.47 kg) (built-in version)
IP rating:	IP 44 (housing version) IP 40 (built-in version)
Ambient temperatures:	T_{max} = 131 °F (55 °C) (housing version) T_{max} = 140 °F (60 °C) (built-in version)
Cable lengths:	6.6 ft (2 m) (housing version 115/230 V) 19.7 in (500 mm) (built-in version 115/230 V)
Parts in Contact with Mediums Hose: Connections:	 Tygon (Norprene), others on request PVDF Straight 5 mm (recommended hose 4/6) Elbow 6 mm (recommended hose 5/8) Screw-in connection DN 4/6 or 1/6" – 1/4"

Calculating condensate accumulation

Dew point	86	104	122	140	158	176	°F
Moisture content Vol %	4	7	12	20	31	47	Vol %
Moisture accumulation (w) per 100 Nl/h/cooled air	2.2	4	6.5	12	22	44	$\frac{ml}{h}$ per 100 Nl

Total condensate accumulation formula:

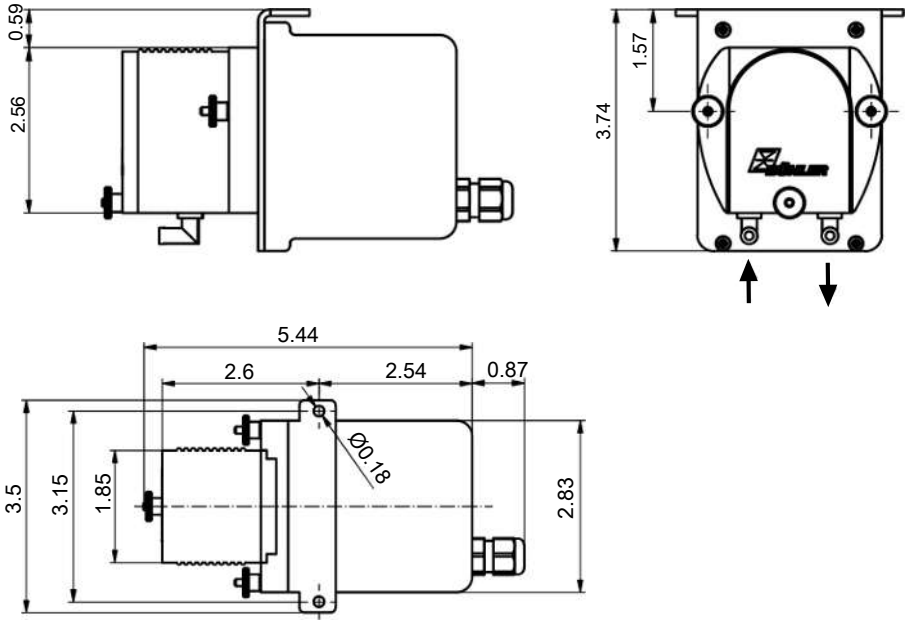
$$w_{tl} = \frac{\text{Cooled air flow}}{100\ \text{Nl/h}} \cdot w\ (\text{inlet dew point})$$

Example: 180 Nl/h behind the cooler; Inlet dew point 122 °F (50 °C).

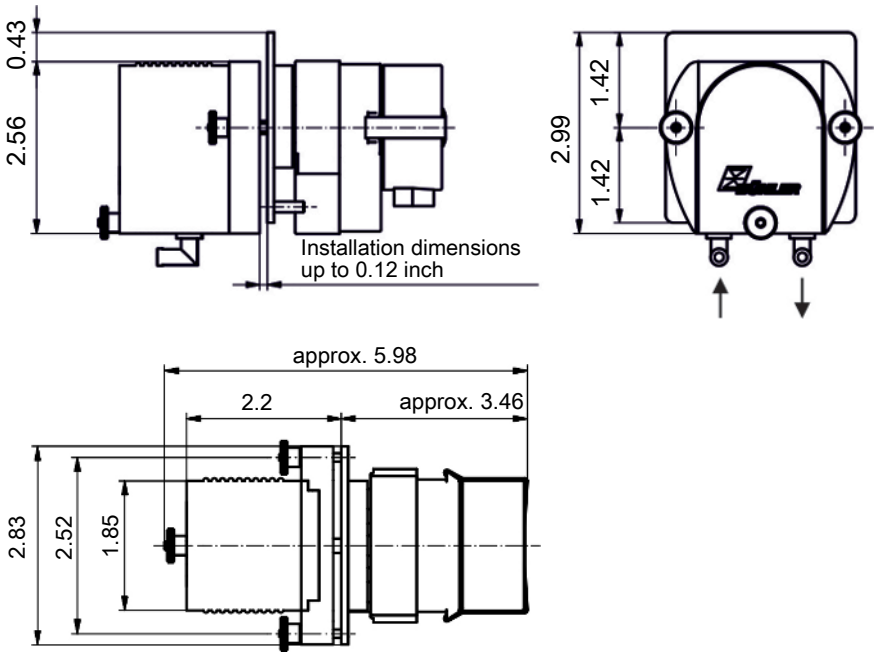
$$w_{tl} = \frac{180\ \text{Nl/h}}{100\ \text{Nl/h}} \cdot 6.5\ \frac{ml}{h} = 12\ \frac{ml}{h}$$

Dimensions

Housing version



Built-in version



Selection matrix for peristaltic pumps and subsequent add-on cooler

Cooler model	Built-in (E)/housing version (G)	Flow rate L/h	Single (E)/double version (D)
EGK 10	G	1.0	E
TS 10	E	1.0	E

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4492	1	X	X	0	1	1	X	Product Characteristic
								Gas path
	1							Single gas path
								Version
		1						Housing version
		2						Built-in version
								Supply voltage
			7					115 V, 60 Hz
			8					230 V 50 Hz
								Area of application
				0				Standard applications – CE
								Hose material
					1			Tygon (Norprene)
								Flow rate/hour
						1		1 L/h
								Hose connection
							1	straight hose nipple
							2	angled hose nipple
							3	straight and angled hose nipple
							4	Screw connection (metric) DN 4/6
							5	Screw connection (US) 1/6"-1/4"
							6	angled hose nipple and screw connection (metric)
							7	angled hose nipple and screw connection (US)
							8	straight hose nipple and screw connection (metric)
							9	straight hose nipple and screw connection (US)

Peristaltic condensate pumps CPsingle X1, CPdouble X1

Condensate accumulates when conditioning gas in gas conditioning. It always accumulates when cooling moist sample gas. On one hand this may occur inadvertently if thermal bridges occur in the sample gas lines. On the other hand the deposit of moisture is necessary to protect the measuring cells in the analyser from damage and/ or stabilise measurements.

Since the sample gas is often conveyed through the analysis system with suction, the condensate must be pumped off to remove it.

So-called peristaltic pumps are particularly suited for this purpose. They systemically protect the sample gas system from external air and based on the hose material used offer high resistance against the often times highly corrosive condensate.

Many applications require equipment which can be used in explosive areas. This is where the CPsingle X1 and CPdouble X1 with flame-proof synchronous geared motors solutions for zone 1.

The CPsingle X1 and CPdouble X1 pump series were developed specifically for these severe operating conditions.

- Suitable for use in Zone 1 according to ATEX and IECEx
- Housing version
- Pumps available with single or double head
- Separate installation possible
- Easy to replace hoses
- 115/230 V AC
- Reliable

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e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

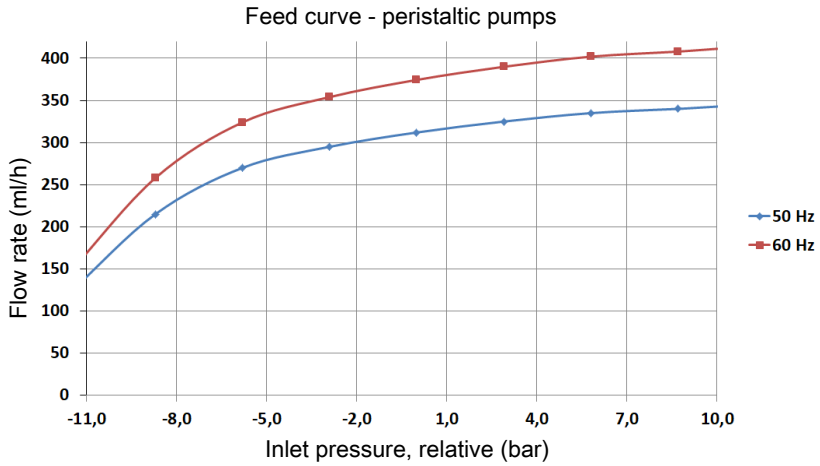
Technical data

Technical Data CPsingle/CPdouble Peristaltic Pumps	
Nominal voltage / power input: at T_{amb} = 68 °F and under load	230 V 50/60 Hz, 0.026 A (50/60 Hz) 115 V 50/60 Hz, 0.052 A (50/60 Hz) ±5 % voltage, ±2 % frequency
Flow rate:	0.005 lpm (50 Hz)/0.006 lpm (60 Hz) with standard hose
Inlet vacuum:	max. 12 psi
Inlet pressure:	max. 15 psi
Output pressure:	15 psi
Degree of protection:	IP 40
Ambient temperature:	32 ... +140 °F
Cord length:	9.8 ft (3 m)
Materials Hose: Connections:	 Norprene (standard) PVDF
Motor markings:	ATEX: ⟨Ex⟩ II 2G Ex db IIB T4 Gb IECEx: Ex db IIB T4 Gb
Pump marking:	⟨Ex⟩ II 2G c IIB T4 X

The motor may be operated without protective circuit and depending on the housing length is designed for maximum heating in the event of a fault.

The expected life of the motor is over 30,000 operating hours.

Flow rate



When operating the pumps with 60 Hz, the values increase by 20 %.

Calculating condensate accumulation

Dew point	86	104	122	140	158	176	°F
Moisture content Vol %	4	7	12	20	31	47	Vol %
Moisture accumulation (w) per 100 Nl/h/cooled air	2.2	4	6.5	12	22	44	$\frac{ml}{h}$ per 100 Nl

Total condensate accumulation formula:

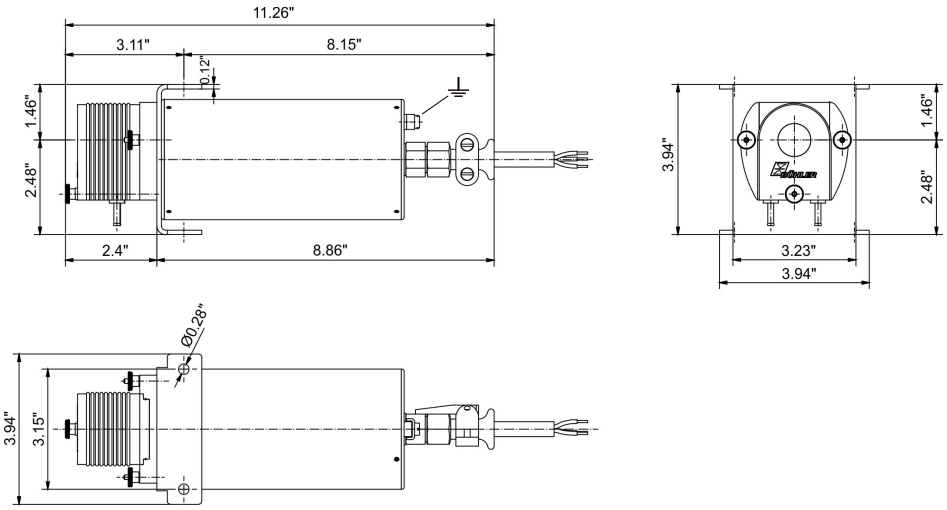
$$w_{tl} = \frac{\text{Cooled air flow}}{100\ \text{Nl/h}} \cdot w\ (\text{inlet dew point})$$

Example: 180 Nl/h behind the cooler; Inlet dew point 122 °F (50 °C).

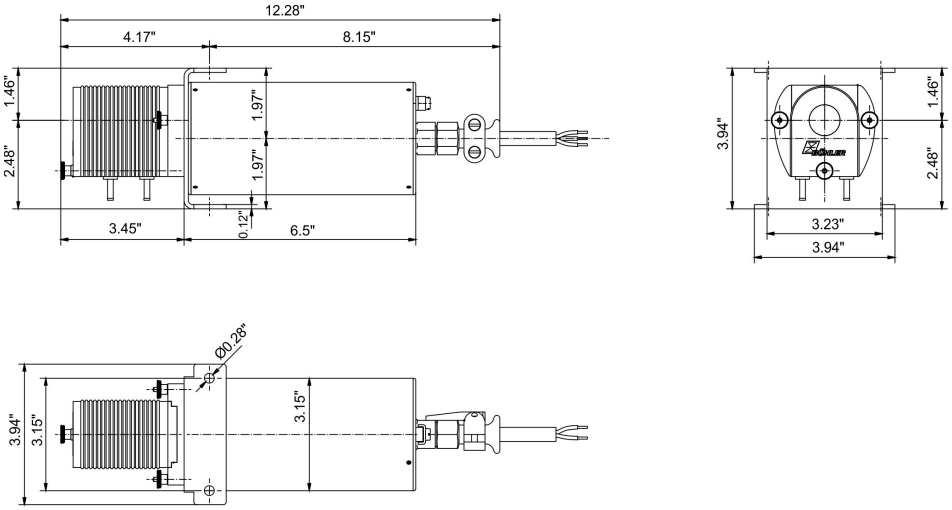
$$w_{tl} = \frac{180\ \text{Nl/h}}{100\ \text{Nl/h}} \cdot 6.5\ \frac{ml}{h} = 12\ \frac{ml}{h}$$

Dimensions of peristaltic pumps 115 / 230 V

Version with 1 gas path



Version with 2 gas paths



Peristaltic pump ordering information

The item number is a code for the configuration of your unit. Please use the following model key:

4492	X	1	X	3	1	0	X	Product Characteristic
								Gas path
	1							Single gas path
	2							Double gas path
								Version
		1						Housing version
								Supply voltage
			1					115 V AC
			3					230 V AC
								Area of application
				3				for explosive areas zone 1
								Hose material
					1			Norprene
								Flow rate / hour
						0		0.3 L/h
								Hose connection
							1	straight hose nipple
							4	Screw connection (metric) DN 4/6
							5	Screw connection (US) 1/6" - 1/4"

Peristaltic condensate pumps CPsingle X2, CPdouble X2

Condensate accumulates when conditioning gas in gas conditioning. It always accumulates when cooling moist sample gas. On one hand this may occur inadvertently if thermal bridges occur in the sample gas lines. On the other hand the deposit of moisture is necessary to protect the measuring cells in the analyser from damage and/ or stabilise measurements.

Since the sample gas is often conveyed through the analysis system with suction, the condensate must be pumped off to remove it.

So-called peristaltic pumps are particularly suited for this purpose. They systemically protect the sample gas system from external air and based on the hose material used offer high resistance against the often times highly corrosive condensate.

Many applications require equipment suitable for explosive areas. This is where CPsingle X2 and CPdouble X2 provides solutions for Zone 2 or Cl.1/Div.2

The CPsingle X2 and CPdouble X2 pump series were developed specifically for these severe operating conditions.

- Versions with ATEX 2, IECEx and Cl.1 Div.2 approval
- Built-in and housing version
- Pumps available with single or double head
- Separate installation possible
- Various flow rates
- Easy to replace hoses
- Various hose materials available for demanding applications
- 115/230 V AC
- Reliable

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Internet: www.buhlertech.com

Pump models for the USA and Canada 4492***2*** in explosive areas

The peristaltic pumps must be installed inside a housing which requires a tool to open and meets the requirements of the overall installation with respect to the housing, layout, space requirement and condensate separation.

Select a housing which meets the requirements of the pump's intended use with respect to mounting, spacing and creepage paths. The housing must be suitable for operating temperature ranges of -20 °C to min. 52 °C (US) and 0 °C to min. 52 °C (Canada).

It must be fully wired inside the housing. The cables and terminals used must be US-listed or (if applicable) CSA certified. They must be designed for the nominal voltage, the nominal current and operating temperature ranges of -20 °C to min. 52 °C (US) and 0 °C to min. 52 °C (Canada).

Water and contaminants must be prevented from entering the unit.

ATEX and IECEx certified pump models 4492**22**

Wiring incl. earth conductor must be carried out using connection terminals and inside a housing which meets the requirements under EN/IEC 60947-7-1, 60947-7-2, or 60999-1 (if applicable) or is approved for the nominal voltage, nominal current and the operating temperature of 0 °C to at least 52 °C and is Ex e certified.

The earth conductor wiring must meet the earth conductor requirements per EN 60079-0 /IEC 60079-0.

The equipment must be installed in a lockable housing. The housing must have a minimum degree of protection of IP54 and meet the requirements under EN 60079-0 (IEC 60079-0) or be Ex e certified. The housing must require a tool to open. Install according to the installation requirements of IEC/EN 60079-14.

The housing must further meet the requirements of the overall installation with respect to the housing, layout, space requirement and condensate separation. The housing must be suitable for operating temperatures of 0 °C to min. 52 °C.

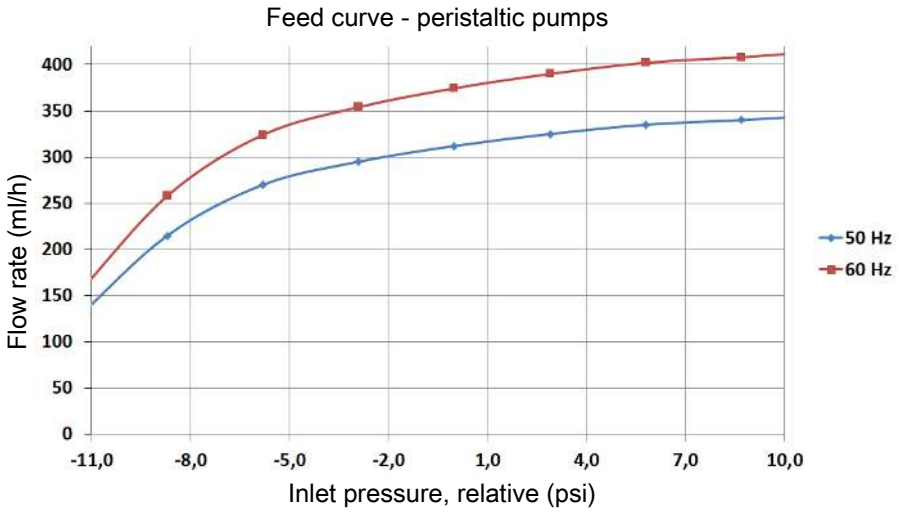
Water and contaminants must be prevented from entering the unit.

Technical data

Technical data peristaltic pumps CPsingle X2/CPdouble X2

Supply voltage/power input: at T_{amb} = 68 °F (20 °C) and under load	230 V 50/60 Hz, 0.028 A 115 V 50/60 Hz, 0.046 A	
Flow rate:	0.3 l/h (50 Hz)/0.36 l/h (60 Hz) with standard hose 13 ml/h (50 Hz)/15 ml/h (60 Hz) 61 ml/h (50 Hz)/73 ml/h (60 Hz)	
Inlet vacuum:	max. 11.6 psi	
Inlet pressure:	max. 14.5 psi	
Outlet pressure:	14.5 psi	
Weight:	CPsingle-SA: 1.54 lb CPsingle-OEM: 1.04 lb	CPdouble-SA: 1.63 lb CPdouble-OEM: 1.12 lb
Protection class:	IP 44 (housing version) IP 40 (built-in version)	
Ambient temperatures:	T_{amb} = 32 ... 122 °F (0 ... 50 °C)	
Cable lengths:	6.6 ft (2 m) (housing version 115/230 V) 19.7 in (500 mm) (Built-in version 115/230 V)	
Parts in Contact with Mediums Hose: Connections:	 Tygon (Norprene) (Standard), Marprene, Fluran PVDF	
Markings:	FM16ATEX0030X II 3G Ex nA IIC T4 Gc IECEx FMG 16.0018X Ex nA IIC T4 Gc USA/Canada: CL.1/Div. 2 Gps: A,B,C,D T4	

Flow rate



When operating the pumps with 60 Hz, the values increase by 20 %.

Calculating condensate accumulation

Dew point	86	104	122	140	158	176	°F
Moisture content Vol %	4	7	12	20	31	47	Vol %
Moisture accumulation (w) per 100 Nl/h/cooled air	2.2	4	6.5	12	22	44	$\frac{ml}{h}$ per 100 Nl

Total condensate accumulation formula:

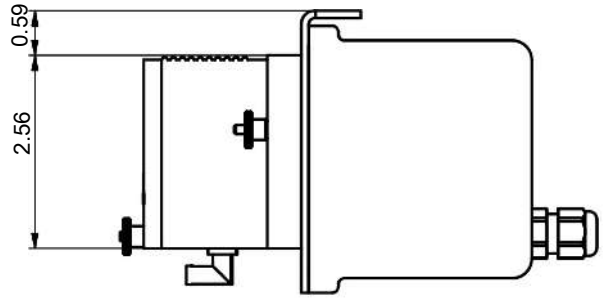
$$w_{tl} = \frac{\text{Cooled air flow}}{100\ \text{Nl/h}} \cdot w\ (\text{inlet dew point})$$

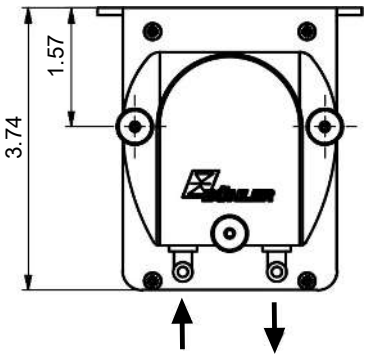
Example: 180 Nl/h behind the cooler; Inlet dew point 122 °F (50 °C).

$$w_{tl} = \frac{180\ \text{Nl/h}}{100\ \text{Nl/h}} \cdot 6.5\ \frac{ml}{h} = 12\ \frac{ml}{h}$$

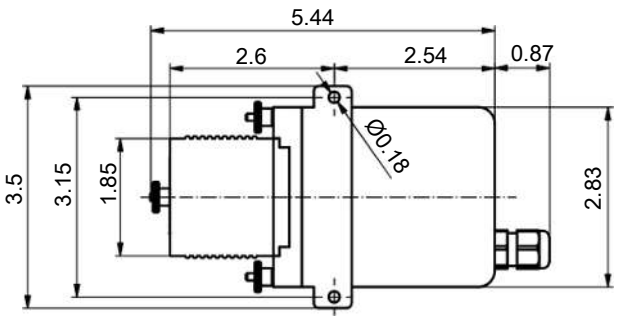
Dimensions of peristaltic pumps 115 / 230 V

Housing versions

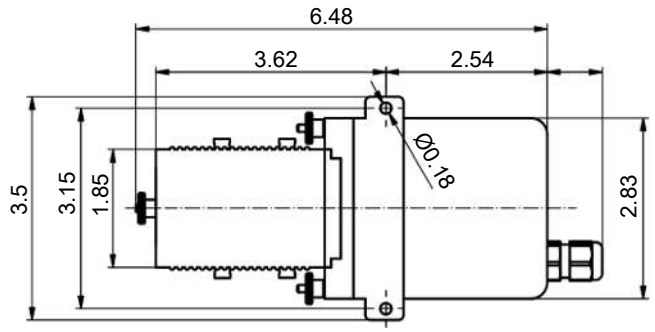




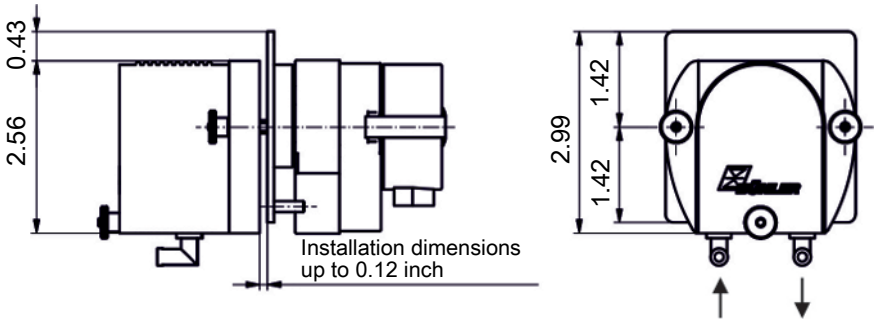
Housing version with 1 gas path



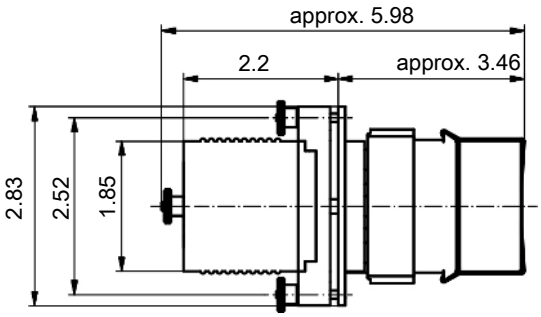
Housing version with 2 gas paths



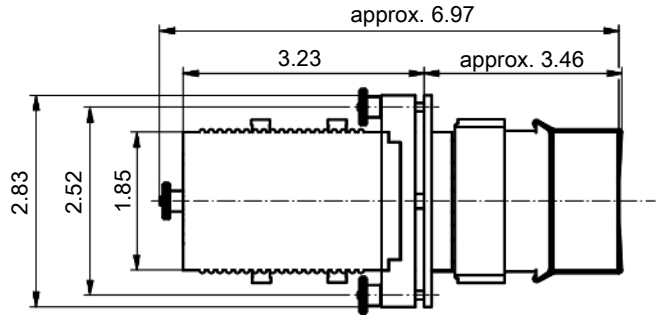
Built-in versions



Built-in version with 1 gas path



Built-in version with 2 gas paths



(All dimensions in inch)

Selection matrix for peristaltic pumps and subsequent add-on cooler

Cooler model	Built-in (OEM)/ Housing version (SA)	Flow rate l/h for 230 V/50 Hz	Single (S)/ Double (D) version
TC-Standard (+) X2	SA (separate installation only)	0.3	S or D
TC-MIDI (+) X2	OEM	0.3	S or D
TC-Double (+) X2	SA	0.3	D
EGK 1 Ex2	OEM	0.3	S or 2x S

Peristaltic pump ordering information

The item number is a code for the configuration of your unit. Please use the following model code:

4492	X	X	2	2	X	X	X	Product Characteristic
								Gas path
	1							Single gas path
	2							Double gas path
								Version
		1						Housing version
		2						Built-in version
								Supply voltage
			2					115/230 V AC
								Area of application
				2				for explosive areas
								Hose material [1) 2)]
					1			Tygon (Norprene)
					2			Fluran
					3			Marprene
								Flow rate/hour
						0		0.3 L/h
						2		13 ml/h (only 115/230 V AC, single gas path)
						3		61 ml/h (only 115/230 V AC, single gas path)
								Hose connection [3)]
							1	straight hose nipple
							2	angled hose nipple
							3	straight and angled hose nipple
							4	Screw connection (metric) DN 4/6
							5	Screw connection (US) 1/6"-1/4"
							6	angled hose nipple and screw connection (metric)
							7	angled hose nipple and screw connection (US)
							8	straight hose nipple and screw connection (metric)
							9	straight hose nipple and screw connection (US)

[1)] Please note hose material information during selection.

[2)] For 13 ml/h and 61 ml/h metering pumps the only hose material option is Tygon (Norprene).

[3)] For 13 ml/h and 61 ml/h metering pumps the only hose connections choices are "Option 4 and 5".

Information on hose materials

The standard hose in Norprene has excellent mechanical properties with high chemical resistance to many substances.

Marprene offers a long life for many applications with high chemical resistance, particularly when oxidation agents are present. This is therefore the first alternative to the standard Norprene hose.

Fluran is particularly beneficial if the condensate contains oils, petrols and other solvents. The mechanical properties should rather be assessed weaker, so we only recommend this hose material for the specified chemicals.

The flow capacity of Fluran and Marprene hoses is slightly lower.

Other materials are available on request.

Sample gas water cooler and gas scrubber

In addition to electric sample gas coolers, we also offer scrubbers and water coolers for specific applications. The following models describe some of the basic versions. Please contact us with your request; we will gladly provide you with a version for your specific application:

Water Cooler 170 IST and 170 IST Titanium

Sample gas is transported through a tube coil inside an outer shell water flows through. The condensate outlet is located at the bottom of the unit, along with a thermometer (not applicable to titanium version) which displays the gas outlet temperature. Model 170 IST Titanium is entirely made from titanium.

Gas Scrubber 161 PVDF spec.

Gas scrubbers utilise the direct contact between the flow of sample gas and water to remove undesirable components from the sample gas. The gas inlet is far below the water level. The purified gas is discharged at the gas scrubber head.

- water connection for ease of use
- non-electric equipment

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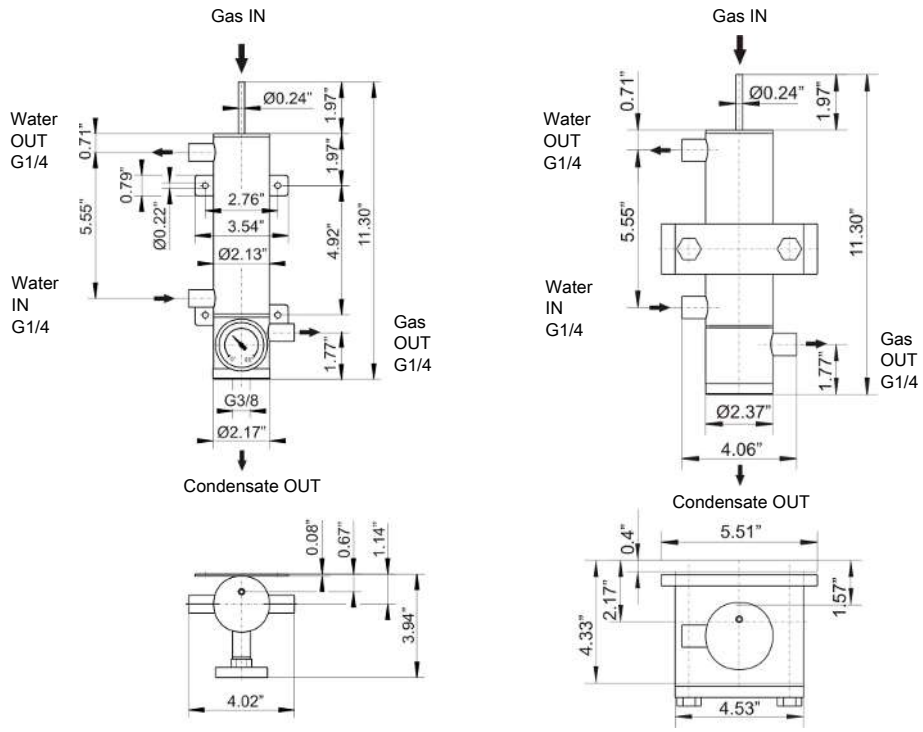
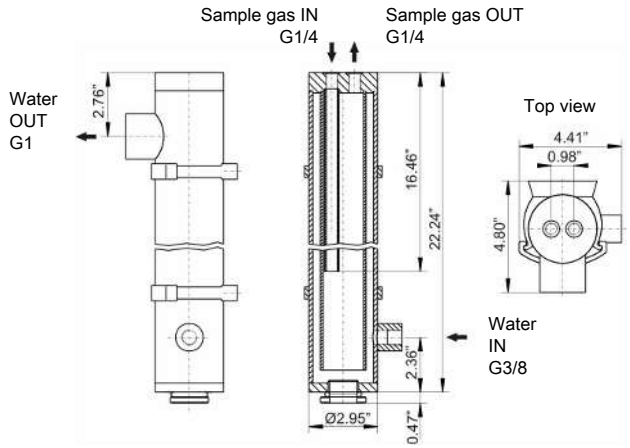
Technical Data

Technical Data	170 IST	170 IST Titanium	161 PVDF spec.
Device model:	Water cooler	Water cooler	Gas scrubber
Cooling medium:	Water	Water	-
Material:	1.4571	Titanium	PVDF
Max. operating pressure:	362 psi	218 psi	29 psi
Max. medium inlet temperature:	320 °F	320 °F	176 °F
Ambient temperature:	36 to 113 °F	36 to 113 °F	36 to 113 °F
Max. water volume:	-	-	2 lpm
Max. flow rate:	-	-	4 lpm

Dimensions type 170 IST/170 IST Titanium



Dimensions type 161 PVDF spec.



Ordering instructions

Item no.	Description
46 12 999	170 IST
46 41 999	170 IST Titanium
46 80 999	161 PVDF spec.

Wash bottle WF-AGF-PV-30

Gas analysis is a complex field. The sample gas to be analysed must be extracted and handled under quite diverse conditions to yield representative and reliable analysis results. There frequently is a need to remove gaseous components from the sample gas by washing these out.

The WF-AGF-PV-30 wash bottle is a product suitable for this purpose. The wash bottle is filled with water or another suitable medium to wash out interfering components.

It is made from non-corrosive PVDF and glass. The Unique quick-release fastener allows for easy medium changes. The bottom gas inlet ensures sufficient contact times.

An optional version with bubbler ensures the gas is finely dispersed in the washing medium.

- Bühler Unique quick-release fastener
- Quick and easy washing medium changes without tools
- Variable wall mount
- Bubbler optional

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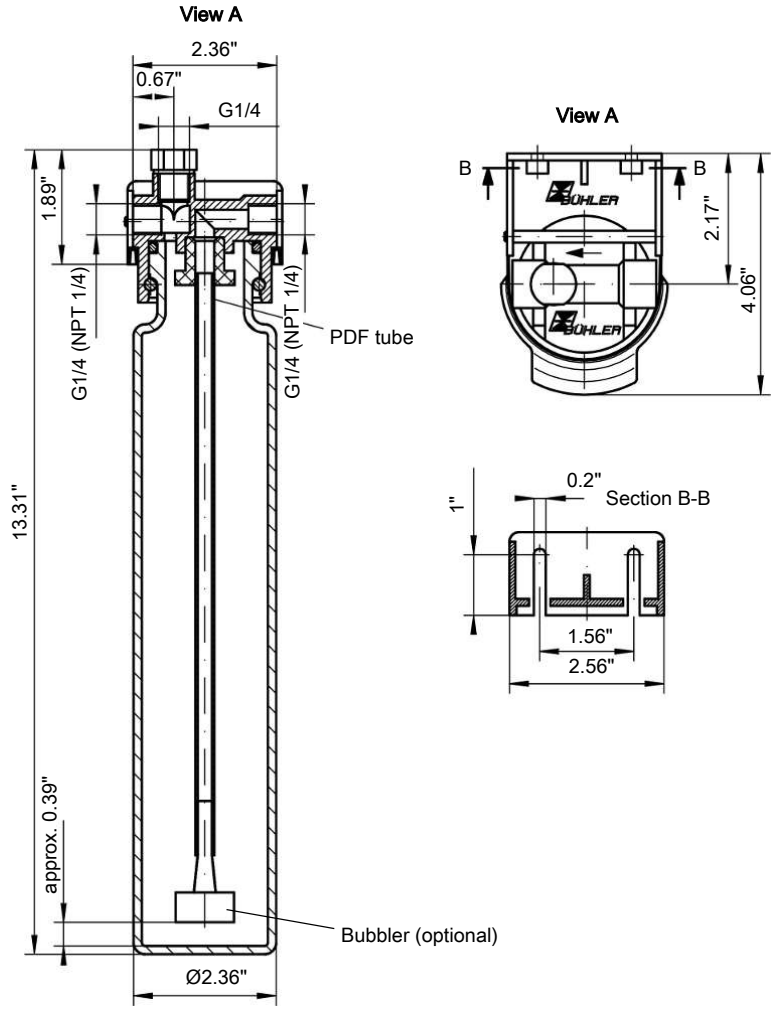
Dimensions



DANGER **Use in explosive areas**

The equipment is **not** suitable for use in explosive areas.

DANGER **Toxic, corrosive condensate**

a) Protect yourself from toxic, corrosive condensate when performing any type of work.

b) Wear appropriate protective equipment.

c) Please note the national safety rules!

Technical Data

Wash bottle WF-AGF-PV-30	
Material – filter head:	PVDF
Material – filter cover:	Duran
Material – gasket:	Viton
Material – bubbler:	Duran 3.3
Thread:	G1/4 or NPT 1/4" (see ordering information)
Weight:	approx. 0.5 kg (1.1 lb)
Volume:	0.6 L (0.16 gal)
Max. operating pressure:	4 bar (8 psi)
Max. operating temperature:	100 °C (212 °F)

Ordering instructions

Filter

Item no.	Model	Connections
44 100 89	WF-AGF-PV-30	G1/4
44 100 89I	WF-AGF-PV-30	NPT 1/4
44 100 91	WF-AGF-PV-30 with bubbler*	G1/4
44 100 91I	WF-AGF-PV-30 with bubbler*	NPT 1/4

*included, separate. Installation: Remove wash bottle head and insert bubbler in the tube end until firmly seated. Reattach wash bottle head.

Spare Parts and Accessories

Item no.	Model
44 100 893	Bubbler

Precooler PC1

In extractive analysis of process and flue gases, reliable and constant reduction of sample gas humidity is essential. Bühler Technologies offers a custom range of gas coolers based on Peltier and compressor technology. Process-based cooling temperature control guarantees maximum dew point stability. This allows highest quality industrial gas analysis.

Bühler Technologies developed the extremely compact PC1 precooler to further increase the energy efficiency of the above main coolers. It is used as a small passive cooling level upstream from the main cooler. The PC1 very effectively uses the ambient air supplied by the fan as a coolant. In moderate ambient temperatures (up to 104 °F) it therefore allows the use of small, cost-effective main coolers.

The intelligent gas path in the interchangeable precooling heat exchanger further ensures very low washout of water-soluble gases (e.g. SO_2/complies with EN 15267). Optional PC1 heat exchangers with built-in acid meter connection (H3PO4) complete the concept.

- High precooling output (up to approx. 40 W or 133 Btu/h)
- Very small, compact design
- Allows the use of small, cost-effective main coolers
- Low SO_2 washout (complies with EN 15267)
- Option acid meter connection
- Easy to replace glass heat exchanger
- Accessories: peristaltic pump (condensate and dosing pump)

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Overview

Precooler components:

- Stainless steel housing with fan,
- Glass heat exchanger (replaceable without tools).

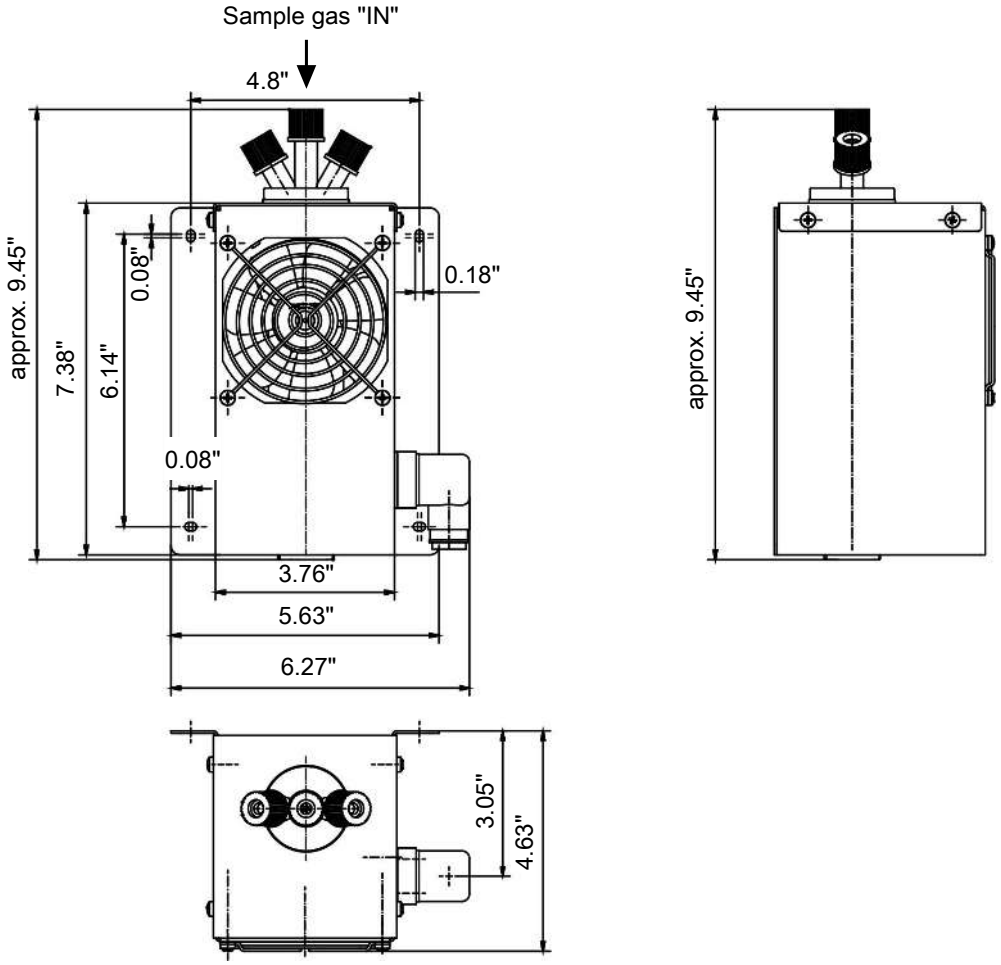
The precooler can generally be equipped with two different heat exchanger styles:

1. Precooling heat exchanger with two gas connections (gas in, gas out).
2. Precooling heat exchanger with three connections (gas in, gas out, acid meter connection).

The precooler can optionally be equipped with the following components:

- Condensate drain via peristaltic pump or condensate pre-separator.
- Dosing pump for dosing phosphoric acid (max. 15 %) into the heat exchanger.

Dimensions

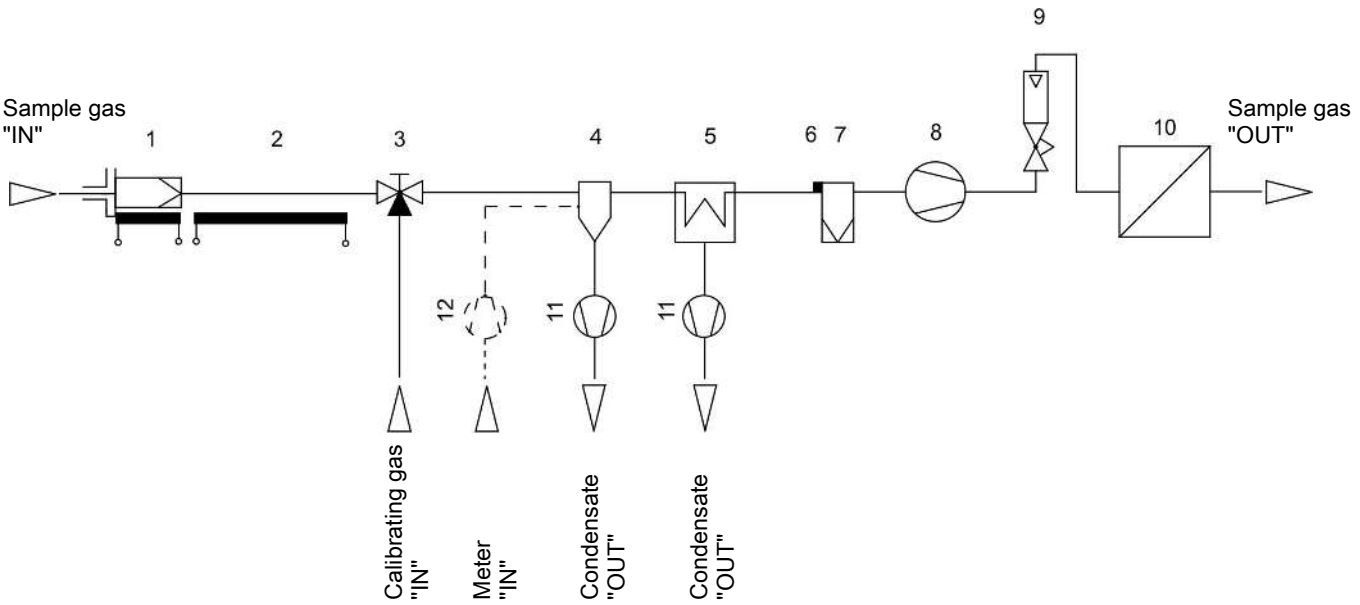


Detailed description of functions

The precooler is a passive cooling unit (without active cooling temperature control). The fan supplies the high efficiency precooling heat exchanger designed specifically for this with ambient air. This provides the initial relevant sample gas cooling to below the dew point. The majority of water is removed from primarily very moist sample gases or gases with high dew point using minimal electricity (approx. 6 W fan) (see diagrams 1a and 1b).

This allows the use of very small, regulated main coolers downstream from the precooler (see typical installation diagram). This increases the energy efficiency of the entire cooling system considerably. Condensate is drained at the corresponding connection for the precooling heat exchanger as usual. The proven Bühler peristaltic pumps or condensate pre-separators are available for this purpose. The already washout optimised precooling heat exchangers (≤ 4 % SO_2 washout input available) are further optionally available with acid meter connection. The Bühler dosing pump thus allows for highly efficient yet highly effective dosing of phosphoric acid. This results in minimal washout of highly water-soluble gases to below the detection limits typical in industrial applications.

Diagram typical installation



1	Sample gas probe	2	Sample gas line
3	Reversing tap	4	PC1 Precooler
5	Sample gas cooler	6	Moisture detector
7	Fine mesh filter	8	Sample gas pump
9	Flow meter	10	Analyser
11	Condensate pump	12	Dosing pump

Technical Data

PC1 Precooler Technical Data	
Ready for operation	Ready for use immediately after switching on
Ambient temperature	41 °F to 104 °F
IP rating	IP 20
Housing	Stainless steel
Packaging dimensions	approx. 13 in (L) x 6.7 in (H) x 9.8 in (W)
Weight incl. heat exchanger	approx. 2.8 lb
Max. inlet dew point	158 °F
Max. pressure	14.5 psi
Max. gas temperature	284 °F
Dead volume	4.88 cu. in.
Operating voltage	230 VAC / 24 VDC
Electrical Connections	Plug per EN 175301-803
Gas connections (metric)	GL 14 (6 mm)
Gas connections (US)	GL 14 (1/4")
Condensate out connection (metric)	GL 25 (12 mm)
Condensate out connection (US)	GL 25 (1/2")
Acid meter connection	GL 14 (6 mm)
Parts in contact with media Heat exchanger:	 Duran glass and borosilicate glass beads

Heat exchanger overview

Heat exchanger	PG1 (2 connections)	PG2 (with acid meter connection)
Version/Material	Duran glass	Duran glass
Max. inlet dew point	158 °F	158 °F
Gas inlet temperature	284 °F	284 °F
Gas pressure p_{max}	14.5 psi	14.5 psi
Pressure drop Δp (v=3.3 lpm) total	0.06 psi	0.06 psi
Dead volume V_{tot} total	4.88 cu. in.	4.88 cu. in.
Gas connections (metric)	GL 14 (6 mm)	GL 14 (6 mm)
Gas connections (US)	GL 14 (1/4")	GL 14 (1/4")
Condensate out connection (metric)	GL 25 (12 mm)	GL 25 (12 mm)
Condensate out connection (US)	GL 25 (1/2")	GL 25 (1/2")
Acid connection	---	GL 14 (6 mm)

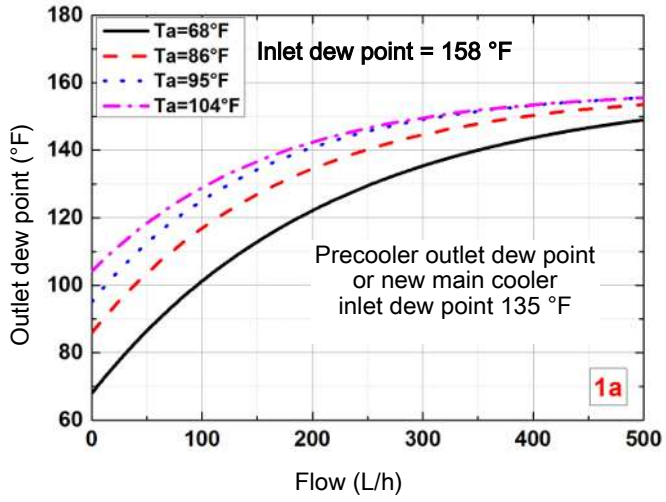
Cooling characteristics/aftercooler configuration

The outlet dew point of the precooler can be determined using the flow outlet dew point diagram (see diagrams 1a and 1b). This should be used as the inlet dew point for a downstream main cooler. Along with the gas flow parameters determined by the application and the ambient temperature the downstream main cooler can be configured for the required cooling capacity (also see cooler calculator at www.buehler-technologies.com). We will gladly also provide you with a personal consultation and configure the cooling units required for your application.

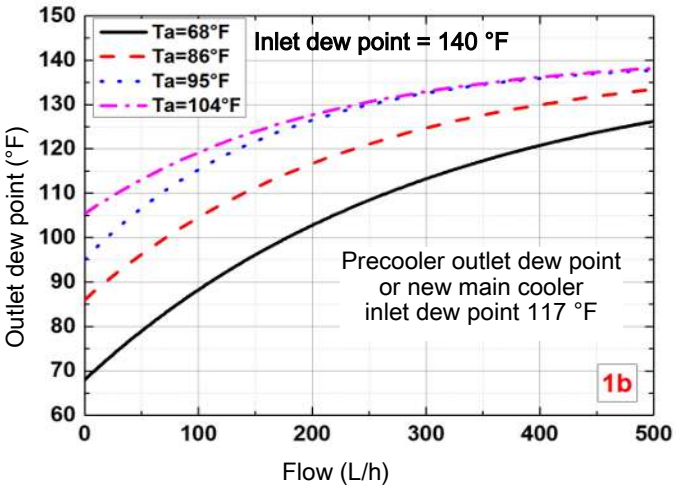
Examples for determining the precooler outlet dew point:

1. Diagram 1a: Precooler inlet dew point = 158 °F, flow = 200 L/h T_a = 86 °F; precooler outlet dew point = 135 °F (corresponds to approx. 30 W precooling capacity). The new inlet dew point for the downstream main cooler is therefore 135 °F.
2. Diagram 1b: Precooler inlet dew point = 140 °F, flow = 200 L/h, T_a = 86 °F; precooler outlet dew point = 117 °F (corresponds to approx. 18 W precooling capacity). The new inlet dew point for the downstream main cooler is therefore 117 °F.

Flow outlet dew point diagram for TP_{IN} = 158 °F



Flow outlet dew point diagram for TP_{IN} = 140 °F



Tab. 1: Precooler outlet dew point varies by sample gas flow (at inlet dew point 158 °F (1a left) and 140 °F (1b right) and different ambient temperatures T_a)

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

45002	X	2	0	0	X	0	Product Characteristics
							Voltage
	0						115 - 230 VAC
	4						24 VDC
							Heat exchanger
		2	0				Glass
							Options (acid meter)
				0	0	0	without acid meter
				0	1	0	ready for acid meter

Spare Parts and Accessories

Item no.	Description
45002014	Heat exchanger glass cartridge with inlet markings
45002015	Pack of borosilicate glass beads
45002007	Ball lock
4460028	230 VAC Fan
4460029	24 VDC fan
45002013	Dosing hose (acid meter)
4382006	Laboratory screw connection GL 14 (acid meter)
45100144	Seal for GL 14
45100134E	Seal for GL 14 DN 4/6
45100137E	Seal for GL 25 DN 5/8
4510028	Automatic condensate drain AK 5.5
4410004	Automatic condensate drain AK 20
see data sheet 450020	Peristaltic Pump CPsingle, CPdouble

Precooler TS 10

In extractive gas analysis the sample gas must be conditioned before it enters the measuring cell of the analyser.

One of these conditioning stages is moisture precipitating in so-called sample gas coolers.

Applications where the moisture content of the sample gas is particularly high or the moisture content fluctuates greatly, installing a precooler in the supply line to the actual sample gas cooler will increase reliability.

This precooler consists of an appropriately dimensioned heat exchanger, which only uses the temperature gradient between the sample gas and ambient air, and a condensate pump.

The TS precooler comes inside a protection cage, ready to install.

- Low maintenance
- Easy to install, compact size
- Heat exchanger in stainless steel or stainless steel with glass coating
- Built-in peristaltic pump

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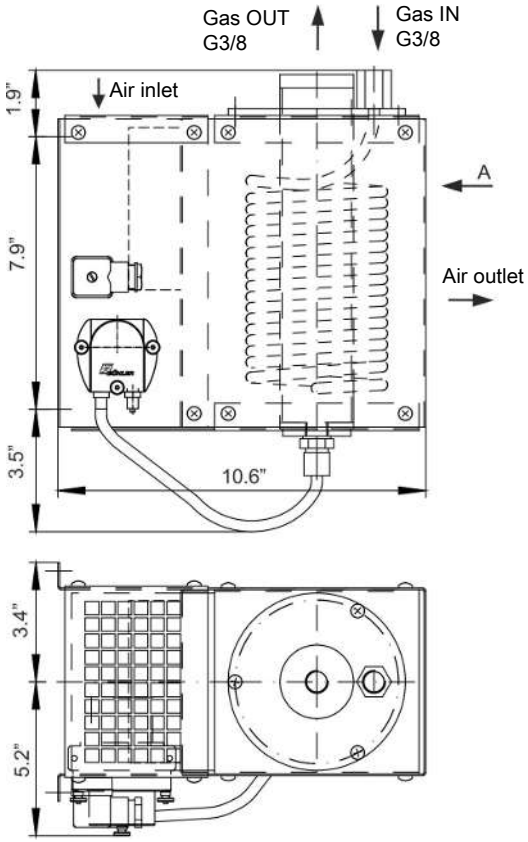
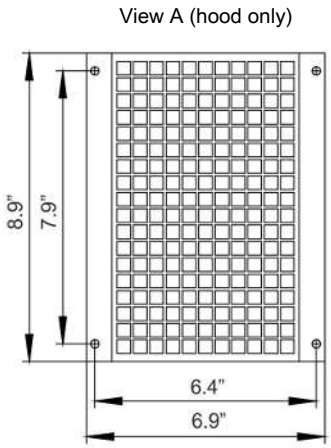
Technical Data

TS 10 precooler Technical Data	
Ambient temperature:	32 .. 140 °F
Electric supply:	115 V, 60 Hz or 230 V, 50 Hz
Power input:	25 W
Type of protection electric:	IP 20
Housing:	Stainless steel
Installation:	wall-mounted
Heat exchanger	
Gas pressure P_{max}:	14.5 psi
Max. gas inlet temperature:	356 °F
Gas connections:	G3/8
Pump condensate connection:	DN 4 (screw connection, metric) on 230 V 1/6" (screw connection, US) on 115 V

Dimensions (inch)





Ordering Instructions

Precooler

Item no.	Description
45 00 999	TS 10 precooler, 230 V, 50 Hz
45 00 899	TS 10 precooler, 115 V, 60 Hz
45 00 799	TS 10 GB precooler (glass coated), 230 V, 50 Hz

Spare parts

Item no.	Description
44 92 00 35 114	Norprene replacement hose with one angled connection and one screw connection (metric) for peristaltic pump 1 L/h (0.016 lpm)
44 92 00 35 115	Norprene replacement hose with one angled connection and one screw connection (US) for peristaltic pump 1 L/h (0.016 lpm)

Dosing unit EMIDos

One conditioning step in extractive analysis of process and emissions gases is reliable, constant reduction of humidity in the sample gas. The condensate this produces results in sometimes considerable washout effect. This can result in inaccurate measurements, particularly in acidic gas components (e.g. SO_2). Adding acidic liquids at an appropriate point in the conditioning system reduces the acid solubility by manipulating the pH level in the condensate, ensuring reliable measurements. The EMIDos dosing unit was designed for this specific application.

It consists of a wall mount made from non-corrosive stainless steel. This holds the reservoir for the dosing agent and the dosing pump with adequate capacity. The tubing has minimal cross-sections to ensure rapid response times. An adjustable sensor for monitoring the residual level is located on the side. The suction port us located inside the container cover.

- Compact design
- Dosing pump with consistent flow rate
- Dosing connection for heat exchanger included
- Reduces SO_2 washout (complies with EN 15267)
- Short feed time, fast response time
- Adjustable level monitor
- Optional: Collection pan for safe acid storage

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Internet: www.buhlertech.com

Overview

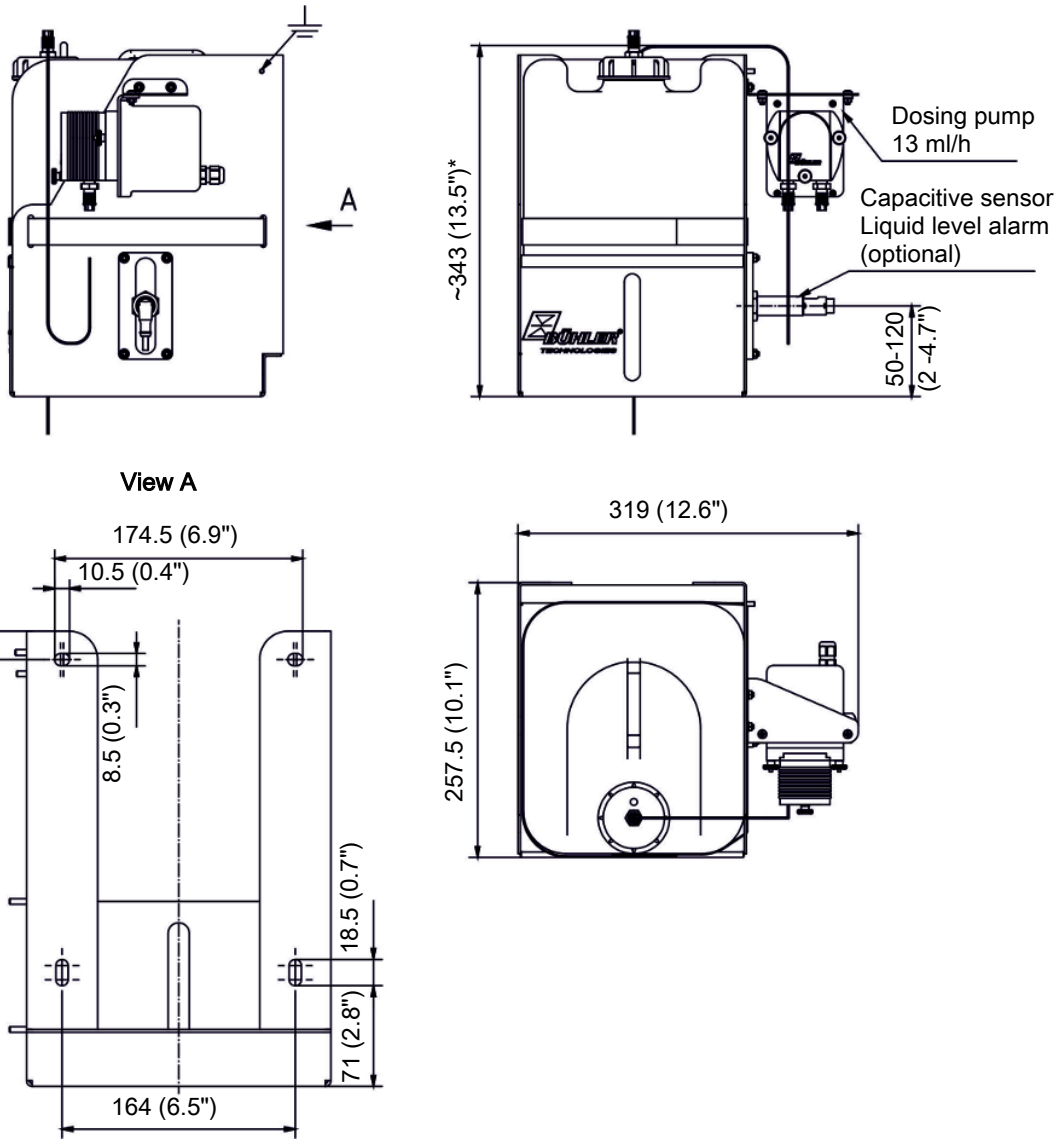
Dosing unit assemblies:

- Stainless steel wall mount
- Dosing pump with pump bracket
- Capacitive sensor for level monitoring
- Acid container with modified cover
- Dosing line kit

The dosing unit can optionally be equipped with the following components:

- Collection pan

Dimensions



*Dimensions apply to top edge of connection. Hose not included.

Detailed description of functions

For EN 15267 compliant systems, the pH level in the condensate is reduced with phosphoric acid to reduce SO_2 washout. At 13 ml/h, the flow rate of the dosing pump is optimised for 10 % acid. Dosing is continuous. With the connection kit, the 1.6 mm dosing line can be connected directly to the standard connection (DN 4/6) of the heat exchanger. The adapter system allows convenient installation of the dosing lines and is detailed in the included operating instructions.

An adjustable position capacitive sensor is optional and can be installed at the side of the metal bracket. If the acid is below the minimum level, a warning is output to be able to reorder acid early.

Technical Data

Meter Technical Data	
Operational readiness:	Ready for use immediately after switching on
Ambient temperature:	41 °F to 122 °F
IP rating:	IP20
Bracket:	Stainless steel, brushed
Weight without acid:	approx. 11 lbs
Acid canister volume:	12.6 gal
Outlet pressure:	15 psi
Capacitive sensor operating voltage:	10...36 V DC
Metering pump operating voltage:	115/230 V AC
Flow rate:	approx. 13 ml/h
Acid feed time:	5 min/m
Sensor electrical connections:	M12x1.5-pin (option)
Parts in contact with media	
Acid container:	HDPE
Dosing line:	PFA
Modified cover:	HDPE/PVDF

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

45003	1	1	X	0	0	Product Characteristics
						Voltage
	1					115 - 230 VAC
						Dosing pump
		1				CPsingle 13 ml/h
						Liquid level monitoring
			0	0	0	without liquid level sensor
			1	0	0	with liquid level sensor

Spare Parts and Accessories

Item no.	Description
9144050018	M12 plug incl. 5 m (16.4 ft) cable
45003017	Capacitive sensor (connection kit)
45003014	Modified cover
45003008	Collection pan
4382006	Laboratory screw connection GL 14 DN 1.6
45003011	Connection kit for heat exchanger with DN 4/6 input
45003011I	Connection kit for heat exchanger with 1/4"-1/6" input

Pre-separators AK 20 V, 11 LD spec., 165 SS, 167 T

In extractive gas analysis it is important to protect the measuring cells from any type of contaminants. In addition to removing particle contamination, it's also extremely important to separate moisture and condensation.

Depending on the composition of the sample gas, a pre-separator may also need to be installed upstream from the sample gas cooler. This reduces the load on the cooler when the moisture content fluctuates.

In some applications removing the moisture with a pre-separator and downstream coalescence filter may suffice. If the sample gas is pressurised, the pre-separators may be equipped with built-in automatic drain valves.

- Various geometric shapes for easy installation
- High operating reliability
- Long life
- Various base materials

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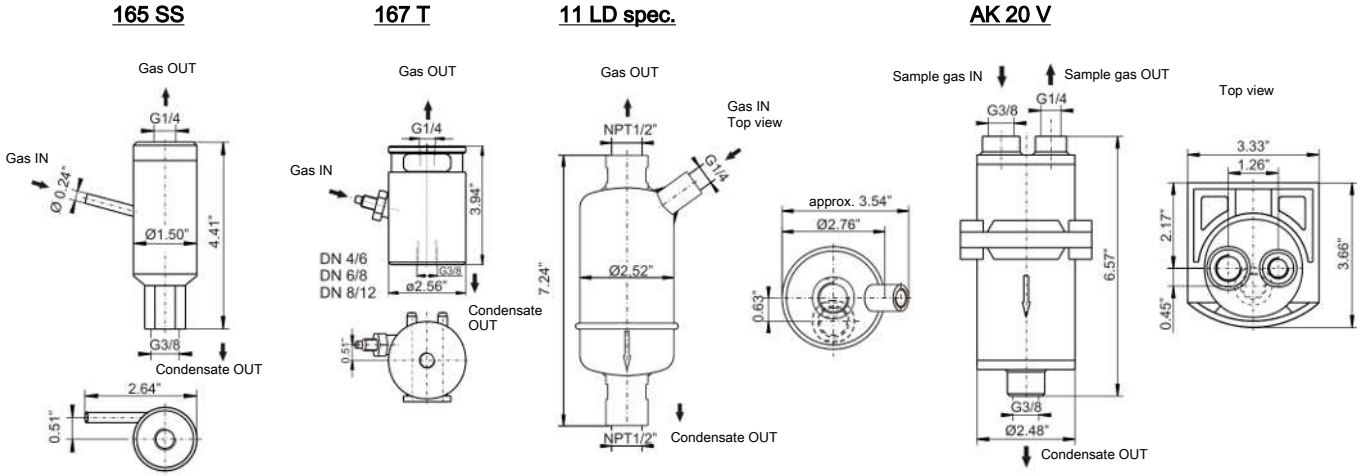
Dimensions



Type	165 SS	167 T-V	167 T-P	11 LD spec.	AK 20 V
max. operating pressure:	930 psi abs.	60 psi abs.	60 psi abs.	160 psi abs.	29 psi abs.
max. medium temperature:	360 °F	180 °F	180 °F	390 °F	210 °F
Ambient temperature:	41 to 176 °F	41 to 176 °F	41 to 176 °F	41 to 176 °F	41 to 176 °F
max. flow rate:	3.3 lpm	3.3 lpm	3.3 lpm	8.8 lpm	8.8 lpm
max. condensate drain approx.:	-	-	-	> 0.8 lpm	-
Material:	Stainless steel 1.4571	PTFE/Viton	PTFE/ Perfluorelastomer	Stainless steel 1.4306, 1.4401, 1.4301	PVDF

Use in explosive areas (additional notices):

The 165 SS, 11 LD spec. and AK 20 V condensate pre-separators meet the fundamental safety requirements of Directive 2014/34/EU and are suitable for use in category 2G, explosion group IIB or IIC areas. The condensate pre-separators are not marked, as they do not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Non-flammable and flammable gases, explosion class IIB or IIC, which could occasionally be explosive during normal operation may be conveyed through the condensate pre-separator.

Model	165 SS	11 LD spec.	AK 20 V
Zone	1	1	1
Explosion group	IIC	IIC	IIB

The maximum surface temperature T_{surf} of the equipment is based on the medium temperature T_{med}. $T_{surf} \leq T_{med}$ applies

DANGER

Dangerous electrostatic charge (explosion hazard)

Incendive electrostatic charges may occur when cleaning plastic housing parts and decals (e.g. with a dry cloth or compressed air). The sparks this produces could ignite flammable, explosive atmospheres.
Always clean plastic housing parts and decals **with a damp cloth**!
Metal housing parts must be earthed.

DANGER

Impact

Strong blows to the housing can produce sparks, which can ignite an EX atmosphere. Protect the equipment from external impact. Damaged housing parts must be replaced immediately.

WARNING **Gas emanation**

Health hazard from gas leaks due to incorrect operation or maintenance

a) Close the gas supply before beginning installation or maintenance.

b) Protect yourself from hot and toxic gases.

c) Wear safety gloves and face shield. Emergent gas could be explosive.

Ordering instructions

Item no.	Model
44 11 004	AK 20 V
46 13 099	Centrifugal separator 165 SS
46 12 299	Centrifugal separator 167 T-V, DN 4/6 connection
46 12 399	Centrifugal separator 167 T-V, DN 6/8 connection
46 12 499	Centrifugal separator 167 T-V, DN 8/12 connection
46 12 599	Centrifugal separator 167 T-P, DN 4/6 connection
46 12 699	Centrifugal separator 167 T-P, DN 6/8 connection
46 12 199	Centrifugal separator 167 T-P, DN 8/12 connection
44 10 002	11 LD spec.

Automatic Condensate Drains AK 5, AK 20, 11 LD V 38 (-O2)

In extractive gas analysis it is important to protect the measuring cells from any type of contaminants. In addition to removing particle contamination, it's also extremely important to separate moisture and condensation.

If the sample gas flowing through the conditioning system is pressurised, drains with automatic drain valves can be used to discharge condensate settling in the sample gas cooler. These do not require any additional energy supply and are available in various material combinations.

For applications with high oxygen concentrations, the product requires special cleaning (free of oil and grease). The automatic condensate drain 11 LD V 38-O2 uses special cleaning processes to remove particles, oil and grease. The contamination limit values are based on EIGA Doc 33/18 “Cleaning of Equipment for oxygen service”. In addition, the material used for the 11 LD V 38-O2 is high-quality stainless steel, which has been tested by Bühler Technologies to ensure its suitability for oxygen applications.

- Various geometric shapes for easy installation
- High operating reliability
- Long life
- Various base materials
- O_2 version with 11 LD V 38 for applications with high-purity oxygen
- Cleaning standard based on EIGA Doc 33/18 with regard to freedom from particles, oil and grease (O_2 version)

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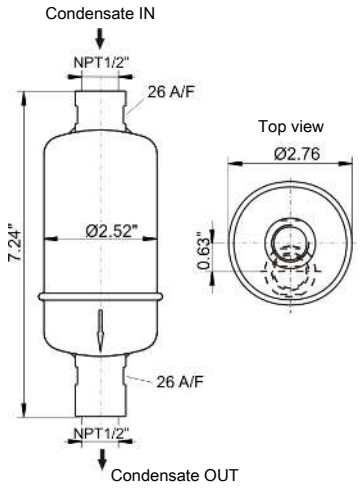
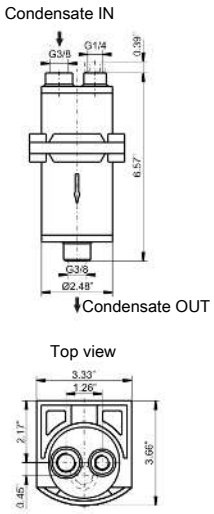
Dimensions

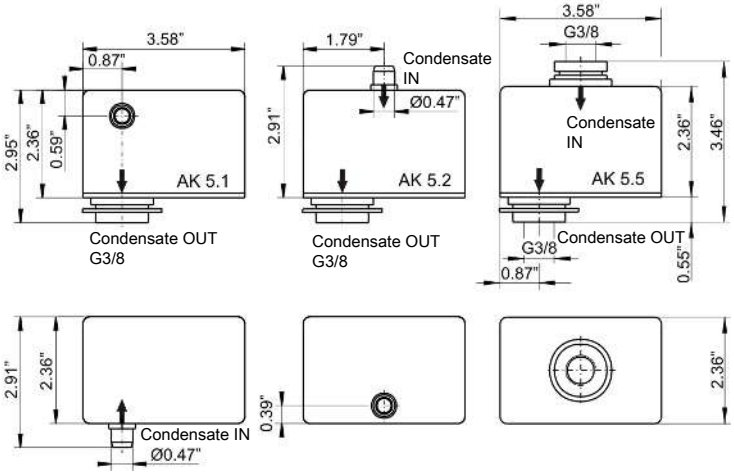
11 LD V 38



AK 20



AK 5



Model	11 LD V 38	11 LD V 38-O2	AK 20	AK 5
max. operating pressure:	260 psi abs.*	36 psi abs.	29 psi abs.	29 psi abs.
max. medium temperature:	390 °F	390 °F	210 °F	210 °F
Ambient temperature:	41 to 140 °F	41 to 140 °F	41 to 140 °F	41 to 140 °F
Weight:	1.8 lb	1.8 lb	0.7 lb with wall bracket (gas outlet sealed)	0.6 lb
Material:	Stainless steel 1.4306, 1.4401, 1.4301	Stainless steel 1.4306, 1.4401, 1.4301	PVDF	PVDF

* For use with high hydrogen concentrations max. 22 psi overpressure.

Use in explosive areas (additional notices):

The condensate drains meet the fundamental safety requirements of Directive 2014/34/EU and are suitable for use in category 2G, explosion group IIB or IIC areas. The condensate drains are not marked, as they do not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Non-flammable and flammable gases, explosion class IIB or IIC, which could occasionally be explosive during normal operation may be conveyed through the condensate drains.

Model	11 LD V 38 (-O2)	AK 20	AK 5
Zone	1	1	1
Explosion group	IIC	IIB	IIB

DANGER

Dangerous electrostatic charge (explosion hazard)

Incendive electrostatic charges may occur when cleaning plastic housing parts and decals (e.g. with a dry cloth or compressed air). The sparks this produces could ignite flammable, explosive atmospheres.
Always clean plastic housing parts and decals **with a damp cloth**!
Metal housing parts must be earthed.

DANGER

Impact

Strong blows to the housing can produce sparks, which can ignite an EX atmosphere. Protect the equipment from external impact. Damaged housing parts must be replaced immediately.

WARNING **Gas emanation**

Health hazard from gas leaks due to incorrect operation or maintenance

a) Close the gas supply before beginning installation or maintenance.

b) Protect yourself from hot and toxic gases.

c) Wear safety gloves and face shield. Emergent gas could be explosive.

Ordering instructions

Item no.	Model
4410001	11 LD V 38
4410001-O2	11 LD V 38 optimised for oxygen
4510006	AK 5.1 horizontal inlet
4510008	AK 5.2 vertical inlet
4510028	AK 5.5
4410004	AK 20

Condensate Vessels GL 1-3

In sample gas conditioning systems which cannot be pressurised, condensate accumulating in the sample gas coolers must be removed with peristaltic pumps or collected in condensate traps.

The GL 1 and GL 2 receptacles have a drain valve and only differ in size.

The GL 3 receptacle has a level switch for displaying the fill level or controlling a pump. The drain is a glass thread version into which a drain valve can optionally be installed.

All condensate traps are made from Duran glass and PTFE, making them corrosion-resistant.

- May be used in explosive areas
- Level switch optional
- Alternative to peristaltic pumps

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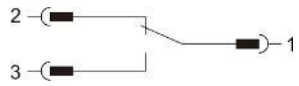
Technical Data

Technical Data Model GL 3	
Grounding receptacle GL 3:	230 V, 1 A, 40 VA, changeover In Ex areas only the following circuit values are permitted: U_i = 30 V, I_i = 50 mA T_{amb} in Ex areas: -5 °C...60 °C (23 °F...140 °F)
Material:	Duran glass, PTFE, PP
Medium temperature:	max. 176 °F

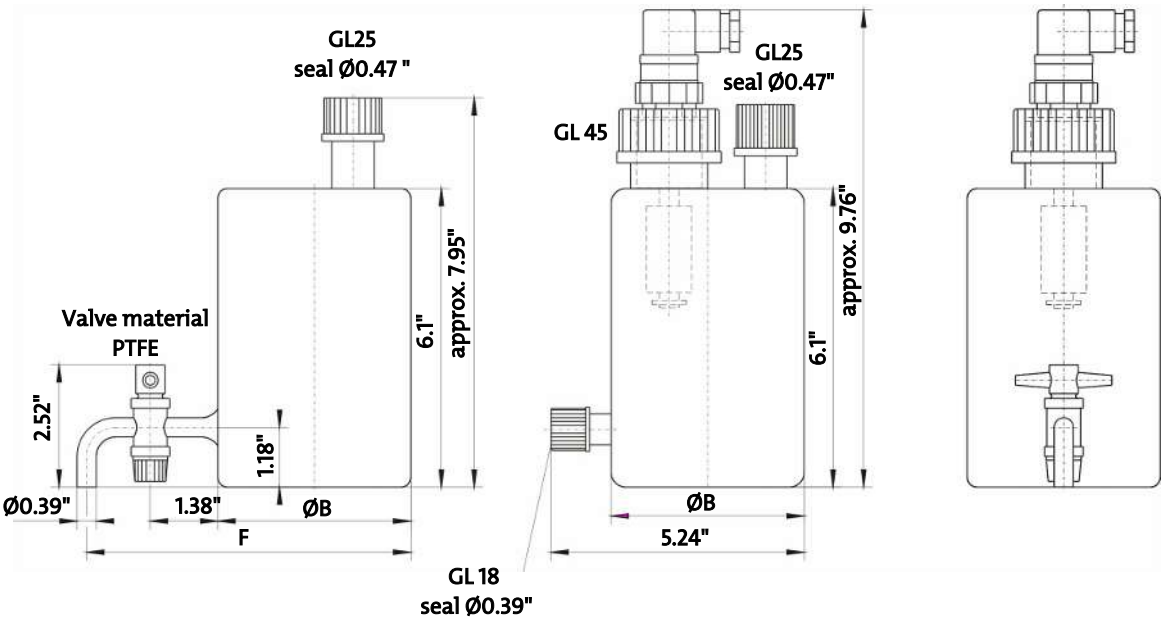
Pin assignment:



Dimensions

Condensate traps

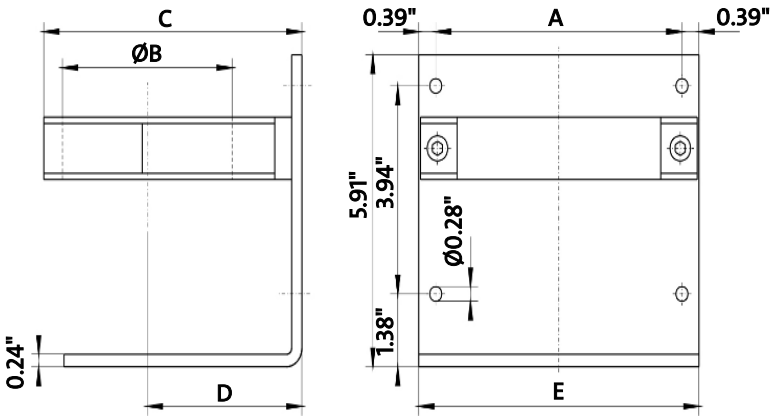
Model GL 1, GL 2 | **Model GL 3** | **Model GL 3 with drain valve option**



Model	A	B	C	D	E	F	Volume
GL 1	2.56 in	Ø 2.36 in	3.94 in	2.48 in	3.35 in	5.04 in	0.1 gal
GL 2 / GL 3	5.71 in	Ø 3.94 in	5.98 in	3.58 in	6.5 in	6.61 in	0.3 gal

Wall bracket

Material: PVC / PE



Use in explosive areas (additional notices):

The receptacles may be used in explosive atmosphere areas zone 1 and 2. Explosion groups IIA and IIB are approved. The receptacles have no innate ignition source and do not fall under Directive 2014/34/EU and therefore do not bear the CE mark.

Be sure to observe the instructions in the respective operating instructions!

Ambient temperature range when used in Ex areas:

GL 1, GL 2 and GL3 : -5 °C (23 °F) $<T_{amb}<$ +60 °C (140 °F)

- Electrostatic charge: Always clean plastic housing parts and decals with a damp cloth.
- Protect the equipment from external blows.

GL 3:

- Only operate in intrinsically safe electric circuits (observe EN 60079-11 and EN 60079-14!).
- U_i = 30 V, I_i = 50 mA. Never exceed these limits!
- Must be connected by a trained professional.

Ordering instructions

Item no.	Model
44 100 05	Condensate trap GL 1, with wall bracket
44 100 19	Condensate trap GL 2, with wall bracket
44 100 29	Condensate trap GL 3, with wall bracket, without drain valve
44 100 292	Drain valve for GL 3
44 100 293	Level switch

Condensate Vessel CV-3, CV-6, CV-10

In extractive gas analysis, the sample gas must be conditioned before it enters the measuring cell of the analyser.

One of these conditioning stages is moisture precipitating in so-called sample gas coolers.

This condensate must be properly removed from inside the analysis cabinet. In applications where it is not corrosive or toxic, it can then be discharged into drains or channels on site. However, it must often first be collected for intermediate storage and properly disposed of at a later time.

The CV-3 to CV-10 series feature vessels in suitable materials for intermediate storage inside or on the system. These are optionally available with liquid level switch or level switch.

- Vessel sizes 3 l (0.8 gal) / 6.5 l (1.7 gal) / 10 l (2.6 gal)
- Chemically resistant materials
- Output of fill level via level switch (optional)
- Signalling of maximum liquid level by liquid level switch (optional)
- Low maintenance
- Easy handling
- Removable top cover
- Robust mounting bracket

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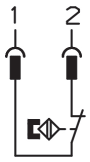
Technical Data

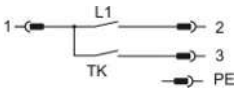
Condensate vessels technical data	
Material:	PVC, PVDF, PP, Viton
Medium temperature:	max. 140 °F
Connections:	G3/8 and G1/4 for condensate inlet and ventilation G1/4 for discharge
Liquid level / level switch	
Max. operating voltage:	230 V
Max. switching current:	0.5 A
Max. contact load:	10 VA

Contact function
Float down
(empty vessel)
Contacts K8-MS



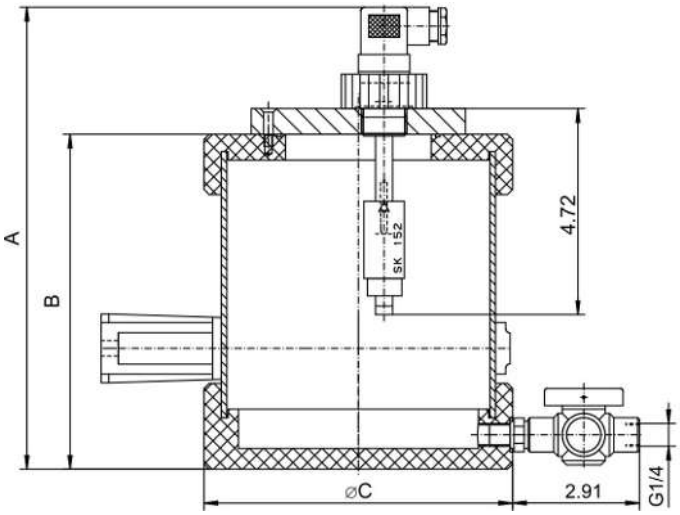
L1 normally closed

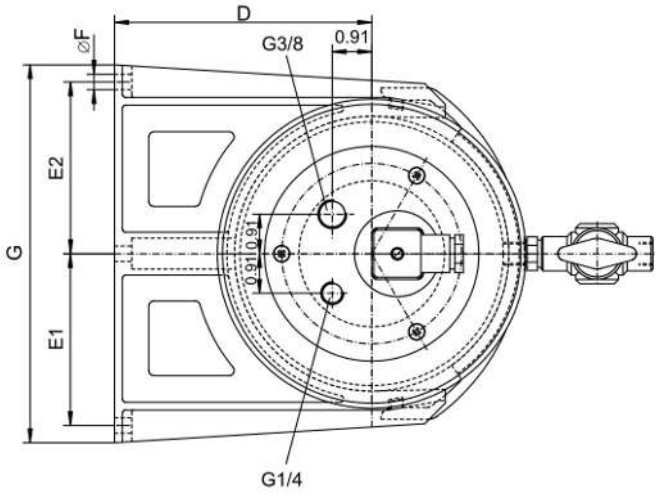
Level switch pin assignment *



* For model NSHL condensate vessels with level switch.

Dimensions





Vessel type	A (inch)	B (inch)	C (inch)	D (inch)	E1 (inch)	E2 (inch)	F (inch)	G (inch)
V = 3 l (0.8 gal)	10.6	7.7	Ø 7.1	5.9	3.9	3.9	3 x Ø0.4	8.7
V = 6,5 l (1.7 gal)	13.5	10.6	Ø 8.9	6.9	4.7	5.9	2 x Ø0.5	12.2
V = 10 l (2.6 gal)	17.9	15.0	Ø 8.9	6.9	4.7	5.9	2 x Ø0.5	12.2

DANGER

Use in explosive areas

The equipment is **not** suitable for use in explosive areas.

DANGER

Toxic, corrosive condensate

a) Protect yourself from toxic, corrosive condensate when performing any type of work.

b) Wear appropriate protective equipment.

c) Please note the national safety rules!

Ordering instructions

Item no.	Description
4410085	Condensate vessel CV-3, V = 3 l (0.8 gal) without liquid level switch
4410088	Condensate vessel CV-3-NS, V = 3 l (0.8 gal) with liquid level switch
4410080	Condensate vessel CV-3-NSHL with level switch
4410096	Condensate vessel CV-6-NS, V = 6.5 l (1.7 gal) with liquid level switch
4410097	Condensate vessel CV-6, V = 6.5 l (1.7 gal) without liquid level switch
4410082	Condensate vessel CV-6-NSHL with level switch
4410094	Condensate vessel CV-10-NS, V = 10 l (2.6 gal) with liquid level switch
4410095	Condensate vessel CV-10, V = 10 l (2.6 gal) without liquid level switch
4410084	Condensate vessel CV-10-NSHL with level switch
44100943	Liquid level switch Nivotemp M-K8MS-PVDF-L120

Moisture Detectors and Controllers

In extractive gas analysis the sample gas must be conditioned before it enters the measuring cell of the analyser. One of these conditioning stages is moisture precipitating in so-called sample gas coolers. Since the composition of the sample gas can fluctuate, a condensate slip downstream from the cooler cannot be entirely ruled out. Moisture detectors installed in the cooler output indicate such slip. Combined with suitable controllers this will generate the respective signals/alarms in the control system.

The moisture detector series features a wide range of options.

FF-HM series for rail mounting:

Potential-free outputs for moisture alarm and cable break on standby current (fail-safe)
LEDs for voltage, moisture and cable break
Fault analysis settings: auto-reset or lock

FF-x-U series inside a small casing:

Connecting one or up to 2 separate moisture detectors
Auto-resetting alarms, based on open circuit principle
LEDs for voltage, moisture and cable break

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Technical Data

Moisture detectors	FF-3-N	FF-40
Material:	PVDF, 1.4571, epoxy resin, 1.4576, PTFE	PE, 1.4571, epoxy resin, 1.4576
Cord length:	Standard 4 m (13 ft), 4 x 0.34²	Standard 4 m (13 ft), 2 x 0.25²
Max. operating pressure:	2 bar	40 bar
Operating temperature:	3 °C to 50 °C (37.4 to 122 °F)	3 °C to 50 °C (37.4 to 122 °F)
Cable break detection:	yes	yes

Type FF-3-N may be operated in ATEX areas of Zone 1 or Zone 2, temperature class T5, gas group IIC, under the following conditions:

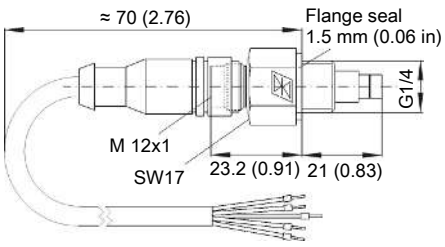
- Only use the humidity sensor in a single circuit with an intrinsically safe, type-approved voltage source of type XR-411. Additional equipment or voltage sources in this circuit are not permitted!
- Clearance and creepage distances in accordance with EN 60079-11 must be maintained to all parts of the FF-3-N humidity sensor. These depend on the specific installation and ambient conditions, including the degree of contamination of the medium.
- The operating parameters of humidity sensor FF-3-N must not be exceeded.
- The type-dependent application specifications for the XR-411 disconnector in the operating instructions and ATEX approval must be observed.

Flowcell	Type G	Type S
Material:	PVDF	1.4571

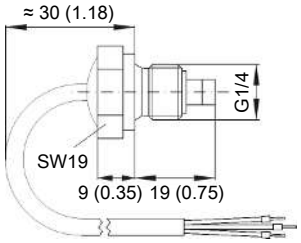
Controllers	FF-HM-230	FF-HM 24	FF-19	FF-x-U	XR-411
Supply voltage:	230/115 V AC 50/60 Hz ±10%	24 V DC ± 10%	24 V DC ± 10%	230/115 V AC 50/60 Hz ±10%	24 V...230 V AC/DC Wide-range power supply unit +10%
Max. switching output current:	230 V/2 A	24 V AC/DC 2 A	24 V AC/DC 2 A	230 V/2 A	AC: 250 V/5 A DC: 150 V/8 A
IP rating:	IP40 Terminals IP20	IP40 Terminals IP20	IP20 when built-in	IP65	IP40 Terminals IP20
Ex protection class:	-	-	-	-	II (1) G [Ex ia Ga] IIC
Max. lead length:	4 m	4 m	4 m	4 m	70 m
Dimensions (WxHxD/mm)	70 x 75 x 109 (2.8 x 3.0 x 4.3")	70 x 75 x 109 (2.8 x 3.0 x 4,3")	8TE x 3HE x 170 (8DU x 3 HU x 6,69")	94 x 180 x 81 (3.7 x 7.1 x 3.2")	22.5 x 99 x 114.5 (0.9 x 3.9 x 4.5")
Connection:	Terminals	Terminals	Multi-pole connector DIN 41612 style B	Terminals	Terminals

Dimensions

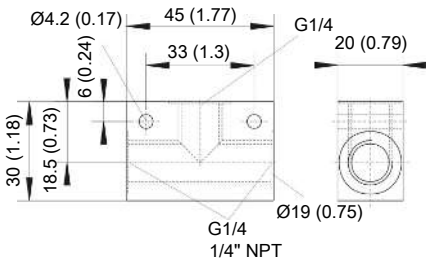
FF-3-N



FF-40



Flowcell



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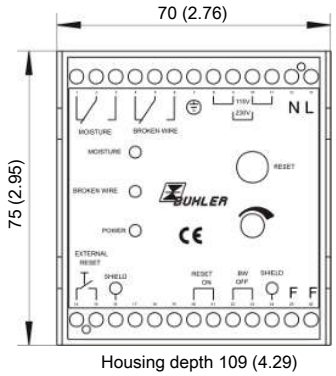
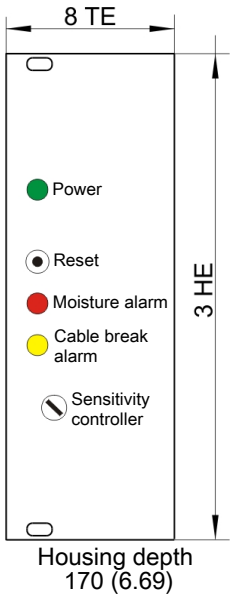
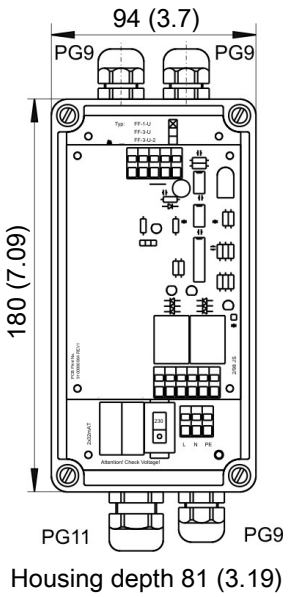


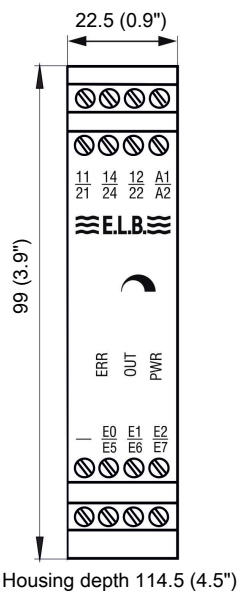
FF-19



FF-x-U



XR-411



Ordering instructions

Item no.	Description
4111100	FF-3-N moisture detector (without cable)
41111000	FF-3-N moisture detector (with cable)
4189699	FF-40 moisture detector
4011000	Type G flowcell (PVDF)
4011000I	Type NPT flowcell (PVDF)
4011005	Type S-G flowcell (stainless steel)
4011005I	Type S-NPT flowcell (stainless steel)
4111020	Controller FF-HM-230
4111030	Controller FF-HM-24
4111017	Controller FF-1-U
4111016	Controller FF-3-U-2
4111040	Controller FF-19
4111110	Controller XR-411

6 Flow meter

Flow Meter SM-6, SM-6-V

The flow of the sample gas to the analyser must be monitored in the extractive gas analysis. The flow meters of the SM-6 series offer efficient flow measurement for gases and liquids. The applications are typically very complex and require the use of particularly corrosion-resistant materials as well as high operating reliability.

In addition to visual flow measurements, they are also suitable for monitoring the depletion of the filtration capacity of the filter installed in the conditioning line. Electric limit switches can be mounted to the measuring tube for this purpose. These connect to the control system via suitable switch amplifiers. Types with built-in needle valves also allow a specific flow rate to be set.

A corrosion-resistant polycarbonate cover which can also be easily retrofitted to previously installed devices is available as an accessory. The transparent, well-ventilated cover protects the front and both sides of the flow meter, and offers reliable protection against accidental adjustment of the measuring point, particularly for devices equipped with ring initiators. At the same time, the measuring tube is protected against light impacts.

- Corrosion-resistant materials
- Easy installation
- Designed for air and water
- Special measuring ranges available upon request
- Easy measuring tube replacement
- Option to add limit switch and needle valve
- Cover prevents contact and accidental adjustment of the measuring point
- Used in **DNV-GL and LR type-tested** conditioning unit
- Special design for use in high-vibration environments

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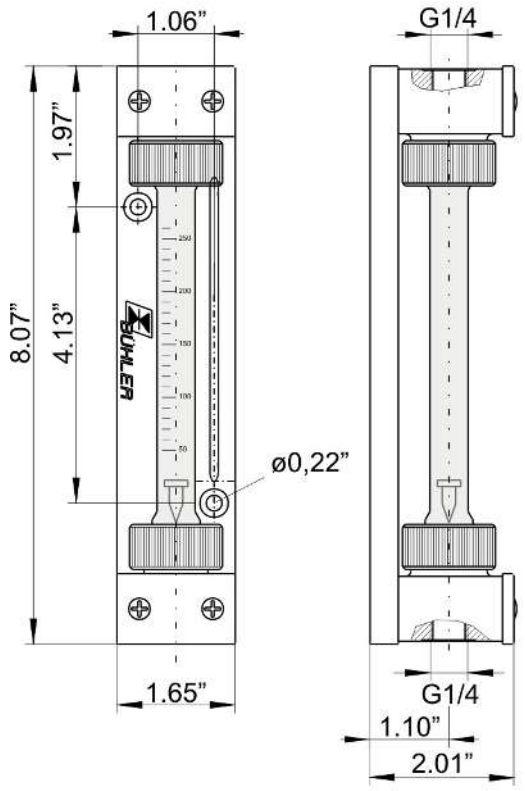
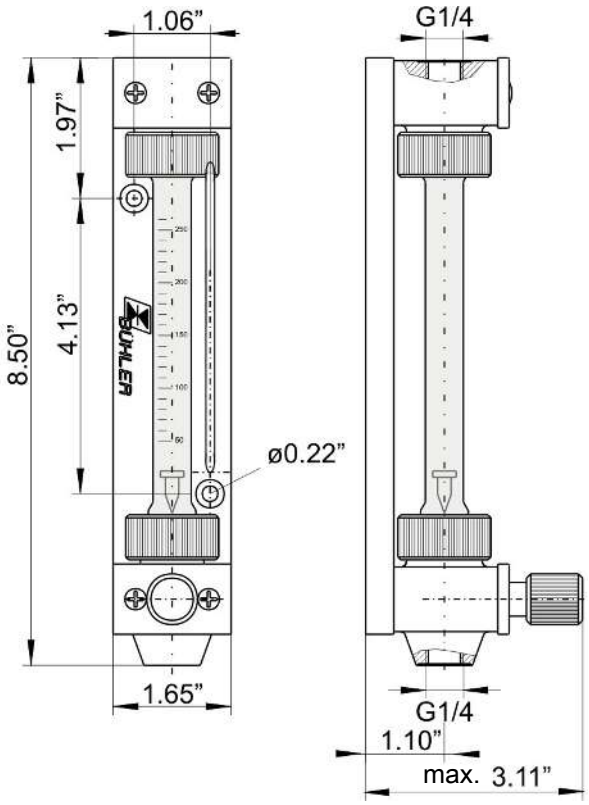
Flow meter dimensions

SM-6



SM-6-V

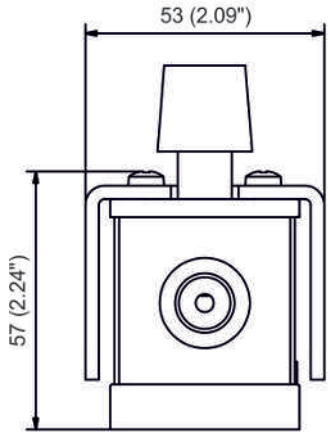


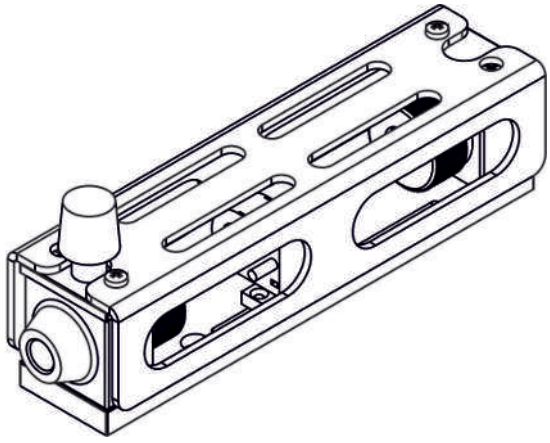
Use in explosive areas (additional notices):

The flow meter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in zone 1, explosion group IIB. The flow meter is not marked, as it does not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Be sure to observe the instructions in the respective operating instructions!

Dimensions flow meter with cover





Technical Data

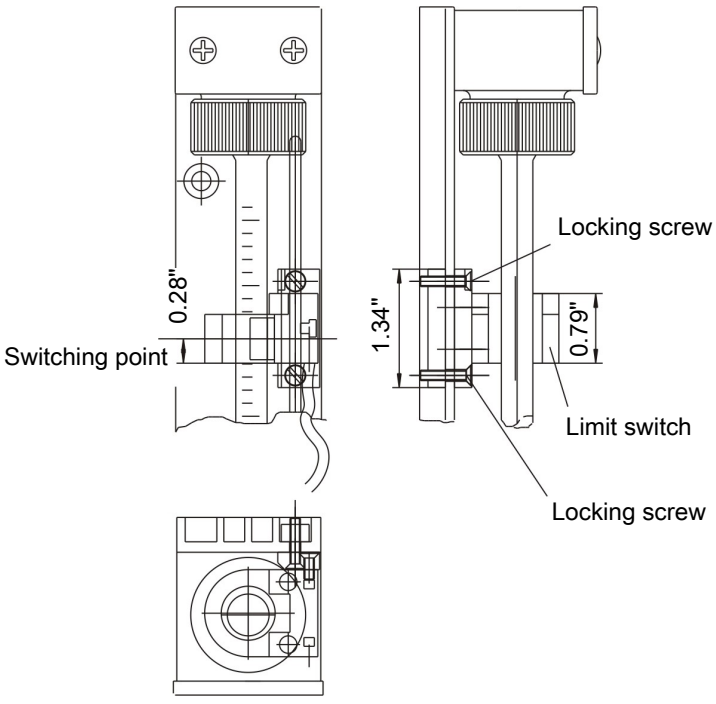
Flow meter	SM-6	SM-6-V
Gas ambient temperature:	-4 °F to 176 °F *	-4 °F to 176 °F *
Liquid ambient temperature:	41 °F to 176 °F *	41 °F to 176 °F *
Medium temperature:	≤ 302 °F, for special ranges max. 176 °F	≤ 266 °F, for special ranges max. 176 °F
Max. operating pressure:	58 psi	58 psi
Mechanical load:	Tested based on DNV-GL CG0339 ** vibration class A (0.7g) 2 Hz-13.2 Hz amplitude ± 1.0 mm 13.2 Hz -100 Hz 0.7 g acceleration	Tested based on DNV-GL CG0339 ** vibration class A (0.7g) 2 Hz-13.2 Hz amplitude ± 1.0 mm 13.2 Hz -100 Hz 0.7 g acceleration
Material		
Heads:	PTFE	PTFE
Seal:	PTFE	PTFE
Adjusting spindle:	-	PVDF/Viton or PCTFE/perfluorelastomer
Measuring tube:	Borosilicate glass	Borosilicate glass
Float:	Hastelloy C 4	Hastelloy C 4
Swivel nut:	PPS fibreglass reinforced	PPS fibreglass reinforced
Base plate:	PA	PA

* Please note the ambient temperature for the configuration with limit switch!
** not when using a flow meter with a cover.

Limit switch	Ø10 (0.39 in)*	Ø15 (0.59 in)
Ingress protection class:	IP 67	IP 67
Ambient temperature:	-4 °F to 176 °F	-4 °F to 158 °F
Housing material:	PBT	PBT
Operation:	bi-stable	bi-stable
Cord length:	2 m (6.6 ft)	2 m (6.6 ft)
Approval:	PTB 99 ATEX 2128X Ex II 2 G Ex ia II C T6...T1 Gb	PTB 99 ATEX 2128X Ex II 2 G Ex ia II C T6...T1 Gb

* Use in special range under some circumstances. For more information available upon request.

Limit switch dimensions



Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4056	X X	X	99	X	Measuring range*
	0 0				Air 6 - 60 Nl/h
	0 1				Air 10 - 100 Nl/h
	0 2				Air 25 - 250 Nl/h
	0 3				Air 50 - 500 Nl/h
	0 4				Air 80 - 800 Nl/h
	0 5				Water 0.5 - 5 L/h
	0 6				Water 1.2 - 12 L/h
	0 7				Water 2.5 - 25 L/h
	0 8				Water 4 - 40 L/h
	0 9				Water 6 - 60 L/h
	1 0				Special range
		0			without needle valve
		1			Valve PVDF / Viton
		2			Valve PCTFE / perfluorelastomer
				S	Limit switch with mounting bracket
				-	without limit switch

* Standard measuring tubes; air 68 °F 17.4 psi abs; water 68 °F

Ordering information for limit switch: A limit switch is factory installed if the last character of the item number is "S". Without the "S" marking the flow meter has no limit switch. We offer various switch amplifiers for controlling the limit switch (see data sheet no. 400003).

Spare parts and accessories – SM-6, SM-6-V

Item no.	Description
40158998	Cover SM-6, SM-6-V

NOTICE

Important information on use of a cover

- Cover only available as retrofit kit.
- Not suitable for explosive areas.
- Maximum medium temperature limited to 120 °C.

Switch Amplifiers for SM-6, SM-6-V

We offer various switch amplifiers for connecting the limit switches to flow meters.

These may only be installed outside explosive areas and have a number of additional safety or monitoring functions.

- Mounts to 35 mm standard rail per EN 60715
- Inherently safe inputs
- Model MACX also with approvals for ATEX, IECEx

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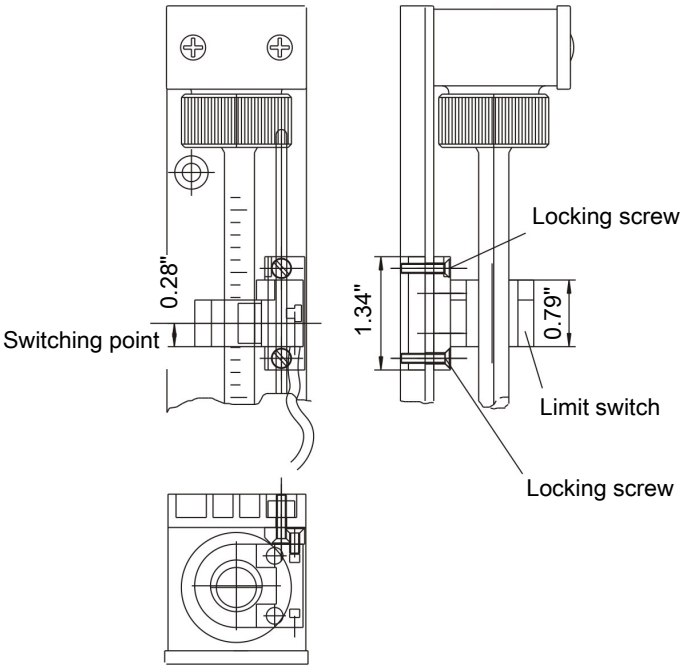
Description

Model MACX: Dual-channel switch amplifier for inherently safe control circuits with one signal output (change-over), one LED each for monitoring the voltage and alarm output function.

Model KCD: Single-channel amplifier inside a compact terminal box with LED switching status indicator.

Limit switch dimensions



Limit Switch Technical Data

Limit switch	Ø10 (0.39 in)*	Ø15 (0.59 in)
Ingress protection class:	IP 67	IP 67
Ambient temperature:	-4 °F to 176 °F	-4 °F to 158 °F
Housing material:	PBT	PBT
Operation:	bi-stable	bi-stable
Cord length:	2 m (6.6 ft)	2 m (6.6 ft)
Approval:	PTB 99 ATEX 2128X Ex II 2 G Ex ia II C T6...T1 Gb	PTB 99 ATEX 2128X Ex II 2 G Ex ia II C T6...T1 Gb

* Use in special range under some circumstances. For more information available upon request.

Switch Amplifier Technical Data

Switch amplifier	MACX MCR-EX-SL-2NAM-R-UP	KCD2-E2L
Supply voltage:	24 ... 230 V AC/DC 50/60 Hz	10-30 V DC
Inherently safe per:	IEC/EN 60079-11	no
Line monitor:	yes	yes
Approvals: *(per operating manual)*	**ATEX:** II(1) G [Ex ia Ga] IIC II 3(1) G Ex ec [ia Ga] nC IIC T4 Gc **IECEx:** [Ex ia Ga] IIC Ex ec [ia Ga] nC IIC T4 Gc	---
Output (not inherently safe):	Changeover contact	NO contact PNP transistor
Switching current output:	250 V AC (2 A, 60 Hz) 120 V DC (0.2 A) 30 V DC (2 A)	200 mA DC
Ambient temperature:	-4 °F ...140 °F	-13 °F ...158 °F
IP rating:	IP20	IP20
Dimensions:	0.69x4.43x4.51 in (WxHxD)	0.79x2.48x1.73 in (WxHxD)

Spare parts and accessories

Item no.	Description
9100070059	MACX switch amplifier
9100070007	Switch amplifier, KCD2-E2L, 24 V DC
4949021	Limit switch with mounting bracket Ø10 (0.39 in)
4949019	Limit switch with mounting bracket Ø15 (0.59 in)

Safety Flow Meter S-SM 3-1

Certain applications in fluid and gas analysis require additional safety precautions, including flow meters. Here it's particularly important to protect the clear measuring tube from mechanical damage. In this series a solid, slotted stainless steel protective tube ensures this protection.

Even with the measuring tube already having a thick wall, the stainless steel casing of course also protects the surroundings in the event a glass cylinder bursts.

- Robust, simple protection
- Large range of applications
- High safety standard

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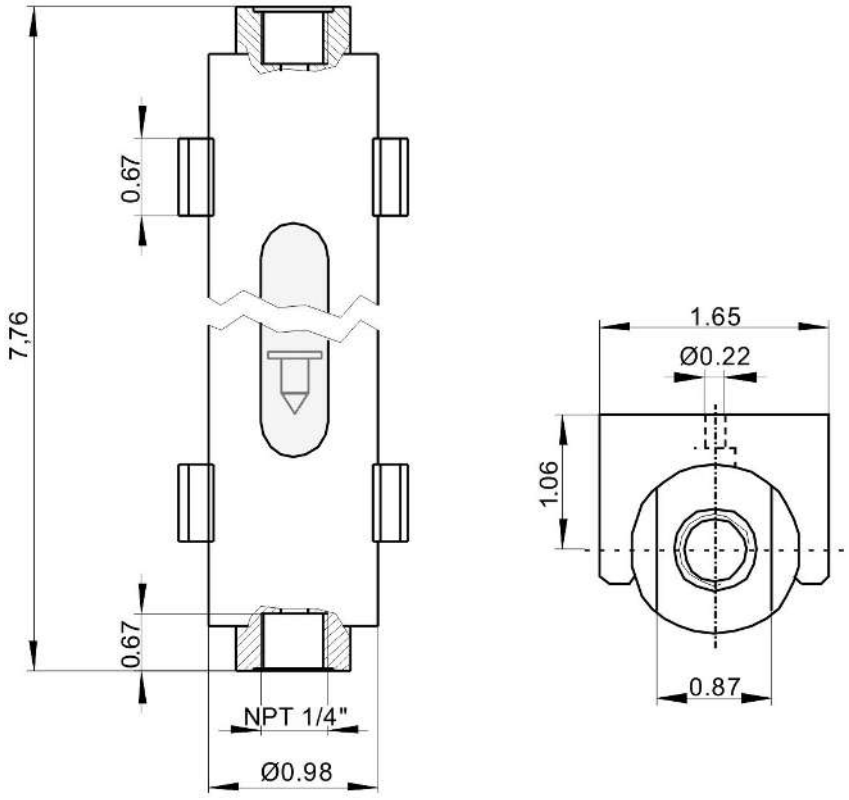
Flow meter dimensions



Use in explosive areas (additional notices):

The flow meter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in zone 1, explosion group IIC. The flow meter is not marked, as it does not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Be sure to observe the instructions in the respective operating instructions!

Technical Data

Safety Flow Meter S-SM	
Ambient temperature:	-4 °F to 176 °C *
Operating pressure:	10 bar (at max. 68 °F) **
Operating temperature:	212 °F (at max. 29 psi) **
Measuring range:	see table
Weight:	2 lbs
Float:	glass, Hastelloy, stainless steel or PTFE
End sections:	PTFE, stainless steel or titanium
Mounting:	via included pipe clamps

* specify in order, select mounting.

** Max. operating pressure [bar] = $10 - \frac{\text{Max. operating temperature [°C]} - 20}{10}$

Typical measuring ranges

	Flow Meter S-SM 3-1	
Medium:	Air	Water
Pressure:	+ 17.4 psi abs	
Temperature:	+ 68 °F	+ 68 °F
	1.6 – 16 Nl/h	0.25 - 2.5 l/h
	4 – 40 Nl/h	0.5 - 5 l/h
	6 - 60 Nl/h	1.2 - 12 l/h
	10 – 100 Nl/h	2.5 - 25 l/h
	25 – 250 Nl/h	
	50 – 500 Nl/h	
	80 – 800 Nl/h	

Spare parts and accessories

Item no.	Description	
40 22 999	Flow Meter S-SM 3-1	End sections stainless steel 1.4571
40 23 999	Flow Meter S-SM 3-1	End sections titanium

7 Accessories for Sample Conditioning Systems

Needle valve NVT-3

PTFE needle valves for fine regulation are indispensable in measurement and control system as well as in analysis and laboratory technology.

These needle valves are intended for fine regulation of highly aggressive mediums. The precise spindle adjustment to the valve seat allows for very fine adjustments. The valves can be used for gaseous and liquid mediums.

- Corrosion-resistant materials
- Easy installation

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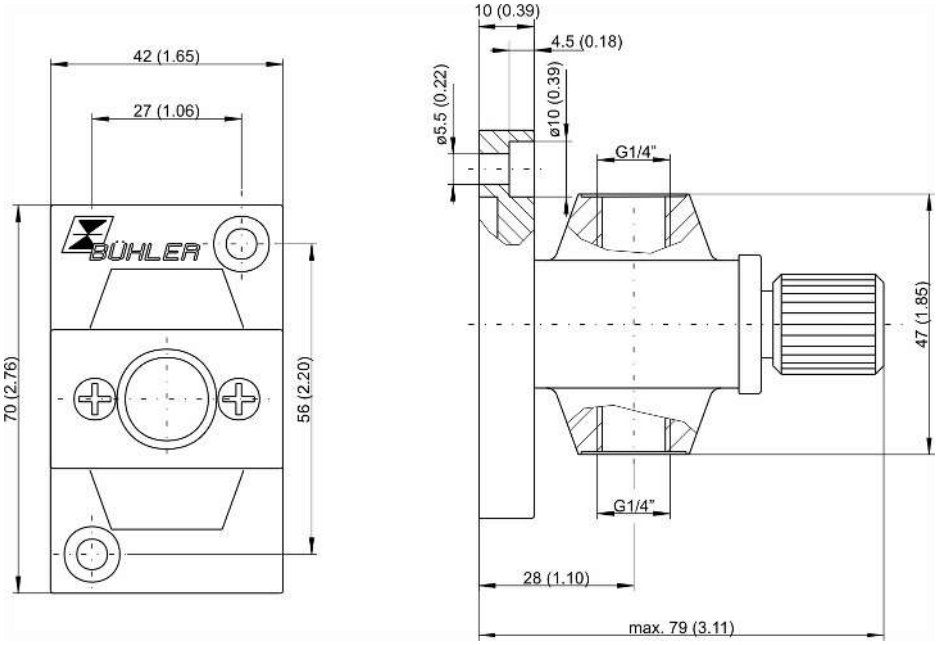
Dimensions

All dimensions in mm (inch)



Use in explosive areas (additional notices):

The type plate on NVT-3 needle valves has no Ex classification, as the mediums do not fall under Directive 2014/34/EU fallen. However, they do meet the fundamental safety requirements of Directive 2014/34/EU and are therefore suitable for use in Ex areas (Zone 1, explosion group IIB). Explosion group IIC non-flammable and flammable gasses which may occasionally be explosive during normal operation may be conveyed through the needle valves (Zone 1).

DANGER **Use in explosive areas**

Flammable gasses and dust could ignite or explode. Avoid the following hazard sources:

Electrostatic charge (sparking)!

Always clean plastic housing parts and decals with a damp cloth.

Keep the gas flow free from particles and drops.

Gas emanation!

Protect the equipment from external blows (shockproof installation).

Risk of fatal injury and explosion hazard from gas leaks due to improper use. Close the shut-off valve (if applicable) to the process or switch off the process for maintenance. Protect yourself from hot and toxic gases. Wear gloves and face shield.

Technical Data

Needle valves	
Material:	see ordering information
Connections:	G 1/4
Flow rate:	up to approx. 6.6 lpm air
Max. operating pressure:	87 psi
Medium temperature max.	266 °F
Ambient temperature:	-4 °F to 176 °F

NOTICE! Please note: The NVT-3 needle valve is not suitable as a shut-off valve.

Ordering instructions

Item no.	Model	Area of application	Material
40 01 899	Needle valve NVT-3	for standard applications	PTFE, PVDF, Viton
40 01 799	Needle valve NVT-3-SO	for extremely aggressive mediums	PTFE, PCTFE, perfluorelastomer

Directional Valves GKH

These reversing taps are primarily used to switch analysis flows. They are available with different switching functions.

Clamps available for mounting.

For corrosive gases

Various designs

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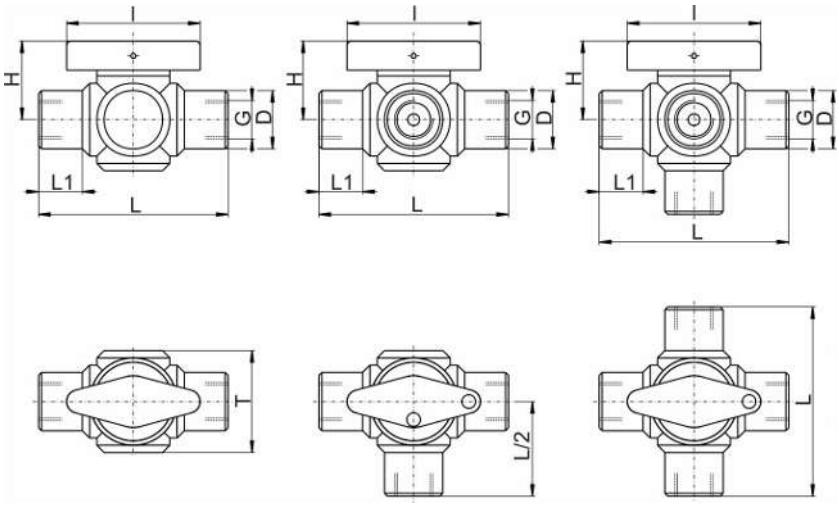
Dimensions



DN	G	D	H	T	L	L1	l
4	1/4"	0.79	1.06	1.18	2.56	0.59	1.57 in

Use in explosive areas (additional notices):

The products do not fall under Directive 2014/34/EU. However, they do meet the fundamental safety requirements of Directive 2014/34/EU and are therefore suitable for use in explosive areas (Zone 1, explosion group II C).

DANGER **Use in explosive areas**

Flammable gasses and dust could ignite or explode. Avoid the following hazard sources:

Electrostatic charge (sparking)!

Always clean plastic housing parts and decals with a damp cloth.

Keep the gas flow free from particles and drops.

Gas emanation!

Protect the equipment from external blows (shockproof installation).

Risk of fatal injury and explosion hazard from gas leaks due to improper use.

Close the shut-off valve (if applicable) to the process or switch off the process for maintenance. Protect yourself from hot and toxic gases. Wear gloves and face shield. Emergent gas can also be explosive. Run lines outside the work and traffic area.

Maximum surface temperature!

Please note the ignition temperatures of explosive gases as well as the maximum surface temperatures per the applicable directives and standards.

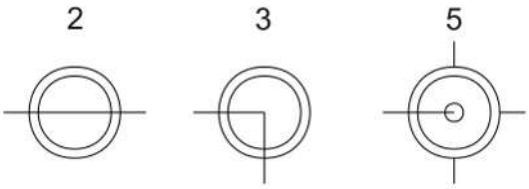
Technical Data

Model GKH	-PVDF	-PFA
Housing material:	PVDF	PFA
O-ring material:	Viton	Viton
Connections:	G 1/4"	G 1/4"
Max. operating pressure*:	145 psi	145 psi
Max. medium temperature:	-22 °F to 284 °F	-22 °F to 392 °F
Nominal width:	0.16 in	0.16 in

* The maximum operating pressure drops as the temperature increases (see chart); specifications in % of the maximum pressure at 68 °F.

Material	max. pressure	68	86	104	122	140	158	176	194	212	230	248	266	284	302	320	338	356	374	392	°F
PVDF	145 psi	100	80	70	60	50	45	40	35	35	30	25	25								%
PFA	145 psi	100	90	85	80	70	60	50	45	40	35	30	30	25	20	15	10	10	10	10	%

Ordering instructions

Item no.	Model	Function
40 61 299	Shut-off valve model GKH-2-PVDF	
40 71 299	Shut-off valve model GKH-2-PFA	
40 61 399	Three-way reversing tap model GKH-3-PVDF	
40 71 399	Three-way reversing tap model GKH-3-PFA	
40 61 599	Five-way reversing tap model GKH-5-PVDF	
40 71 599	Five-way reversing tap model KH-5-PFA	

One of the following items must also be ordered for fastening:	
40 60 098	Fastening claw
40 60 099	Clamp 2-pack

Screw connections for hoses and pipes (PVDF/PFA)

The fittings are used to connect plastic tubes and pipes. Only screw fittings frequently used with our gas conditioning components are listed:

- Screw-in connections, straight and angled
- Female connectors, straight and angled
- Fork screw fittings
- T screw fittings
- Couplers, straight, T- and four-way
- Tube-pipe couplers, straight and angled
- Bulkhead couplings
- Sealing plug
- Spare parts

Please contact us for other types and dimensions!

Removable compressing fittings
Material: PVDF and PFA
G- and NPT threads; standard 1/8", 1/4", 3/8" and 1/2"
Metric hose and pipe sizes; standard DN 4/6, DN 5/8, DN 6/8, DN 8/12 and DN 10/12
US hose and pipe sizes; standard: 1/4"-1/8", 1/4"-1/6", 3/8"-1/4" and 1/2"-3/8"

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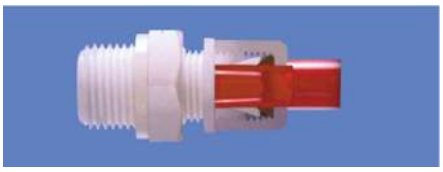
Internet: www.buhlertech.com

General Technical Data

PVDF version:

With PVDF fittings the hose slides of a cylindrical connection piece and secured with a clamping collar and the knurled nut.



PFA version:

With PFA fittings the rigid tube slides over a cylindrical connection piece. When tightening the knurled nut, the gasket will seal the connection and a cutting ring secure it.

All specifications in this data sheet in mm, US specifications in parentheses!

Approved pressure varies by medium temperature

Max. rated pressure:	145 psi
Medium temperature max.	PVDF -40 °F to 284 °F
	PFA -85 °F to 392 °F

Overview

Medium temperature	< 20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	°C
	< 68	86	104	122	140	158	176	194	212	230	248	266	284	302	320	338	356	374	392	°F
PVDF	10	8	7	6	5	4.5	4	3.5	3	2.5	2.5	2	1	-	-	-	-	-	-	bar
	145	116	101.5	87	72.5	65.25	58	50.75	43.5	36.25	36.25	29	14.5	-	-	-	-	-	-	psig
PFA	10	9	8.5	8	7	6	5	4.5	4	3.5	3.5	3	2.5	2	1.5	1	1	1	1	bar
	145	130.5	123.25	116	101.5	87	72.5	65.25	58	50.75	50.75	43.5	36.25	29	21.75	14.5	14.5	14.5	14.5	psig

Use in explosive areas (additional notices):

The products do not fall under Directive 2014/34/EU. However, they do meet the fundamental safety requirements of 2014/34/EU and are therefore suitable for use in explosive areas (Zone 1, explosion group II C).

DANGER **Use in explosive areas**

Flammable gasses and dust could ignite or explode. Avoid the following hazard sources:

Electrostatic charge (sparking)!

Always clean plastic housing parts and decals with a damp cloth.

Keep the gas flow free from particles and drops.

Gas emanation!

Protect the equipment from external blows (shockproof installation).

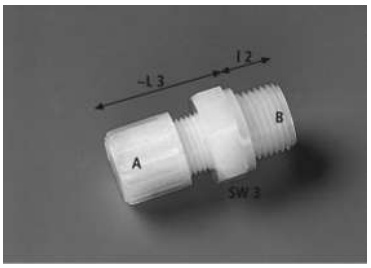
Risk of fatal injury and explosion hazard from gas leaks due to improper use.

Close the shut-off valve (if applicable) to the process or switch off the process for maintenance. Protect yourself from hot and toxic gases. Wear gloves and face shield. Emergent gas can also be explosive. Run lines outside the work and traffic area.

Maximum surface temperature!

Please note the ignition temperatures of explosive gases as well as the maximum surface temperatures per the applicable directives and standards.

Straight screw-in connection



See table for dimensions

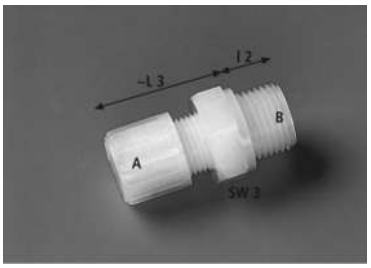
A	Hose dimensions
B	Thread (external)
L3	Installation size
L2	Thread length
SW3	Spanner size

Other dimensions available upon request

	A	B	L3 mm	L3 (US)	L2 mm	L2 (US)	SW3 mm	SW3 (US)	Item no. PVDF	Item no. PFA
Straight screw fitting **Metric hose G thread**	DN 4/6	G 1/8	23.5	(0.93)	8	(0.31)	14	(0.55)	4346054	43701003
		G 1/4	25	(0.98)	12	(0.47)	17	(0.67)	4346055	4346009
		G 3/8	26.5	(1.04)	12	(0.47)	22	(0.87)	4346056	4346010
		G 1/2	29	(1.14)	14	(0.55)	27	(1.06)	4346057	4346011
	DN 5/8	G 1/8	28.5	(1.12)	8	(0.31)	17	(0.67)	43701001	43701004
		G 1/4	29	(1.14)	12	(0.47)	17	(0.67)	4368083	43701005
		G 3/8	30.5	(1.20)	12	(0.47)	22	(0.87)	4368003	
		G 1/2	33	(1.30)	14	(0.55)	27	(1.06)	43701002	43701006
	DN 6/8	G 1/8	28.5	(1.12)	8	(0.31)	17	(0.67)	4368050	4368008
		G 1/4	29	(1.14)	12	(0.47)	17	(0.67)	4368051	4368009
		G 3/8	33	(1.30)	12	(0.47)	22	(0.87)	4368052	4368010
		G 1/2	28.5	(1.12)	14	(0.55)	27	(1.06)	4368053	4368011
	DN 8/12	G 1/4	37	(1.46)	12	(0.47)	22	(0.87)	4381045	4381008
		G 3/8	37.5	(1.48)	12	(0.47)	22	(0.87)	4381046	4381009
		G 1/2	40	(1.57)	14	(0.55)	27	(1.06)	4381047	4381010
	DN 10/12	G 3/8	37.5	(1.48)	12	(0.47)	22	(0.87)	4346095	43701007
		G 1/2	40	(1.57)	14	(0.55)	27	(1.06)	4368086	43701008

	A	B	L3 mm	L3 (US)	L2 mm	L2 (US)	SW3 mm	SW3 (US)	Item no. PVDF	Item no. PFA
Straight screw fitting **Metric hose NPT thread**	DN 4/6	NPT 1/8	22	(0.87)	10	(0.39)	12	(0.47)	4346058	4346016
		NPT 1/4	23	(0.91)	15	(0.59)	17	(0.67)	4346059	4346017
		NPT 3/8	24	(0.94)	15.3	(0.60)	19	(0.75)	4346060	4346018
		NPT 1/2	25	(0.98)	20	(0.79)	24	(0.94)	4346061	4346019
	DN 5/8	NPT 1/4	27	(1.06)	15	(0.59)	17	(0.67)	43460603	
		NPT 3/8	24	(0.94)	15.3	(0.60)	19	(0.75)	43460602	
		NPT 1/2	29	(1.14)	20	(0.79)	24	(0.94)	43701009	43701011
	DN 6/8	NPT 1/8	27	(1.06)	10	(0.39)	17	(0.67)	4368054	4368016
		NPT 1/4	27	(1.06)	15	(0.59)	17	(0.67)	4368055	4368017
		NPT 3/8	28	(1.10)	15.3	(0.60)	19	(0.75)	4368056	43701012
		NPT 1/2	29	(1.14)	20	(0.79)	24	(0.94)	4368057	43701013
	DN 8/12	NPT 1/4	35	(1.38)	15	(0.59)	22	(0.87)	4381048	4381014
		NPT 3/8	35	(1.38)	15.3	(0.60)	22	(0.87)	4381049	43701014
		NPT 1/2	36	(1.42)	20	(0.79)	24	(0.94)	4381050	43701015
	DN 10/12	NPT 3/8	35	(1.38)	15.3	(0.60)	22	(0.87)	43701010	43701016
		NPT 1/2	36	(1.42)	20	(0.79)	24	(0.94)	4369037	43701017

Straight screw-in connection



See table for dimensions

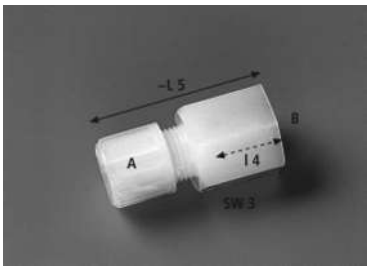
A	Hose dimensions
B	Thread (external)
L3	Installation size
L2	Thread length
SW3	Spanner size

Other dimensions available upon request

	A	B	L3 mm / (US)		L2 mm / (US)		SW3 mm / (US)		Item no. PVDF	Item no. PFA
Straight screw fitting	1/4"-1/8"	G 1/8	25.5	(1.00)	8	(0.31)	14	(0.55)	43701020	43701042
US hose		G 1/4	27	(1.06)	12	(0.47)	17	(0.67)	4347010	43701043
G thread		G 3/8	28.5	(1.12)	12	(0.47)	22	(0.87)	43701021	
		G 1/2	31	(1.22)	14	(0.55)	27	(1.06)	43701022	43701044
	1/4"-1/6"	G 1/8	25.5	(1.00)	8	(0.31)	14	(0.55)	43701023	43701045
		G 1/4	27	(1.06)	12	(0.47)	17	(0.67)	4347008	43701046
		G 3/8	28.5	(1.12)	12	(0.47)	22	(0.87)	43701025	43701047
		G 1/2	31	(1.22)	14	(0.55)	27	(1.06)	43701026	43701048
	3/8"-1/4"	G 1/4	35	(1.38)	12	(0.47)	19	(0.75)	43701027	43701049
		G 3/8	35.5	(1.40)	12	(0.47)	22	(0.87)	43701028	43701050
		G 1/2	38	(1.50)	14	(0.55)	27	(1.06)	43701029	43701051
	1/2"-3/8"	G 3/8	39.5	(1.56)	12	(0.47)	22	(0.87)	43701030	
		G 1/2	42	(1.65)	14	(0.55)	27	(1.06)	43701031	43701052

	A	B	L3 mm / (US)		L2 mm / (US)		SW3 mm / (US)		Item no. PVDF	Item no. PFA
Straight screw fitting	1/4"-1/8"	NPT 1/8	24	(0.94)	10	(0.39)	12	(0.47)	43701032	43701053
US hose		NPT 1/4	25	(0.98)	15	(0.59)	17	(0.67)	43701033	43701054
NPT thread		NPT 1/2	27	(1.06)	20	(0.79)	24	(0.94)	43701034	
	1/4"-1/6"	NPT 1/8	24	(0.94)	10	(0.39)	12	(0.47)	43701035	43701055
		NPT 1/4	25	(0.98)	15	(0.59)	17	(0.67)	43701036	43701056
		NPT 3/8	26	(1.02)	15.3	(0.60)	19	(0.75)		43701057
		NPT 1/2	27	(1.06)	20	(0.79)	24	(0.94)	43701037	
	3/8"-1/4"	NPT 1/4	33	(1.30)	15	(0.59)	19	(0.75)	43701038	43701058
		NPT 3/8	33	(1.30)	15.3	(0.60)	19	(0.75)	43701039	43701059
		NPT 1/2	34	(1.34)	20	(0.79)	24	(0.94)	43701040	43701060
	1/2"-3/8"	NPT 3/8	37	(1.46)	15.3	(0.60)	22	(0.87)		43701061
		NPT 1/2	38	(1.50)	20	(0.79)	27	(0.94)	43701041	43701062

Straight female connector



See table for dimensions

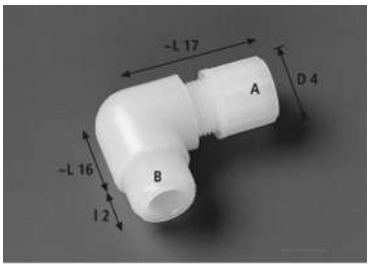
A	Hose dimensions
B	Thread (internal)
L4	Thread length
L5	Length
SW3	Spanner size

Other dimensions available upon request

	A	B	L5 mm / (US)		L4 mm / (US)		SW3 mm / (US)		Item no. PVDF	Item no. PFA
Straight female connector **Metric hose G thread**	DN 4/6	G 1/8	31	(1.22)	10	(0.39)	14	(0.55)	4346062	4346024
		G 1/4	36	(1.42)	15	(0.59)	17	(0.67)	4346063	4346025
		G 3/8	36	(1.42)	15	(0.59)	22	(0.87)	4346064	4346026
		G 1/2	38	(1.50)	16	(0.63)	27	(1.06)	4346065	43708013
	DN 6/8	G 1/8	36	(1.42)	10	(0.39)	17	(0.67)	4368058	4368024
		G 1/4	41	(1.61)	15	(0.59)	17	(0.67)	4368059	4368025
		G 3/8	41	(1.61)	15	(0.59)	22	(0.87)	4368060	43708014
		G 1/2	42	(1.65)	16	(0.63)	27	(1.06)	4368061	4368074
	DN 8/12	G 1/4	48	(1.89)	15	(0.59)	22	(0.87)	4381051	4381041
		G 3/8	48	(1.89)	15	(0.59)	22	(0.87)	4381052	
		G 1/2	49	(1.93)	16	(0.63)	27	(1.06)	4381053	43708015
	DN 10/12	G 3/8	48	(1.89)	15	(0.59)	22	(0.87)	4368081	43708016
		G 1/2	49	(1.93)	16	(0.63)	27	(1.06)	43708001	43708017

	A	B	L5 mm / (US)		L4 mm / (US)		SW3 mm / (US)		Item no. PVDF	Item no. PFA
Straight female connector **Metric hose NPT thread**	DN 4/6	NPT 1/8	32	(1.26)	11.6	(0.46)	14	(0.55)	4346081	43708018
		NPT 1/4	38	(1.50)	16.4	(0.65)	17	(0.67)	43708002	43708019
		NPT 3/8	39	(1.54)	17.4	(0.69)	22	(0.87)	43708003	43708020
		NPT 1/2	47	(1.85)	22.6	(0.89)	27	(1.06)	43708004	43708021
	DN 6/8	NPT 1/8	35	(1.38)	11.6	(0.46)	19	(0.75)	43708005	
		NPT 1/4	41	(1.61)	16.4	(0.65)	19	(0.75)	43708006	43708022
		NPT 3/8	42	(1.65)	17.4	(0.69)	22	(0.87)	43708007	43708023
		NPT 1/2	48	(1.89)	22.6	(0.89)	27	(1.06)	43708008	43708024
	DN 8/12	NPT 1/4	48	(1.89)	16.4	(0.65)	24	(0.94)	43708009	
		NPT 1/2	53	(2.09)	22.6	(0.89)	27	(1.06)	43708010	
	DN 10/12	NPT 3/8	49	(1.93)	17.4	(0.69)	24	(0.94)	43708011	
		NPT 1/2	53	(2.09)	22.6	(0.89)	27	(1.06)	43708012	43708025

Elbow screw fitting



See table for dimensions

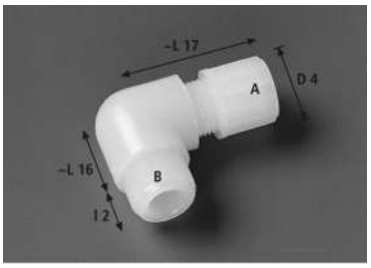
A	Hose dimensions
B	Thread (external)
L16	Installation size
L17	Angular dimension
L2	Thread length

Other dimensions available upon request

	A	B	L16 mm / (US)		L17 mm / (US)		L2 mm / (US)		Item no. PVDF	Item no. PFA
Elbow screw fitting **Metric hose G thread**	DN 4/6	G 1/8	12	(0.47)	25	(0.98)	8	(0.31)	4346068	4346034
		G 1/4	13	(0.51)	26	(1.02)	12	(0.47)	4346069	4346035
		G 3/8	19	(0.75)	29	(1.14)	12	(0.47)	4346070	43702009
		G 1/2	15	(0.59)	32	(1.26)	14	(0.55)	4346071	43702010
	DN 5/8	G 1/8	15	(0.59)	30	(1.18)	8	(0.31)	43702001	
		G 1/4	15	(0.59)	30	(1.18)	12	(0.47)	43702002	
		G 3/8	15	(0.59)	33	(1.30)	12	(0.47)	4368084	
		G 1/2	15	(0.59)	36	(1.42)	14	(0.55)	43702003	
	DN 6/8	G 1/8	15	(0.59)	30	(1.18)	8	(0.31)	4368064	43702011
		G 1/4	15	(0.59)	30	(1.18)	12	(0.47)	4368065	43702012
		G 3/8	15	(0.59)	33	(1.30)	12	(0.47)	4368066	43702013
		G 1/2	15	(0.59)	36	(1.42)	14	(0.55)	4368067	4368036
	DN 8/12	G 1/4	19	(0.75)	40	(1.57)	12	(0.47)	4381056	4381027
		G 3/8	19	(0.75)	40	(1.57)	12	(0.47)	4381057	
		G 1/2	19	(0.75)	43	(1.69)	14	(0.55)	4381058	43702014
	DN 10/12	G 3/8	19	(0.75)	40	(1.57)	12	(0.47)	43702004	43702015
		G 1/2	19	(0.75)	43	(1.69)	14	(0.55)	4381085	43702016

	A	B	L16 mm / (US)		L17 mm / (US)		L2 mm / (US)		Item no. PVDF	Item no. PFA
Elbow screw fitting **Metric hose NPT thread**	DN 4/6	NPT 1/8	12	(0.47)	25	(0.98)	10	(0.39)	4346072	43702017
		NPT 1/4	13	(0.51)	26	(1.02)	15	(0.59)	4346073	4346042
		NPT 3/8	15	(0.59)	29	(1.14)	15.3	(0.60)	4346074	4346043
		NPT 1/2	15	(0.59)	32	(1.26)	20	(0.79)	4346075	4346044
	DN 5/8	NPT 1/8	15	(0.59)	30	(1.18)	10	(0.39)	43702005	
		NPT 1/4	15	(0.59)	30	(1.18)	15	(0.59)	43702006	
		NPT 3/8	15	(0.59)	33	(1.30)	15.3	(0.60)	4368148	
	DN 6/8	NPT 1/8	15	(0.59)	30	(1.18)	10	(0.39)	4368068	43702018
		NPT 1/4	15	(0.59)	30	(1.18)	15	(0.59)	4368069	4368040
		NPT 3/8	15	(0.59)	33	(1.30)	15.3	(0.60)	4368070	4368041
		NPT 1/2	15	(0.59)	36	(1.42)	20	(0.79)	4368071	4368042
	DN 8/12	NPT 1/4	19	(0.75)	40	(1.57)	15	(0.59)	4381059	
		NPT 3/8	19	(0.75)	40	(1.57)	15.3	(0.60)	4381060	43702019
		NPT 1/2	21	(0.83)	40	(1.57)	20	(0.79)	4381061	
	DN 10/12	NPT 3/8	19	(0.75)	40	(1.57)	15.3	(0.60)	43702007	
		NPT 1/2	21	(0.83)	40	(1.57)	20	(0.79)	43702008	43702020

Elbow screw fitting



See table for dimensions

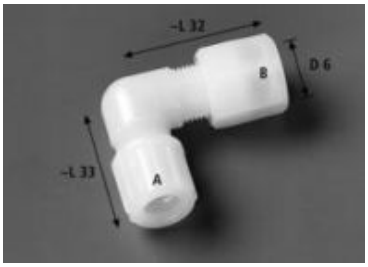
A	Hose dimensions
B	Thread (external)
L16	Installation size
L17	Angular dimension
L2	Thread length

Other dimensions available upon request

	A	B	L16 mm / (US)		L17 mm / (US)		L2 mm / (US)		Item no. PVDF	Item no. PFA
Elbow screw fitting	1/4"-1/8"	G 1/8	12	(0.47)	27	(1.06)	8	(0.31)	43702021	
		G 1/4	13	(0.51)	28	(1.10)	12	(0.47)	43702022	
US hose G thread		G 3/8	19	(0.75)	31	(1.22)	12	(0.47)	43702023	
	1/4"-1/6"	G 1/8	12	(0.47)	27	(1.06)	8	(0.31)	43702024	43702033
		G 1/4	13	(0.51)	28	(1.10)	12	(0.47)		43702034
		G 3/8	19	(0.75)	31	(1.22)	12	(0.47)		43702035
	3/8"-1/4"	G 1/4	17	(0.67)	38	(1.50)	12	(0.47)	43702025	43702036
		G 3/8	17	(0.67)	38	(1.50)	12	(0.47)	43702026	43702037
		G 1/2	17	(0.67)	41	(1.61)	14	(0.55)		43702038
	1/2"-3/8"	G 1/2	19	(0.75)	45	(1.77)	14	(0.55)	43702027	43702039

	A	B	L16 mm / (US)		L17 mm / (US)		L2 mm / (US)		Item no. PVDF	Item no. PFA
Elbow screw fitting	1/4"-1/8"	NPT 1/8	12	(0.47)	27	(1.06)	8	(0.31)		43702040
		NPT 1/4	13	(0.51)	28	(1.10)	12	(0.47)		43702041
US hose NPT thread	1/4"-1/6"	NPT 1/8	12	(0.47)	27	(1.06)	10	(0.39)	43702028	43702042
		NPT 1/4	13	(0.51)	28	(1.10)	15	(0.59)	43702029	43702043
		NPT 1/2	15	(0.59)	34	(1.34)	20	(0.79)		43702044
	3/8"-1/4"	NPT 1/4	17	(0.67)	38	(1.50)	15	(0.59)	43702030	43702045
		NPT 1/2	17	(0.67)	41	(1.61)	20	(0.79)	43702031	
	1/2"-3/8"	NPT 3/8	19	(0.75)	42	(1.65)	15.3	(0.60)		43702046
		NPT 1/2	21	(0.83)	42	(1.65)	15.3	(0.60)	43702032	43702047

Elbow fitting tube - pipe



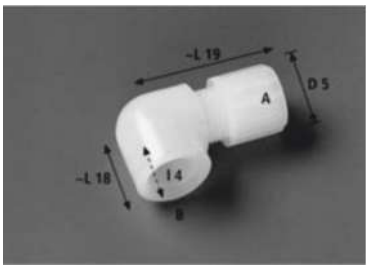
See table for dimensions

A	Hose dimensions
B	Thread (internal)
L32	Angular dimension
L33	Installation size
SW	Spanner size

Other dimensions available upon request

	A	B	L32 mm / (US)		L33 mm / (US)		SW mm / (inch)		Item no. PVDF	Item no. PFA
Elbow coupler tube - pipe	DN 4/6	6	39	(1.54)	26	(1.02)	17	(0.67)	4346086	43704005
		10	45	(1.77)	29	(1.14)	22	(0.87)	43704001	43704006
metric - metric	DN 6/8	6	40	(1.57)	30	(1.18)	17	(0.67)	4368085	
		10	45	(1.77)	33	(1.30)	22	(0.87)	43704002	
	DN 10/12	10	45	(1.77)	43	(1.69)	22	(0.87)	43704003	
US - US	1/4"-1/8"	1/4"	39	(1.54)	26	(1.02)	17	(0.67)	43704004	43704007

Elbow female connector



See table for dimensions

A	Hose dimensions
B	Thread (internal)
L18	Installation size
L19	Angular dimension
L4	Thread length

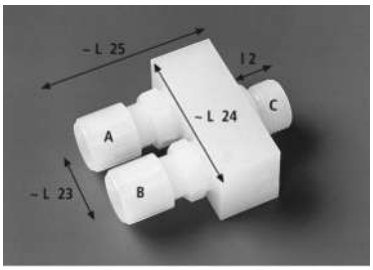
Other dimensions available upon request

	A	B	L18 mm / (US)		L19 mm / (US)		L4 mm / (US)		Item no. PVDF	Item no. PFA
Elbow female connector	DN 4/6	G 1/8	17	(0.67)	26	(1.02)	10	(0.39)	43703001	43703025
		G 1/4	20	(0.79)	29	(1.14)	15	(0.59)	43703002	43703026
Metric hose G thread		G 3/8	20	(0.79)	32	(1.26)	15	(0.59)	43703003	
		G 1/2	23	(0.91)	34	(1.34)	16	(0.63)	43703004	
	DN 6/8	G 1/8	17	(0.67)	30	(1.18)	10	(0.39)	43703005	43703027
		G 1/4	20	(0.79)	33	(1.30)	15	(0.59)	43703006	43703028
		G 3/8	20	(0.79)	36	(1.42)	15	(0.59)	43703007	
		G 1/2	23	(0.91)	38	(1.50)	16	(0.63)	43703008	43703029
	DN 8/12	G 1/4	20	(0.79)	40	(1.57)	10	(0.39)	43703009	
		G 3/8	20	(0.79)	43	(1.69)	15	(0.59)	43703010	43703030
		G 1/2	23	(0.91)	45	(1.77)	15	(0.59)	43703011	43703031
	DN 10/12	G 3/8	20	(0.79)	43	(1.69)	15	(0.59)	43703012	
		G 1/2	23	(0.91)	45	(1.77)	16	(0.63)	43703013	43703032

	A	B	L18 mm / (US)		L19 mm / (US)		L4 mm / (US)		Item no. PVDF	Item no. PFA
Elbow female connector	DN 4/6	NPT 1/8	20	(0.79)	26	(1.02)	11.6	(0.46)	43703014	43703033
		NPT 1/4	24	(0.94)	29	(1.14)	16.4	(0.65)	43703015	43703034
Metric hose NPT thread		NPT 1/2	32	(1.26)	34	(1.34)	22.6	(0.89)	43703016	
	DN 6/8	NPT 1/8	20	(0.79)	30	(1.18)	11.6	(0.46)	43703017	
		NPT 1/4	24	(0.94)	33	(1.30)	16.4	(0.65)	43703018	43703035
		NPT 3/8	26	(1.02)	36	(1.42)	17.4	(0.69)	43703019	
		NPT 1/2	32	(1.26)	38	(1.50)	22.6	(0.89)	43703020	
	DN 8/12	NPT 1/2	32	(1.26)	45	(1.77)	22.6	(0.89)	43703021	
	DN 10/12	NPT 1/2	32	(1.26)	45	(1.77)	22.6	(0.89)	43703022	43703036

	A	B	L18 mm / (US)		L19 mm / (US)		L4 mm / (US)		Item no. PVDF	Item no. PFA
Elbow female connector	1/4"-1/6"	G 1/8	17	(0.67)	32	(1.26)	10	(0.39)		43703040
		G 1/4	20	(0.79)	35	(1.38)	15	(0.59)	43703037	
US hose G thread	1/2"-3/8"	G 3/8	20	(0.79)	45	(1.77)	15	(0.59)	43703038	43703041
		G 1/2	23	(0.91)	47	(1.85)	16	(0.63)		43703042
US hose NPT thread	3/8"-1/4"	NPT 1/4	24	(0.94)	42	(1.65)	16.4	(0.65)	43703039	
	1/2"-3/8"	NPT 1/2	32	(1.26)	47	(1.85)	22.6	(0.89)		43703043

Fork screw fitting



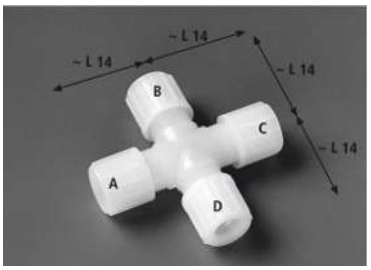
See table for dimensions

A=B	Hose dimensions
C	Thread (external)
L24, 25	Spanner size
L23	Hose spacing
L2	Thread length

Other dimensions available upon request

	A=B	C	L23 mm / (US)		L24 mm / (US)		L25 mm / (US)		L2 mm / (US)		Item no. PVDF
Metric hose G thread	DN 4/6	G 1/8	20	(0.79)	40	(1.57)	43	(1.69)	8	(0.31)	43705001
		G 1/4	20	(0.79)	40	(1.57)	43	(1.69)	12	(0.47)	4346050
	DN 6/8	G 1/8	25	(0.98)	50	(1.97)	54.5	(2.15)	8	(0.31)	43705002
		G 1/4	25	(0.98)	50	(1.97)	54.5	(2.15)	12	(0.47)	43705003
Metric hose NPT thread	DN 4/6	NPT 1/8	20	(0.79)	40	(1.57)	43	(1.69)	10	(0.39)	43705004
		NPT 1/4	20	(0.79)	40	(1.57)	43	(1.69)	15	(0.59)	4346084
US hose NPT thread	1/4"-1/6"	NPT 1/4	20	(0.79)	40	(1.57)	45	(1.77)	15	(0.59)	43705005

4-way fitting, hose connection all ends



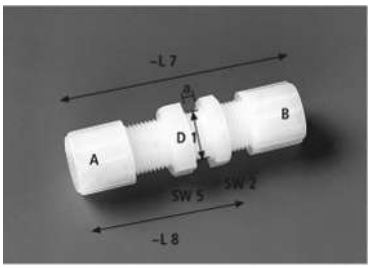
See table for dimensions

A=B=C=D	Hose dimensions
L14	Dimensions

Other dimensions available upon request

	A=B=C=D	L14 mm / (US)		Item no. PVDF	Item no. PFA
Cross fitting metric	DN 4/6	25	(0.98)	4346077	4346048
	DN 6/8	33	(1.30)	4368073	
	DN 8/12	43	(1.69)	4381063	4381039
	DN 10/12	43	(1.69)	43714001	

Bulkhead coupling, hose connection both ends



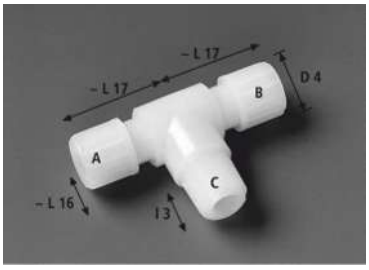
See table for dimensions

A=B	Hose dimensions
D1	Hole diameter
L7	Total length
L8	Inside length
SW2	Fixed spanner size
SW5	Spanner size loose nut

Other dimensions available upon request

	A=B	D1 mm	D1 (US)	L7 mm	L7 (US)	L8 mm	L8 (US)	SW2 mm	SW2 (US)	SW5 mm	SW5 (US)	Item no. PVDF	Item no. PFA
Bulkhead couplings	DN 4/6	10.5	(0.41)	53	(2.09)	36	(1.42)	14	(0.55)	14	(0.55)	4346067	4346030
	DN 6/8	14.5	(0.57)	64	(2.52)	43	(1.69)	19	(0.75)	19	(0.75)	4368063	4368030
metric	DN 8/12	18.5	(0.73)	84	(3.31)	56	(2.20)	24	(0.94)	24	(0.94)	4381055	4381023
	DN 10/12	18	(0.71)	84	(3.31)	55	(2.17)	24	(0.94)	24	(0.94)	4381953	43713003
US	1/4"-1/8"	10	(0.39)	55	(2.17)	36	(1.42)	14	(0.55)	14	(0.55)	43713001	43713004
	1/4"-1/6"	10.5	(0.41)	57	(2.24)	38	(1.50)	14	(0.55)	14	(0.55)	4346087	43713005
	3/8"-1/4"	16.5	(0.65)	77	(3.03)	51	(2.01)	22	(0.87)	22	(0.87)	43713002	43713006

T-fitting



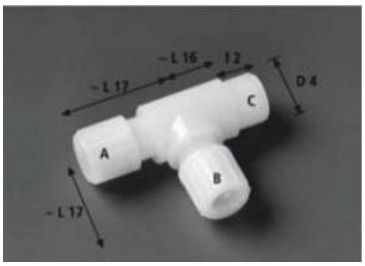
See table for dimensions

A=B	Hose dimensions
C	Thread (external)
L16	Outside dimensions
L17	Spacing
L3	Thread length

Other dimensions available upon request

	A=B	C	L16 mm	L16 (US)	L17 mm	L17 (US)	L3 mm	L3 (US)	Item no. PVDF	Item no. PFA
Metric hose G thread	DN 4/6	G 1/8	20	(0.79)	26	(1.02)	8	(0.31)	4346079	43706008
		G 1/4	27	(1.06)	27	(1.06)	12	(0.47)	4346103	43706009
	DN 6/8	G 1/8	20	(0.79)	31	(1.22)	8	(0.31)	43706001	43706010
		G 1/4	27	(1.06)	31	(1.22)	12	(0.47)	43706002	43706011
Metric hose NPT thread	DN 4/6	NPT 1/8	12	(0.47)	26	(1.02)	10	(0.39)		43706012
		NPT 1/4	15	(0.59)	27	(1.06)	15	(0.59)		43706013
	DN 6/8	NPT 1/4	15	(0.59)	31	(1.22)	15	(0.59)		43706014
US hose G thread	1/4"-1/8"	G 1/4	15	(0.59)	30	(1.22)	12	(0.47)	43706003	
	1/4"-1/6"	G 1/8	20	(0.79)	28	(1.10)	8	(0.31)	43706004	
		G 1/4	27	(1.06)	29	(1.14)	12	(0.47)	43706005	
US hose NPT thread	1/4"-1/8"	NPT 1/8	12	(0.47)	30	(1.22)	10	(0.39)	43706006	
		NPT 1/4	15	(0.59)	30	(1.22)	15	(0.59)		43706015
	1/4"-1/6"	NPT 1/8	12	(0.47)	28	(1.10)	10	(0.39)	43706007	

T screw fitting (asymmetric)



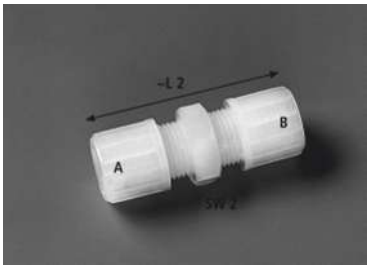
See table for dimensions

A=B	Hose dimensions
C	Thread (internal)
L16	Outside dimensions
L17	Spacing
L2	Thread length

Other dimensions available upon request

	A=B	C	L16 mm / (US)		L17 mm / (US)		L2 mm / (US)		Item no. PVDF	Item no. PFA
Metric hose G thread	DN 4/6	G 1/8	12	(0.47)	26	(1.02)	8	(0.31)	43707001	43707008
		G 1/4	15	(0.59)	27	(1.06)	12	(0.47)	4346078	43707009
	DN 6/8	G 1/8	12	(0.47)	31	(1.22)	8	(0.31)	43707002	
		G 1/4	15	(0.59)	31	(1.22)	12	(0.47)	43707003	
Metric hose NPT thread	DN 4/6	NPT 1/8	12	(0.47)	26	(1.02)	10	(0.39)	43707004	
		NPT 1/4	15	(0.59)	27	(1.06)	15	(0.59)	4346083	43707010
	DN 6/8	NPT 1/8	15	(0.59)	31	(1.22)	10	(0.39)	43707005	
		NPT 1/4	15	(0.59)	31	(1.22)	15	(0.59)	43707006	43707011
US hose G thread	1/4"-1/8"	G 1/4	15	(0.59)	29	(1.14)	12	(0.47)	43707007	
US hose NPT thread	1/4"-1/6"	NPT 1/4	15	(0.59)	29	(1.14)	17	(0.67)		43707012
	3/8"-1/4"	NPT 1/4	18	(0.71)	38	(1.50)	17	(0.67)		

Coupler, hose connection both ends



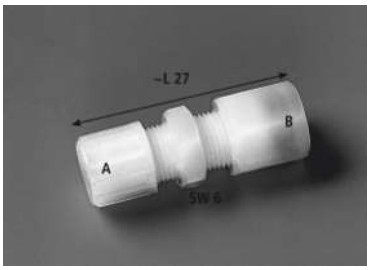
See table for dimensions

A	Hose dimension 1
B	Hose dimension 2
L2	Length
SW2	Spanner size

Other dimensions available upon request

	A	B	L2 mm / (US)		SW2 mm / (US)		Item no. PVDF	Item no. PFA
Straight coupler hose - hose	DN 4/6	DN 4/6	39	(1.54)	14	(0.55)	4346066	43709004
		DN 6/8	45	(1.77)	19	(0.75)	4346051	43709005
metric	DN 6/8	DN 6/8	49	(1.93)	19	(0.75)	4368062	43709006
	DN 8/12	DN 8/12	64	(2.52)	24	(0.94)	4381054	43709007
	DN 10/12	DN 10/12	64	(2.52)	24	(0.94)	4346121	43709008
US	1/4"-1/8"	1/4"-1/8"	47	(1.85)	14	(0.55)	43709001	43709009
	1/4"-1/6"	1/4"-1/6"	47	(1.85)	14	(0.55)	43709002	43709010
		3/8"-1/4"	48	(1.89)	22	(0.87)		43709011
	3/8”-1/4”	3/8"-1/4"	63	(2.48)	22	(0.87)	43709003	43709012

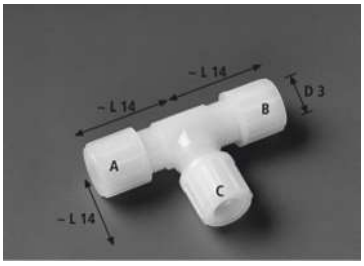
Coupler hose - pipe



See table for dimensions
A Hose dimensions
B Pipe dimensions
L Length
2
7
S Spanner size
W
6
Other dimensions available upon request

	A	B	L27 mm / (US)		SW6 mm / (US)		Item no. PVDF	Item no. PFA
Straight coupler hose - pipe	DN 4/6	6	50	(1.97)	17	(0.67)	4346088	43710008
		10	54	(2.13)	19	(0.75)	43710001	
metric - metric	DN 6/8	6	54	(2.13)	17	(0.67)	43710002	
		10	58	(2.28)	22	(0.87)	43710003	43710009
	DN 8/12	10	65	(2.55)	22	(0.87)	43710004	
	DN 10/12	10	65	(2.55)	22	(0.87)	43710005	
US - US	1/4"-1/8"	1/4"	54	(2.13)	17	(0.67)	43710006	
	3/8"-1/4"	1/4"	62	(2.44)	22	(0.87)		43710010
US hose Metric pipe	1/4"-1/6"	6	52	(2.05)	17	(0.67)	43710007	

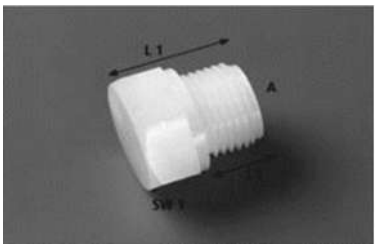
T-piece, hose connection all ends



See table for dimensions
A=B=C Hose dimensions
L14 Dimensions
Other dimensions available upon request

	A=B=C	L14 mm / (US)		Item no. PVDF	Item no. PFA
T-coupler	DN 4/6	26	(1.02)	4346076	4346046
metric	DN 6/8	31	(1.22)	4368072	4368044
	DN 8/12	43	(1.69)	4381062	43711003
	DN 10/12	43	(1.69)	4381083	43711004
US	1/4"-1/8"	28	(1.10)	43711001	43711005
	1/4"-1/6"	28	(1.10)	4346099	43711006
	3/8"-1/4"	38	(1.50)	43711002	43711007

Sealing plug



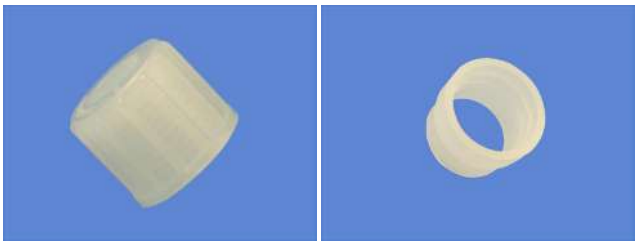
See table for dimensions

A	Thread (external)
l1	Thread length
L1	Total length
SW1	Spanner size

Other dimensions available upon request

	A	L1 mm / (US)		l1 mm / (US)		SW1 mm / (US)		Item no. PVDF	Item no. PFA
metric	G 1/8	14	(0.55)	8	(0.31)	14	(0.55)	43712001	43712008
	G 1/4	22.5	(0.89)	12	(0.47)	17	(0.67)	43712002	43712009
	G 3/8	25.5	(1.00)	12	(0.47)	22	(0.87)	43712003	43712010
	G 1/2	28.5	(1.12)	14	(0.55)	27	(1.06)	4346096	43712011
US	NPT 1/8	10	(0.39)	15	(0.59)	12	(0.47)	43712004	43712012
	NPT 1/4	15	(0.59)	23	(0.91)	17	(0.67)	43712006	43712013
	NPT 3/8	15.3	(0.60)	25	(0.98)	19	(0.75)	43712005	43712014
	NPT 1/2	20	(0.79)	32	(1.26)	24	(0.94)	43712007	43712015

Spare parts: Knurled nuts and clamping collars



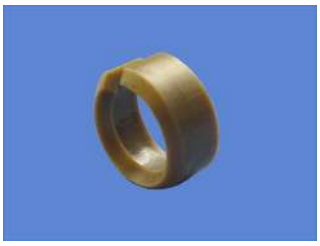
Knurled nut Clamping collar

Connection principle 1A – Material: PVDF

	A (hose)	Knurled nut PVDF	Clamping collar PVDF
metric	DN 4/6	4350213	9008925
	DN 5/8	4350214	4350219
	DN 6/8	4350214	4350219
	DN 8/12	4350215	4350220
	DN 10/12	4350215	4350220
US	1/4"-1/8"	43712022	43712024
	1/4"-1/6"	43712022	43712024
	3/8"-1/4"	43712023	43712025

Spare parts: Gaskets and cutting rings

Gasket



Cutting ring

Connection principle 1C – Material: PFA

	A (hose)	Knurled nut PVDF	Gasket PTFE	Cutting ring PEEK
metric	DN 4/6	4350213	43712026	43712031
	DN 5/8	4350214	43712027	43712032
	DN 6/8	4350214	43712027	43712032
	DN 8/12	4350215	43712028	43712033
	DN 10/12	4350215	43712028	43712033
US	1/4"-1/8"	43712022	43712029	43712034
	1/4"-1/6"	43712022	43712029	43712034
	3/8"-1/4"	43712023	43712030	43712035

PVDF and PFA hose and pipe fittings for glass connections

The fittings are used to connect plastic tubes and pipes to glass fittings, for example in glass heat exchangers or glass condensate traps. We further offer types with hose fittings integrated in the swivel nut and types to insert and secure in existing glass fittings.

You will further find seals required for using the selected plug-in fittings with your existing glass fittings.

Hoses can also be connected to glass connections without fittings by using a support tube and secured with the seal. These support tubes are also listed in this data sheet.

Glass fittings GL14, GL18 and GL25
PVDF removable compression fittings
Metric hose and pipe sizes; standard: DN 4/6, DN 5/8, DN 6/8, DN 8/12 and DN 10/12
US hose and pipe sizes; standard: 1/4“ - 1/8“, 1/4“ - 1/6“, 3/8“ - 1/4“ and 1/2“ - 3/8“

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

General Data

PVDF version (preferably for flexible hoses)

With PVDF fittings the hose slides over a cylindrical connection piece and secured with a clamping collar and the knurled nut

PFA version (preferably for less flexible hoses)

With PFA fittings the rigid tube slides over a cylindrical connection piece. When tightening the knurled nut, the gasket will seal the connection and a cutting ring secure it.

All fittings with cylindrical female threads have a gasket strip, omitting washers and gaskets during installation. The thermoplastic material can be considered self-sealing

NOTICE

Use in explosive areas (additional notices)

The products do not fall under Directive 2014/34/EU. However, they do meet the fundamental safety requirements of Directive 2014/34/EU and are therefore suitable for use in explosive areas (Zone 1, Group II C).

NOTICE

Electrostatic charge (sparking)

Always clean (wipe) plastic housing parts and decals with a damp cloth. Keep the gas flow free from particles and drops.

WARNING

Gas emanation

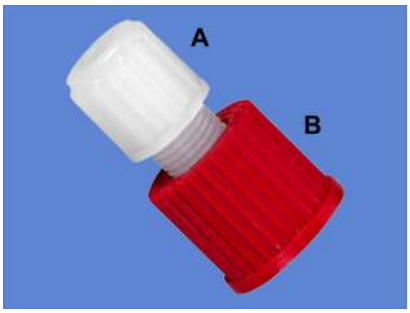
Protect the equipment from external blows (shockproof installation). Risk of fatal injury and explosion hazard from gas leaks due to improper use. Close the shut-off valve (if applicable) to the process or switch off the process for maintenance. Protect yourself from hot and toxic gases. Wear gloves and face shield. Emergent gas can also be explosive. Run lines outside the work and traffic area.

NOTICE

Maximum surface temperature

Please note the ignition temperatures of explosive gases as well as the maximum surface temperatures per the applicable directives and standards.

Glass fittings with hose connection (O-ring)



A: Hose connection
B: Glass threaded connection

	A	B	Item no. PVDF	Item no. PFA
Screw connections (metric)	DN 4/6	GL 14	43715001	43715011
		GL 18	43715002	43715012
		GL 25	43715003	43715013
	DN 5/8	GL 18	43715004	-
	DN 6/8	GL 18	43715005	43715014
		GL 25	43715006	43715015
	DN 8/12	GL 25	4550299	43715016
	DN 10/12	GL 25	43715007	43715017
Screw connections (US)	1/4" - 1/8"	GL 14	43715008	43715018
	1/4" - 1/6"	GL 14	43715009	43715019
	1/2“ - 3/8“	GL 25	43715010	43715020

Approved pressure varies by medium temperature

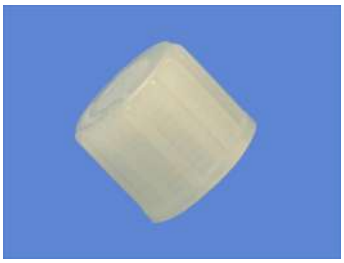
Materials in contact with media: PVDF or PFA, Viton
Max. medium temperature: -30 °C bis +140 °C (-22 °F to +284 °F)

Medium temperature	< 50	60	70	80	90	100	110	120	130	140	°C
	< 122	140	158	176	194	212	230	248	266	284	°F
Max. pressure	6	5	4.5	4	3.5	3	2.5	2.5	2	1	bar
	87	72.5	65.25	58	51	43.5	36.25	36.25	29	14.5	psi

NOTICE

The actual permissible pressures of these fittings are determined by the approved pressure ratios of the connected glass receptacle!

Small parts (replacement)



Knurled nut

Clamping collar

Gasket

Cutting ring

Connection principle 1A – Material: PVDF

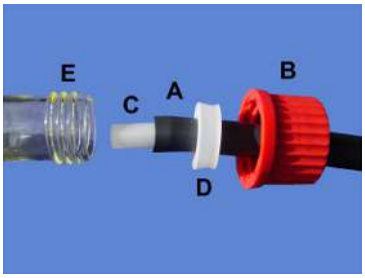
	A (hose)	PVDF knurled nut	PVDF clamping collar
metric	DN 4/6	4350213	9008925
	DN 5/8	4350214	4350219
	DN 6/8	4350214	4350219
	DN 8/12	4350215	4350220
	DN 10/12	4350215	4350220
US	1/4" - 1/8"	43712022	43712024
	1/4" - 1/6"	43712022	43712024
	3/8" - 1/4"	43712023	43712025

Connection principle 1C – Material: PFA

	A (hose)	PVDF knurled nut	PTFE gasket	PEEK cutting ring
metric	DN 4/6	4350213	43712026	43712031
	DN 5/8	4350214	43712027	43712032
	DN 6/8	4350214	43712027	43712032
	DN 8/12	4350215	43712028	43712033
	DN 10/12	4350215	43712028	43712033
US	1/4" - 1/8"	43712022	43712029	43712034
	1/4" - 1/6"	43712022	43712029	43712034
	3/8" - 1/4"	43712023	43712030	43712035

Glass fittings with hose connection

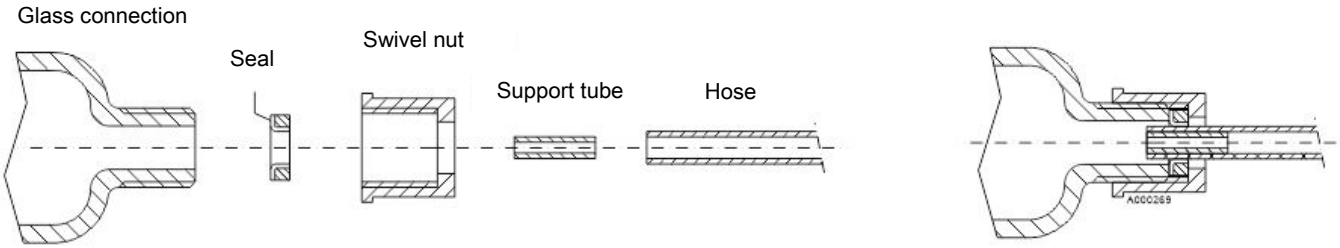
When using hoses with simple swivel nuts and seals, support tubes must be used, as the hose will otherwise deform and not seal. The size must be determined based on the inside diameter of the hose, which is approximately the outside diameter of the support tube.



A: Hose
B: Swivel nut for glass thread
C: Support tubes for hoses
D: Silicone seal with PTFE sleeve at one end
Di: Seal inside diameter

	A	E	Di	B Swivel nut	D Silicone seal with sleeve at one end	C Support tubes for hoses
Fittings metric	DN 4/6	GL 14	6	45100132	45100134E	4445014
	DN 5/8	GL 18	8	45100140	45100138E	4445012
	DN 5/8	GL 25	8	45100133	45100137E	4445012
	DN 6/8	GL 18	8	45100140	45100138E	4510273
	DN 8/10	GL 18	10	45100140	45100141E	4445013
	DN 8/12	GL 25	12	45100133	45100135E	4445013
	DN 10/12	GL 25	12	45100133	45100135E	4445010
Fittings US	1/4" - 1/8"	GL 14	6	45100132	45100134E	4445014
	1/4" - 1/6"	GL 14	6	45100132	45100134E	4445014
	5/16" - 3/16"	GL 18	8	45100140	45100138E	4445012
	5/16" - 3/16"	GL 25	8	45100133	45100137E	4445012
	3/8" - 1/4"	GL 18	10	45100140	45100141E	4445015
	3/8" - 1/4"	GL 25	10	45100133	451001352E	4445015
	1/2" - 3/8"	GL 25	12	45100133	45100135E	4445016

Connection principle



Approved pressure varies by medium temperature

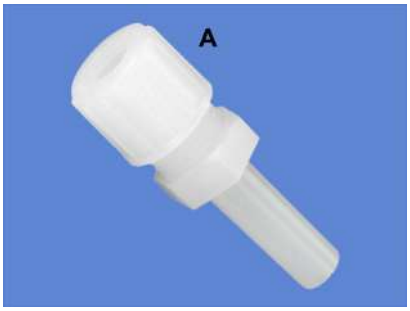
Materials in contact with media: PTFE
Max. medium temperature: -30 °C to +140 °C (-22 °F to +284 °F)

Medium temperature	< 100	110	120	130	140	°C
	< 212	230	248	266	284	°F
max. pressure	3	2.5	2.5	2	1	bar
	43.5	36.25	36.25	29	14.5	psi

NOTICE

The actual permissible pressures of these fittings are determined by the approved pressure ratios of the connected glass receptacle!

Straight screw connections with hose connection for GL seals



A: Hose connection
B: Glass threaded connection
Di: Seal inside diameter

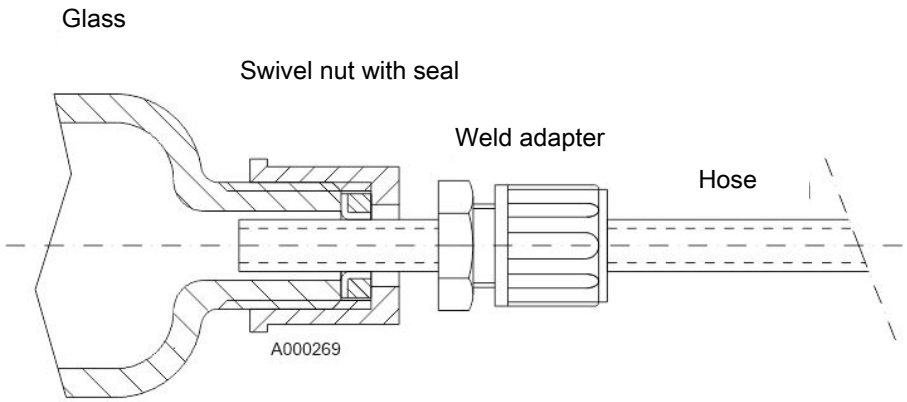
	A	B	Di	Item no. PVDF	Item no. PFA
Screw connections (metric)	DN 5/8	GL 18	8	43716001	-
	DN 8/10	GL 25	10	43716007	-
	DN 8/12	GL 25	12	43716002	-
	DN 10/12	GL 25	12	43716003	43716005
Screw connections (US)	1/4" - 1/8"	GL 18 / 25	8	43716004	-
	3/8" - 1/4"	GL 18 / 25	8	-	43716006

Elbow fittings with hose connection for GL seals

A: Hose connection
B: Glass threaded connection
Di: Seal inside diameter

	A	B	Di	Item no. PVDF	Item no. PFA
Screw connections (metric)	DN 4/6	GL 14	6	43717001	43717007
		GL 18 / 25	8	43717002	-
	DN 6/8	GL 14	6	43717003	-
		GL 18 / 25	8	43717004	13717008
	DN 8/12	GL 18 / 25	12	43717005	-
	DN 10/12	GL 18 / 25	12	43717006	43717009
Screw connections (US)	1/4" - 1/6"	GL 18 / 25	-	-	43717010
	3/8" - 1/4"	GL 18 / 25	8	-	43717011

Connection principle



Approved pressure varies by medium temperature

Materials in contact with media: PVDF or PFA, PTFE
Medium temperature max.: -30 °C to +140 °C (-22 °F to +284 °F)

Medium temperature	< 100	110	120	130	140	°C
	< 212	230	248	266	284	°F
max. pressure	3	2.5	2.5	2	1	bar
	43.5	36.25	36.25	29	14.5	psi

NOTICE

The actual permissible pressures of these fittings are determined by the approved pressure ratios of the connected glass receptacle!

Pipe fittings and plugs made of stainless steel

The screw fittings are only for connecting and joining stainless steel tubes. Only screw fittings frequently used with our gas conditioning components are listed:

- Screw-in connections, straight and angled
- Tube adapter, straight and angled
- Sealing plug
- Spare parts

Please contact us for other types and dimensions!

Removable compression fittings; material: Stainless steel 316
Tapered thread (ISO/BSP); standard: 1/4" and 3/8"
NPT thread; standard: 1/4" and 3/8"
Metric tube sizes; standard: 6, 8, 10 and 12 mm
US tube sizes; standard: 1/4", 3/8" and 1/2"
Grease-less versions available upon request

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Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Examples for using screw fittings and plugs

- Connecting stainless steel gas heat exchangers
- Probes: Connections for sample gas, calibrating gas, purge air, control air
- Connecting stainless steel filters
- Spare parts for gas pumps with stainless steel head

General Technical Data

Material: Stainless steel 316 (1.4401) or 1.4471.

All specifications in this data sheet in mm, US specifications in parentheses!

Permissible pressures

Permissible operating pressure in bar/psig for seamless stainless steel tubes.

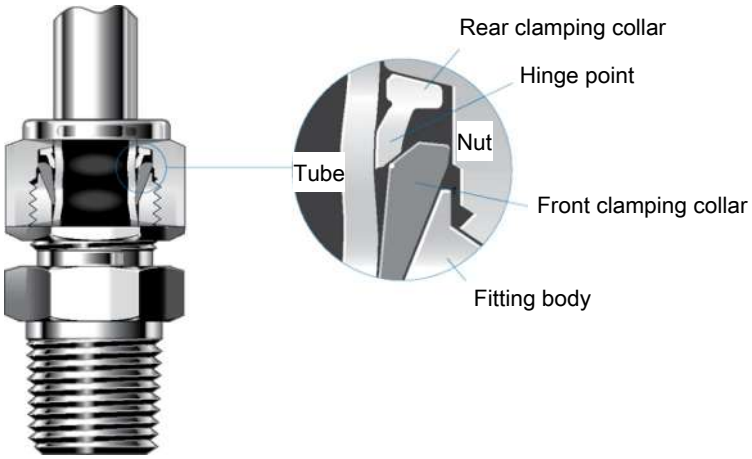
For single weld tubes, multiply the specified pressure by 0.8.

Information in the pressure tables are guidelines!

	Tube wall thickness	6 mm	8 mm	10 mm	12 mm	1/8"	1/4"	3/8"	Pressure
metric	1 mm	420	310	240	200	-	-	-	bar
		6094	4498	3482	2902	-	-	-	psig
	1.5 mm	710	520	400	330	-	-	-	bar
		10302	7545	5804	4788	-	-	-	psig
	2 mm	-	-	580	470	-	-	-	bar
		-	-	8415	6819	-	-	-	psig
US	0.89 mm (0.035")	-	-	-	-	720	341.5	227	bar
		-	-	-	-	10900	5100	3300	psig
	1.25 mm (0.049")	-	-	-	-	-	517	330	bar
		-	-	-	-	-	7500	4800	psig
	1 mm (0.065")	-	-	-	-	-	703	448	bar
		-	-	-	-	-	10200	6500	psig

Special properties

- Spring-loaded design with two clamping collars.
- Easy installation.
- No torque is applied to the tube during installation.



When installing the design with the new geometry the front clamping collar is pressed onto the fitting body and the tube, creating primary seals, whilst the rear clamping collar folds inward to firmly clamp around the tube. The geometry of the rear clamping collars creates a better hinge-tension effect, which converts axial movement into radial pressure onto the tube, requiring little torque.

Straight screw-in connection

See table for dimensions

A Outside tube diameter
B Threaded connection
L Total length
SW Spanner size

Other dimensions available upon request

	A	B (inch)	L mm / (inch)		SW mm / (inch)		Item no.
Tapered ISO / BSP thread (RT)	6 mm	1/4"	37.9	(1.492)	14	(0.55)	9029007
		3/8"	38.4	(1.51)	18	(0.708)	9029009
Metric tube	8 mm	1/4"	38.7	(1.52)	15	(0.59)	9029041
		3/8"	39.2	(1.54)	18	(0.708)	9029042
	10 mm	3/8"	40.9	(1.61)	18	(0.708)	9029043
	12 mm	3/8"	43.4	(1.7)	22	(0.866)	9029044
US tube	1/4"	1/4"	37.9	(1.49)	9/16“	(0.56)	9029006
		3/8"	38.4	(1.51)	11/16“	(0.688)	9029045
	3/8"	1/4"	39.87	(1.57)	5/8“	(0.625)	9029046
		3/8"	39.87	(1.57)	11/16“	(0.688)	9029047
	1/2"	3/8"	43.4	(1.71)	13/16“	(0.813)	9029048
NPT thread	6 mm	NPT 1/4	37.9	(1.492)	14	(0.55)	9029000
Metric tube		NPT 3/8	38.4	(1.51)	18	(0.708)	9029049
	8 mm	NPT 1/4	38.7	(1.52)	15	(0.59)	9029001
		NPT 3/8	39.2	(1.54)	18	(0.708)	9029050
		NPT 1/2	45.6	(1.8)	22	(0.866)	9029068
	10 mm	NPT 3/8	40.9	(1.61)	18	(0.708)	9029051
	12 mm	NPT 3/8	43.4	(1.7)	22	(0.866)	9029052
US tube	1/4"	NPT 1/4	37.9	(1.49)	9/16“	(0.56)	9029003
		NPT 3/8	38.4	(1.5)	11/16“	(0.688)	9029053
	3/8"	NPT 1/4	39.87	(1.57)	5/8“	(0.625)	9029011
		NPT 3/8	39.87	(1.57)	11/16“	(0.688)	9029054
	1/2"	NPT 3/8	43.4	(1.71)	13/16“	(0.813)	9029055

Straight connector

See table for dimensions

A Outside tube diameter 1
B Outside tube diameter 2
L Length

Other dimensions available upon request

	A	B	L	Item no.
metric	6 mm	6 mm	41 mm	9029024
		8 mm	39.4 mm	9029056
	8 mm	8 mm	43.2 mm	9029057
	10 mm	10 mm	46.2 mm	9029058
US	1/4"	1/4"	1.61”	9029059
		3/8"	1.70”	9029060
	3/8"	3/8"	1.77”	9029061

Elbow screw fitting

See table for dimensions

A	Outside tube diameter
B	ISO threaded connection
C	Screw-in connection pivoting radius
SW	Screw-in connection spanner size

Other dimensions available upon request

	A	B (inch)	C mm / (inch)		SW mm / (inch)		Item no.
Tapered ISO / BSP thread (RT)	6 mm	1/4"	27	(1.06)	12.7	(0.5)	9029017
		3/8"	29.8	(1.17)	17.5	(0.688)	9029062
Metric tube	8 mm	1/4"	28.8	(1.134)	14.29	(0.563)	9029063
		3/8"	30.6	(1.2)	17.5	(0.688)	9029064
	10 mm	3/8"	31.5	(1.24)	17.5	(0.688)	9029065
	12 mm	3/8"	36	(1.42)	20.64	(0.813)	9029066
US tube	1/4"	1/4"	27	(1.06)	1/2“	(0.5)	9029067
		3/8"	29.8	(1.17)	11/16“	(0.688)	9029069
	3/8"	1/4"	30.48	(1.20)	5/8“	(0.625)	9029070
		3/8"	31.24	(1.23)	11/16“	(0.688)	9029071
	1/2"	3/8"	36.07	(1.42)	13/16“	(0.813)	9029072
NPT thread	6 mm	NPT 1/4	27	(1.06)	12.7	(0.5)	9029016
Metric tube		NPT 3/8	29.8	(1.17)	17.5	(0.688)	9029073
	8 mm	NPT 1/4	28.8	(1.134)	14.29	(0.563)	9029074
		NPT 3/8	30.6	(1.29)	17.5	(0.688)	9029075
	10 mm	NPT 3/8	31.5	(1.24)	17.5	(0.688)	9029076
	12 mm	NPT 3/8	36	(1.42)	20.64	(0.813)	9029077
US tube	1/4"	NPT 1/4	27	(1.06)	1/2“	(0.5)	9029078
		NPT 3/8	29.8	(1.17)	11/16“	(0.688)	9029079
	3/8"	NPT 1/4	30.48	(1.20)	5/8“	(0.625)	9029080
		NPT 3/8	31.24	(1.23)	11/16“	(0.688)	9029081
	1/2"	NPT 3/8	36.07	(1.42)	13/16“	(0.813)	9029082

Angled connector

See table for dimensions

A	Outside tube diameter 1
B	Outside tube diameter 2
C	Screw-in connection pivoting radius
SW	Screw-in connection spanner size

Other dimensions available upon request

	A	B	C	SW	Item no.
metric	6 mm	6 mm	27 mm	1/2“	9029083
	8 mm	8 mm	28.8 mm	9/16“	9029084
	10 mm	10 mm	31.5 mm	11/16“	9029085
US	1/4"	1/4"	1.06”	1/4“	9029086
	3/8"	3/8"	1.2”	5.8“	9029087

Spare parts: Swivel nuts and cutting rings

Swivel nut

Front clamping collar

Rear clamping collar

	Tube OD	Spanner size SW mm / (inch)		Swivel nut	Clamping collars set = 10 count
metric	6 mm	14	(0.55)	9029091	9029032
	8 mm	16	(0.63)	9029092	9029033
	10 mm	19	(0.75)	9029093	9029034
	12 mm	22	(0.866)	9029094	9029035
US	1/8"	7/16“	(0.44)	9029095	9029036
	1/4"	9/16“	(0.56)	9029096	9029037
	3/8"	11/16“	(0.687)	9029097	9029038

Screw-in plug

US (NPT thread)

cylindrical pipe thread
(G thread)

See table for dimensions
SW Screw-in connection spanner size
L Length
Other dimensions available upon request

		SW mm / (inch)		L mm / (inch)		Item no.
metric	G 1/8"	10	(0.4)	17	(0.67)	9008471
	G 1/4"	13	(0.51)	21	(0.83)	9008472
	G 3/8"	17	(0.67)	21	(0.83)	9008456
US	NPT 1/8"	7/16“	(0.44)	19.1	(0.75)	9029039
	NPT 1/4"	9/16“	(0.56)	24.4	(0.96)	9029022
	NPT 3/8"	11/16“	(0.687)	25.1	(0.99)	9029040

Stainless steel pipe fittings for high-purity oxygen applications

Reliable analysis of oxygen concentrations is crucial in the electrolysis of water, for example, in order to monitor the LEL in a safety-relevant manner. Oxygen is also measured continuously in biogas plants, flue gas analysis and air separation plants. For this purpose, the gas must be transported safely from the sampling point to the analyser through pipe connections.

Due to its oxidising properties, oxygen places high demands on the cleanliness of parts in contact with the medium. The connecting and joining elements are cleaned in accordance with ASTM-G93 to ensure that they are free of particles, oil and grease.

The fittings are supplied individually shrink-wrapped to maintain cleanliness until installation on site. Only fittings frequently used with our gas conditioning components are listed here: Straight screw-in connections, straight pipe connectors, spare parts.

For applications with high-purity oxygen.
Special cleaning according to the ASTM-G93 standard procedure for stage C oxygen applications
Suitability-tested materials for high$_o$2 concentrations
Removable compression fittings; material: Stainless steel 316
Tapered thread (ISO/BSP); standard: 1/4" and 3/8"
NPT thread; standard: 1/4" and 3/8"
Metric tube sizes; standard: 6, 8, 10 and 12 mm
US tube sizes; standard: 1/4", 3/8" and 1/2"

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Internet: www.buhlertech.com

Examples for use of screw fittings

- Connecting stainless steel gas heat exchangers.
- Spare parts for gas pumps with stainless steel head.

General Technical Data

Material: Stainless steel 316 (1.4401).

All specifications in this data sheet are in mm, US specifications in parentheses!

Special cleaning of fittings according to ASTM-G93 standard procedure for applications with increased oxygen concentration. Parts in contact with media are cleaned free of oil and grease and partially silver-plated. Parts not in contact with media are cleaned and greased with Krytox 240AC lubricant. Fittings are individually packaged and shrink-wrapped, do not open until immediately before use.

Permissible pressures

Permissible operating pressure in bar/psig for seamless stainless steel tubes.

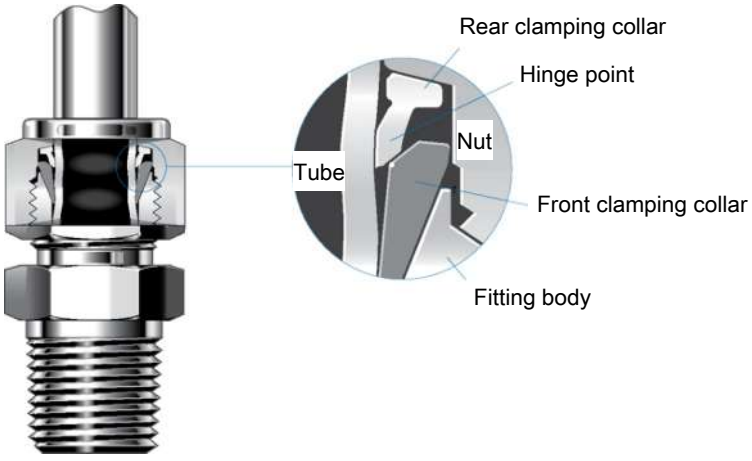
For single weld tubes, multiply the specified pressure by 0.8.

Information in the pressure tables are guidelines!

	Tube wall thickness	6 mm	8 mm	10 mm	12 mm	1/4"	3/8"	pressure
metric	1 mm	420	310	240	200	-	-	bar
		6094	4498	3482	2902	-	-	psig
	1.5 mm	710	520	400	330	-	-	bar
		10302	7545	5804	4788	-	-	psig
	2 mm	-	-	580	470	-	-	bar
		-	-	8415	6819	-	-	psig
US	0,89 mm (0.035").	-	-	-	-	341.5	227	bar
		-	-	-	-	5100	3300	psig
	1.25 mm (0.049").	-	-	-	-	517	330	bar
		-	-	-	-	7500	4800	psig
	1 mm (0.065").	-	-	-	-	703	448	bar
		-	-	-	-	10200	6500	psig

Special properties

- Silver-plated front clamping collar.
- Special cleaning according to the ASTM-G93 standard procedure for stage C oxygen applications.
- Spring-loaded design with two clamping collars.
- Easy installation.
- No torque is applied to the tube during installation.



During installation, the front clamping collar is pressed onto the fitting body and the tube, creating primary seals, whilst the rear clamping collar folds inward to firmly clamp around the tube. The geometry of the rear clamping collars creates a hinge-tension effect, which converts axial movement into radial pressure onto the tube, requiring little torque.

Straight screw-in connection for applications with high-purity oxygen.

To ensure the absence of particles, oil and grease, lubricant must not be used for screw connections that come into contact with media. To prevent leaks, a BAM-approved PTFE sealing tape should be used (see accessories).

A	Outside tube diameter
B	Threaded connection
L	Total length
SW	Spanner size

	A*	B* (inch)	L mm/(inch)		SW mm/(inch)		Item no.
Tapered ISO/ BSP thread (RT)	6 mm	1/4"	37.9	(1.492)	14	(0.55)	9028111
	8 mm	1/4"	38.7	(1.52)	15	(0.59)	9028145
Metric tube	10 mm	3/8"	40.9	(1.61)	18	(0.708)	9028168
	12 mm	3/8"	43.4	(1.7)	22	(0.866)	9028113
US tube	1/4"	1/4"	37.9	(1.49)	9/16"	(0.56)	9028144
	3/8"	1/4"	39.87	(1.57)	5/8"	(0.625)	9028146
	1/2"	3/8"	43.4	(1.71)	13/16"	(0.813)	9028169
NPT thread	6 mm	NPT 1/4	37.9	(1.492)	14	(0.55)	9028109
Metric tube	8 mm	NPT 1/4	38.7	(1.52)	15	(0.59)	9028170
		NPT 3/8	39.2	(1.54)	18	(0.708)	9028171
	10 mm	NPT 3/8	40.9	(1.61)	18	(0.708)	9028172
	12 mm	NPT 3/8	43.4	(1.7)	22	(0.866)	9028173
US tube	1/4"	NPT 1/4	37.9	(1.49)	9/16"	(0.56)	9028174
	3/8"	NPT 1/4	39.87	(1.57)	5/8"	(0.625)	9028175
		NPT 3/8	39.87	(1.57)	11/16"	(0.688)	9028176
	1/2"	NPT 3/8	43.4	(1.71)	13/16"	(0.813)	9028177

* Other dimensions available upon request.

Straight connector for applications with high-purity oxygen

Definition of dimensions

A	Outside tube diameter 1
B	Outside tube diameter 2
L	Length

	A*	B*	L	Item no.
metric	6 mm	6 mm	41 mm	9028182
		8 mm	39.4 mm	9028163
	10 mm	10 mm	46.2 mm	9028164
US	1/4"	1/4"	1.61"	9028165
		3/8"	1.70"	9028166
	3/8"	3/8"	1.77"	9028167

* Other dimensions available upon request.

Spare parts: Swivel nuts and cutting rings for applications with high-purity oxygen.

Swivel nut

Rear clamping collar

Silver-plated front clamping collar

	Tube OD	Spanner size SW mm/(inch)		Swivel nut	Front clamping collar	Rear clamping collar
metric	6 mm	14	(0.55)	9008794	9008795	9008796
	8 mm	16	(0.63)	9028154	9028155	9028156
	10 mm	19	(0.75)	9028157	9028158	9028159
	12 mm	22	(0.866)	9008791	9008792	9008793
US	1/8"	7/16"	(0.44)	9028160	9028161	9028162
	1/4"	9/16"	(0.56)	9028147	9028148	9028149
	3/8"	11/16"	(0.687)	9028150	9028151	9028152
	1/2"	7/8"	(0.875)	9028178	9028179	9028180

Accessories

Item no.	Description
9022325	BAM-approved PTFE sealing tape (Roll of 14,8 ft)

Back Pressure Regulator ARP-1.2

The back pressure regulator is used to maintain a constant sample gas pressure inside the analyser regardless of the respective barometer reading, and installs in the gas outlet of the analyser.

Using the back pressure regulator eliminates measuring errors due to barometric variation. The back pressure regulator is set to a pressure higher than the normal fluctuations in the atmospheric air pressure.

- Constant sample gas pressure
- High accuracy ± < 0.03 psia
- Maintenance-free

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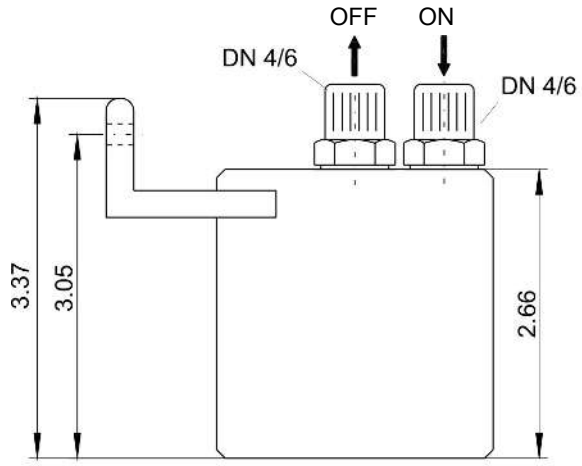
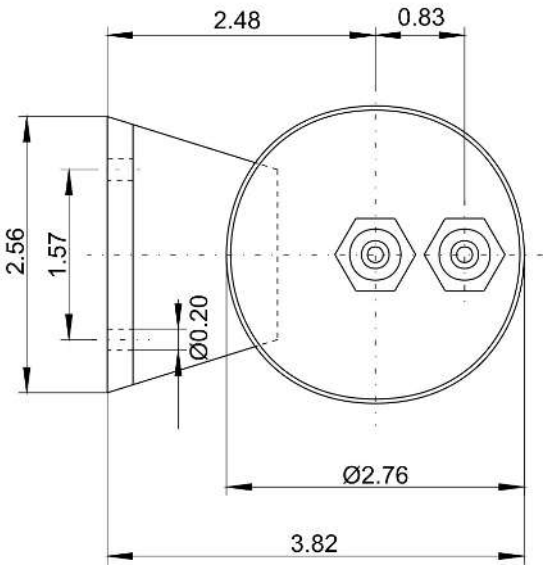
Dimensions (inch)

Side view



Top view



Technical Data

ARP-1.2 Back Pressure Regulator	
Flow rate:	min. 0.42 lpm max. 3.3 lpm
Settings:	Standard 1067 ± 0.03 psia* max. 20 psia
Accuracy:	< 0.03 psia < 0.02 psia at constant flow
Sample gas temperature:	41 °F to 122 °F
Gas connections:	Hose DN 4/6
Materials:	CuBe/1.4571/PP PVDF/Viton
Dead volume:	2.75 cu. in.
Weight:	0.53 lb

* unless otherwise specified you will receive the standard version. Other pressures available upon request

Ordering Instructions

Item no.	Model
46 00 999	ARP-1.2 Back Pressure Regulator

NOTICE! For safety reasons, the back pressure regulator comes with hose connection between the inlet and outlet. This must be removed prior to installation.

GO Pressure Regulator

Pressure regulator overview

Stainless Steel – Brass - Aluminium

PR-1

- Stainless steel 316L pressure regulator
- Single-stage design
- Inlet pressure: max. 5950 psig
- Outlet control range: 0-10 psig to 0-500 psig
- Flow coefficient: Cv 0.06 or 0.2
- Operating temperature: -40 °F to 500 °F (at 3050 psig)

PR-2

- Brass pressure regulator
- Single-stage design
- Inlet pressure: max. 3050 psig
- Outlet control range: 0-10 psig to 0-500 psig
- Flow coefficient: Cv 0.06 or 0.2
- Operating temperature: -67 °F to 347 °F

PR-5

- Stainless steel 316L pressure regulator
- Single-stage design
- Inlet pressure: max. 200 psig
- Outlet control range: 0-10 psig to 0-50 psig
- Flow coefficient: Cv 0.2
- Operating temperature: 32 °F to 347 °F

PR-7

- Stainless steel 316L or brass pressure regulator
- Single-stage design for high flow rates
- Inlet pressure: max. 3050 psig
- Outlet control range: 0-25 psig to 0-100 psig
- Flow coefficient: Cv 1.0
- Operating temperature: 32 °F to 248 °F

PR-9

- Stainless steel 316L pressure regulator
- Single-stage design for high temperatures
- Inlet pressure: max. 3050 psig at 644 °F or 1520 psig at 1004 °F
- Outlet control range: 0-25 psig to 0-250 psig
- Flow coefficient: Cv 0.06
- Operating temperature: -328 °F to 1004 °F

PR-10

- Aluminium pressure regulator
- Single-stage design with fine tuning
- Inlet pressure: max. 3050 psig
- Outlet control range: 0-10 psig to 0-250 psig
- Flow coefficient: Cv 0.06
- Operating temperature: -65 °F to 347 °F

CPR-1

- Stainless steel 316L pressure regulator
- Single-stage design, compact model
- Inlet pressure: max. 3050 psig
- Outlet control range: 0-10 psig to 0-500 psig
- Flow coefficient: Cv 0.06 or 0.2
- Operating temperature: -40 °F to 176 °F

SPR

- Stainless steel 316L pressure regulator
- Single-stage design
- Inlet pressure: max. 5950 psig
- Outlet control range: 0-10 psig to 0-500 psig
- Flow coefficient: Cv 0.2
- Operating temperature: -40 °F to 210 °F

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High pressure regulator

PR-50

- Stainless steel 316L pressure regulator
- Single-stage design
- Inlet pressure: max. 6100 psig
- Outlet control range: 0-500 psig to 0-2030 psig
- Flow coefficient: Cv 0.06
- Operating temperature: -40 °F to 350 °F

PR-59

- Stainless steel 316L pressure regulator
- Single-stage design, optionally available with integrated bleeder valve and balanced poppet
- Inlet pressure: max. 4050 psig
- Outlet control range: 0-500 psig to 0-2030 psig
- Flow coefficient: Cv 2.0
- Operating temperature: -40 °F to 248 °F

Back pressure regulator

Stainless steel – brass

BP-3

- Stainless steel 316L back pressure regulator
- Control range: 0-10 psig to 0-500 psig
- Flow coefficient: Cv 2.4
- Operating temperature: -40 °F to 500 °F

BP-4

- Brass back pressure regulator
- Control range: 0-10 psig to 0-500 psig
- Flow coefficient: Cv 0.3
- Operating temperature: -65 °F to 347 °F

BP-6

- Stainless steel 316L back pressure regulator
- High flow rate
- Control range: 0-100 psig bar to 0-1000 psig
- Flow coefficient: Cv 2.4
- Operating temperature: -40 °F to 248 °F

BP-8

- Stainless steel 316L or brass back pressure regulator
- High flow rate
- Control range: 0-10 psig to 0-250 psig
- Flow coefficient: Cv 2.4
- Operating temperature: -40 °F to 347 °F

BP-60

- Stainless steel 316L back pressure regulator
- High pressure
- Control range: 0-500 psig to 0-3050 psig
- Flow coefficient: Cv 0.095
- Operating temperature: -40 °F to 347 °F

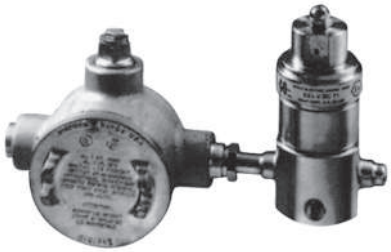
BP-66

- Stainless steel 316L back pressure regulator
- Piston sensor, high pressure
- Control range: 0-4050 psig to 0-6100 psig
- Flow coefficient: Cv 0.095
- Operating temperature: -40 °F to 347 °F

Heated pressure regulator/vaporizer

HPR2 – steam

- Stainless steel 316L pressure regulator
- Single-stage design with steam-heated heat exchanger for heating or vaporizing gas streams
- Inlet pressure: max. 5950 psig
- Outlet control range: 0-10 psig to 0-500 psig
- Flow coefficient: Cv 0.06 or 0.2
- Operating temperature: -40 °F to 500 °F



HPR2 – electric

- Stainless steel 316L pressure regulator
- Single-stage design with electric heated heat exchanger for heating or vaporizing gas streams
- Voltages: 110 V or 230 V in various output classes, optional Ex protection
- Inlet pressure: max. 5950 psig
- Outlet control range: 0-10 psig to 0-500 psig
- Flow coefficient: Cv 0.06 or 0.2
- Operating temperature: -40 °F to 500 °F

Pressure regulators, cylinder pressure regulators, safety valves

Stainless steel – brass

Pressure regulators

DLM 240-15-50	DLM 240-50-100
Item no. AL423321	Item no. AL423308
Chrome-plated brass	**Chrome-plated brass**
Single-stage design	Single-stage design
Inlet pressure: max. 3480 psig	Inlet pressure: max. 3480 psig
Outlet control range: 7 to 280 psig	Outlet control range: 73 to 725 psig
Flow capacity: 833 l/min (N_2)	Flow capacity: 1667 l/min (N_2)
Operating temperature: - 4 °F to + 122 °F	Operating temperature: - 4 °F to + 122 °F

DIM 240-3-5	DIM 240-30-30
Item no. AL422501	Item no. AL415995
Stainless steel 316L	**Stainless steel 316L**
Single-stage design	Single-stage design
Inlet pressure: max. 3480 psig	Inlet pressure: max. 3480 psig
Outlet control range: 4 to 44 psig	Outlet control range: 73 to 435 psig
Flow capacity: 83 l/min (N_2)	Flow capacity: 500 l/min (N_2)
Operating temperature: - 4 °F to + 122 °F	Operating temperature: - 4 °F to + 122 °F

BSI 50-1-2
Item no. AL423103
Stainless steel 316L
Single-stage design
Inlet pressure: max. 725 psig
Outlet control range: 0.73 to 15 psig
Flow capacity: 33 l/min (N_2)
Operating temperature: - 4 °F to + 122 °F

Cylinder pressure regulator

HBD 240-10-12
Item no. AL422163
Chrome-plated brass
Two-stage design
Inlet pressure: max. 3480 psig
Outlet control range: 1.5 psig to 100 psig
Flow capacity: 157 l/min (N_2)
Operating temperature: - 40 °F to 165 °F

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HBD 240-10-12-S
Item no. AL422164
Stainless steel 316L
Two-stage design
Inlet pressure: max. 3480 psig
Outlet control range: 1.5 psig to 100 psig
Flow capacity: 157 l/min (N_2)
Operating temperature: - 40 °F to 165 °F

Safety valves

SV 805 ES – Stainless steel 1.4541
Item no. AL421145
SV 805 ME – Brass
Item no. AL421144
Connections:
Inlet: G3/8
Outlet: for Ø6 mm (0.24 inch) tube
Gauge pressure: 232 psig standard (other gauge pressures on request)

Heated sample gas line

The most common problems in gas analysis systems are related to sample gas conditioning and the sampling lines. Condensate in the sample gas, adsorption and contamination from the sample gas line can affect the accuracy of measurements considerably.

Sampling lines transport the sample gas from the sampling point to the gas conditioner or the analyser. The heated sampling lines keep the temperature of the sample gas above the dew point or the reaction temperature, preventing gas condensation in the analysis system. Condensation must be prevented in the sampling lines for accurate, reliable measurements.

Our experts will gladly advise you on selecting suitable sampling lines and other components for your specific application.

- Proven, reliable sampling line
- Corrugated PA outer sheath standard
- Self-regulating lines at 65 °C (149 °F) and 120 °C (248 °F)
- Regulated lines up to 200 °C (392 °F)
- Pt100 standard, thermal element optional
- Atex Zone 1 lines available
- PTFE- and VA core standard
- Double and replaceable cores available
- Options with additional power supply and sensor line
- Helpful options such as insufficient temperature contact, plug and screw connections
- Helpful accessories such as insulating sleeves and transitional heaters

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Technical Data

Heated lines for non-explosive applications

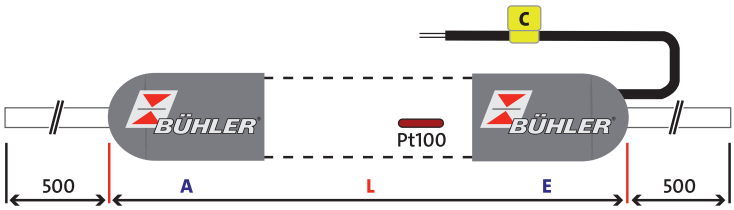
Self-regulating lines	
Voltage:	230 V/50 Hz or 115 V/60 Hz
Max. operating temperature:	65 °C (149 °F): Output 25 W/m 120 °C (248 °F): Output 60 W/m
Materials/lengths:	End caps silicone, cable end sleeves, connecting cable length 2 m (3.28 ft), sheath corrugated PA tube Core: PTFE DN 4/6 and stainless steel (1.4571) 6 mm (0.24 in), fixed, 500 mm (19.69 in) unheated protrusion both ends

Controllable lines	
Voltage:	230 V/50 Hz or 115 V/60 Hz
Max. operating temperature:	200 °C (392 °F): Output 100 W/m
Sensor:	1 x Pt100 (2-lead) standard (others available upon request)
Materials/lengths:	End caps silicone, cable end sleeves, connecting cable length 2 m (6.56 ft), sheath corrugated PA tube Core: PTFE DN 4/6 and stainless steel (1.4571) 6 mm (0.24 in), fixed, 500 mm (19.69 in) unheated protrusion both ends

Other dimensions, materials and replaceable core available upon request.

Dimensions

Schematic heated line construction. The Pt100 only is only installed standard in the controllable line.



Ordering Instructions

Item no.	Type
48 5000 XXXX	self-regulating to 65 °C (149 °F)
48 5001 XXXX	self-regulating to 120°C (248 °F)
48 5012 XXXX	controllable up to 200 °C (392 °F)

Item numbers of lines only for non-explosive gases and environments. Lines for use in explosive areas available upon request.

XXXX indicates consecutive numbering. Please contact us for the version you require.

Special types available upon request.

Temperature controller for use in controllable lines type 48 5012 XXXX

Item no.	Type
48 5300 0002	Wall-mounted temperature controller, terminal clamps, operating voltage 90...250 V, switching current 10 A
48 5300 0003	Wall-mounted temperature controller, heating connects via round connector 4+PE, operating voltage 90...250 V, switching current 20 A

Helpful accessories for connecting heated lines

A suitable connection between heated lines requires thermal insulation or active heating between the unheated ends. Silicone foam insulating sleeves are available for this purpose. If passive insulation is inadequate, you may choose a self-regulating transitional heater.

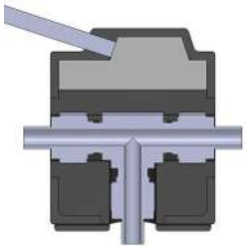
Insulating Sleeve

Technical Data - Insulating Sleeve	
Type:	ID 20 mm/OD 42 mm
Length:	80 mm (3.15 in)
Item number:	48 5300 0016

Self-regulating transitional heater

Outside view

Inside view



The self-regulating transitional heater can be used for cutting ring fittings as well as tubes and pipes with an outside diameter of 6 mm (0.24 in), 8 mm (0.31 in) and 1/4". The construction allows heating straight connectors, 90° elbows as well as T-fittings.

Technical Data - Self-Regulating Transitional Heater	
Material:	Silicone (elastic)
Ambient temperature:	-60 °C to +200 °C (-76 °F to 392 °F)
Operating temperature:	+200 °C (392 °F) (self-regulating)
Voltage:	$230V_{AC}$ / $115V_{AC}$
Electrical connection:	1 m (3.28 ft)silicone cable with cable ends, protection rating II
International protection rating:	IP62
Dimensions:	$Ø_o$ = 63 mm (2.48 in), $Ø_i$ = 17 mm (0.67 in), L = 60 mm (2.36 in)
Item number:	48 5300 0017

8 NOx-Converter

Gas-Converter BÜNOx 2+

In order to protect humans and the environment, the emission of nitric oxides must be reduced as much as possible. In order to use cost-effective gas analysis methods, e.g. infrared technology the NO_2 rate in the emitted gasses must be catalytically converted to NO.

The conversion takes place in small reactors with electric heating which are filled with various catalyst materials developed specifically for this process.

The BÜNOx 2+ converter series offers high energy efficiency, high conversion rates and a long life with a service computer for predictable maintenance.

The NOx computer uses specific user data input by the customer to calculate the remaining life of the converter cartridge based on a configured standard curve and if desired alerts the customer to service requirements.

- NOxCal service computer for predictable service alerts
- 19” rack mount housing
- Optional bypass solenoid valves
- Optional long-life cartridges (extended service life)
- Low temperatures for high efficiency
- Optimised menu navigation
- Easy cartridge replacement without tools
- High conversion rate > 97%
- High NO_2 capacity

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e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Technical Data

General

	19" Rack mount
Operating temperature	752 °F *
Ready for operation	after approx. 30 min (max. 45 min) heat up time

* varies by converter material

Gas inlet conditions

Sample gas pressure	up to 21.8 PSI absolute
Sample gas flow rate	up to 120 L/h (2 lpm)
Sample gas temperature	41 °F to 122 °F
Dew point after cooler	< 50 °F

Ambient conditions

during operation	
Ambient temperature	41 °F to 122 °F
in storage	
Ambient temperature	-4 °F to 158 °F
Humidity	< 80 % rel. humidity

Electrical specifications

Power supply	115 V AC or 230 V AC; 50/60 Hz
Power input	< 500 W
Thermal load	85 W at an oven temperature of 752 °F

Signal inputs and outputs

Status outputs:	
– Service / NOXCal	Changeover contact max. 230 V AC / DC, 1 A
– Operating mode	Changeover contact max. 230 V AC / DC, 1 A
– Temperature	Changeover contact max. 230 V AC / DC, 1 A
Analogue output	Temperature 4-20 mA
Signal input	Solenoid valve control, 24 V DC, 1 mA via external switch

Structural specifications

Dimensions (w x h x d)	19 x 5.2 x 11.2 in
Weight	approx. 22.5 lb
Protection class per EN 60529	IP20

Reactor cartridge

	Model MC
Filling material	metal-based
Life	see diagram
Conversion factor $NO_2 \rightarrow NO$	≧ 97 % when cartridge new
Max. NO_2 capacity at 1.17 lpm	300 ppm
Max. conversion temperature *	797 °F

* The converter temperature should only be increased if the conversion level drops below 95 % with the cartridge almost depleted.

Service life (laboratory operation)

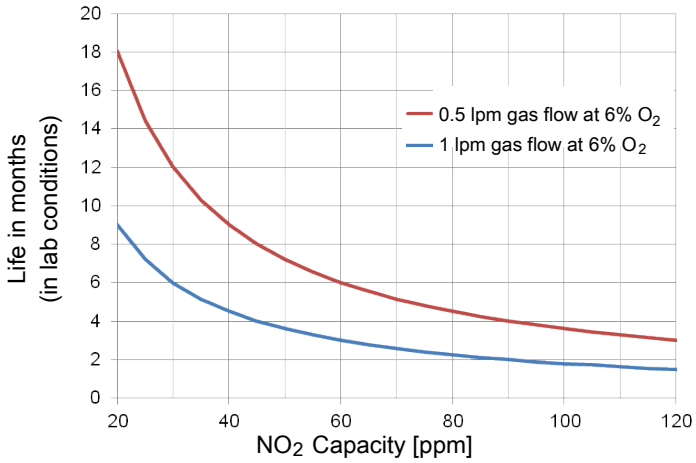


Fig. 1: Diagram converter cartridge life in lab conditions

Life of standard cartridges MC shown.

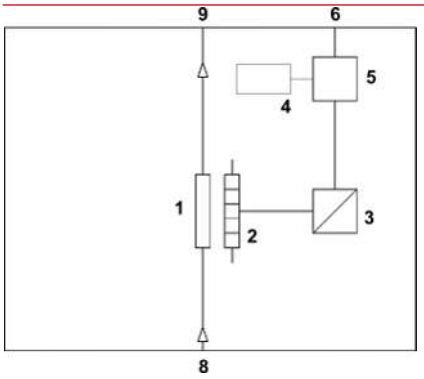
When using the long-life cartridge the life increases significantly.

Values determined in lab conditions. Actual life during operation may differ.

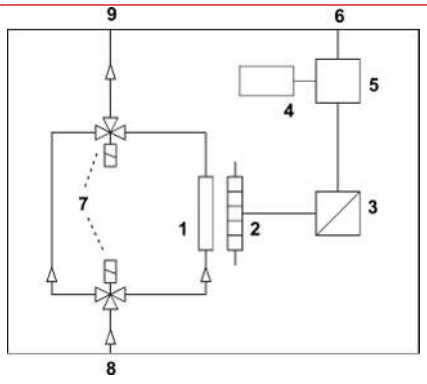
Flow chart

19" housing, unheated

Converter without solenoid valves



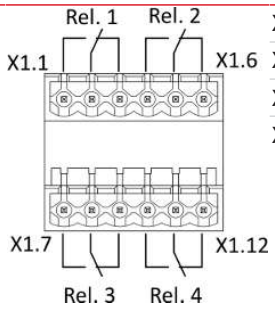
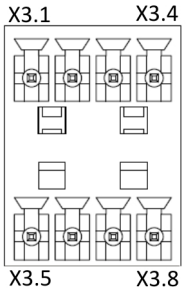
Converter with Solenoid valves



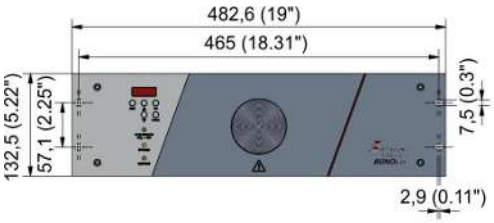
Legend

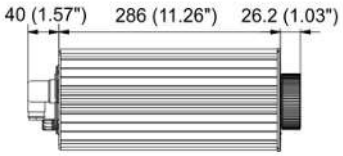
1: Reactor cartridge
2: Tubular furnace
3: Temperature controller
4: Temperature display
5: BÜNOx 2+ control unit
6: Signal inputs and outputs
7: 3/2 directional solenoid valves
8: Gas inlet
9: Gas outlet

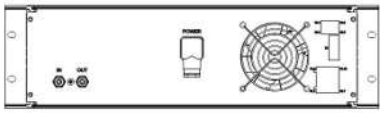
Connection terminals

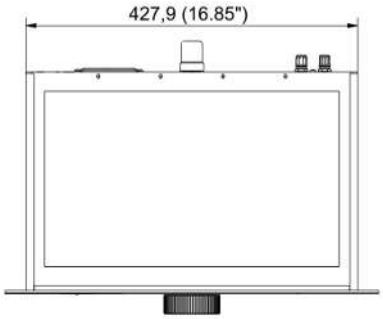
Plug		Terminal	Relay	Description
X1		X1.1 ...X1.3	Rel. 1	Operating mode status conversion / bypass
		X1.4...X1.6	Rel. 2	Status: Excess/low temperature alarm
		X1.7...X1.9	Rel. 3	Status: Service alert
		X1.10...X1.12	Rel. 4	Option
X2				reserved
X3		X3.1		PE / cable shield
		X3.2		External solenoid valve switchover (potential-free) 
		X3.3		
		X3.4		N/C
		X3.5		PE / cable shield
		X3.6		+; analogue output
		X3.7		-; analogue output
		X3.8		N/C

Dimensions

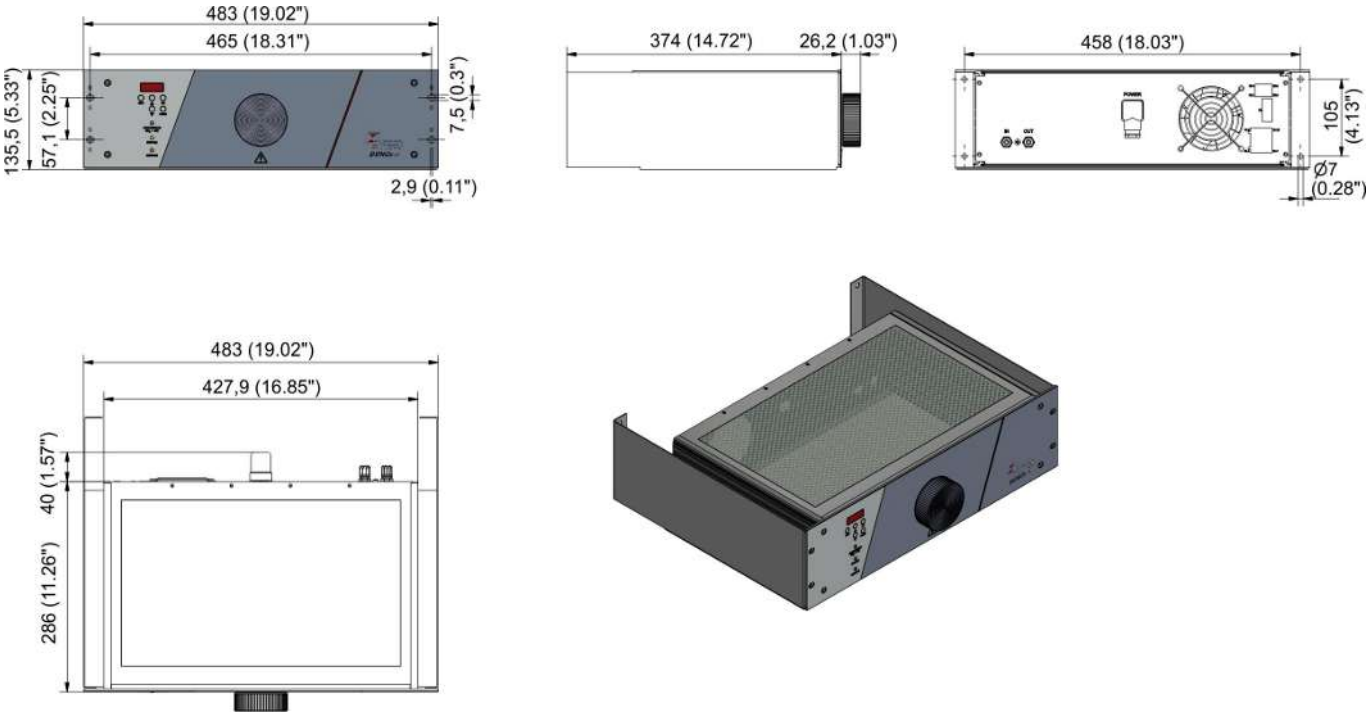








Option wall bracket



Ordering instructions

BÜNOx 2+

The item number is a code for the configuration of your unit. Please use the following model key:

553	1	XX	XX	X	Product characteristic
					Solenoid valves option
		00			without solenoid valves
		10			with solenoid valves
					Power supply
			99		230 V AC, 50-60 Hz
			98		115 V AC, 50-60 Hz
					Gas connections
					Standard 6 mm
				I	1/4"

Accessories

Item no.	Description
metal-based material	
553 199 70	Long-Life cartridge MC
553 199 90	Cartridge MC
Accessories	
553 199 992	Set of Gaskets
553 000 01	Wall bracket for Bünox 2+ and Bünox

9 Portable Analyzers

Portable O2-Analyzer BA 4000

The mobile Bühler O_2 analyser model BA 4000 is used for sample measurements in process systems.

The BA 4000 can be configured to include the optional internal sample gas pump. The sample gas pump is controlled with an on/off switch in the front panel. It is necessary if the sample gas is under atmospheric pressure or slight negative pressure.

The limit alarms allow for monitoring specific O_2 concentrations. An output signal (0-1 V or 4-20 mA) transmits the measurements.

The analyser can quite quickly and easily be calibrated with N_2 as zero gas and air as the range medium. Both calibration points can be adjusted using two trim potentiometers in the front panel.

This device comes standard with one equipment filter. For moist sample gases the portable TGAK gas conditioning system is used for the required sample gas conditioning.

A powerful battery pack allows up to 14 hours of cordless analyser operation.

- Paramagnetic cell measuring principle
- 4 - 20 mA output signal standard
- Long measuring cell life
- Easy to use
- Quick, accurate and reliable O_2 analysis
- Housing protection class IP20
- Battery powered

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Technical Data

Technical data	
Measuring component:	Oxygen
Measuring range:	0 - 25 Vol. % O_2, optional 0 - 100 Vol. % O_2
Measuring principle:	paramagnetic cell measuring principle
Measuring Data	
Accuracy:	0.1 % O_2 absolute
Reproducibility:	± 0.05 % O_2
Response time:	T_{90} <10 s
Zero drift:	± 0.1 Vol.% O_2 per week
Sensitivity drift:	± 1% of measuring span per week
Gas inlet conditions	
Gas temperature:	41 °F to 104 °F
Gas overpressure.	min. 0.15 psig max. 20 psig with sample gas pump installed: -0.07 psig
Gas flow without pump:	min. 0.15 psig through the measuring cell: approx. 0.12 lpm
Sample gas conditioning	
Dew point:	at least 41 °F below ambient temperature
Dust particles:	Equipment filter with replaceable 8µ filter element
Calibration	
Zero point:	with nitrogen (technically pure)
Endpoint:	with ambient air or test gas, depending on the measuring range
Climatic conditions	
Ambient temperature:	50 °F to 113 °F
Transport and storage temperature:	-13 °F to 149 °F
Relative humidity:	<75 % annual average
Measurement output	
Current signal:	4...20 mA (max. 400 Ω)
Voltage signal:	0 - 1 V (min. 1 k Ω) optional
Displays	
Measurement display:	LCD 3½ digits
Flow	Float flow meter
Scale:	0 to 0.33 lpm air
Power supply	
Wall power supply:	100 - 240 V, 50/60 Hz
Installed set of rechargeable batteries:	12 V, 2.7 Ah (operating time without options approx. 14 hrs.)
Construction	
Housing:	Aluminium housing with handle
Housing protection class:	IP20 (standard)
Dimensions (h x w x d):	6.1 x 9.3 x 11 in
Weight	approx. 10 lb
Sample gas inlet:	Stainless steel hose nipple for hose with inside diameter: 4 mm (0.16 in) installed filter with fibreglass cartridge
Materials of parts in contact with gas media:	PVDF, glass, steel 1.4571, gold, viton, platinum/iridium, epoxy resin

Ordering instructions

Device model

Item no.	Description
5511999	BA 4000 0 - 25 Vol. % O_2 *
5511998	BA 4000 0 - 100 Vol. % O_2 *

* incl. mains adapter (Item no.: 551100992)

Accessories (optional)

Item no.	Description
55110991	Internal sample gas pump

Portable O2-Analyzer BA 4000 Inj.

The portable Bühler O_2 analyser model BA 4000 Inj. is a special unit for determining oxygen in low gas volumes. This analyser is a modification of the BA 4000, primarily used in the food industry to analyse small residual amounts in modified atmosphere packaging. We offer two versions:

The BA 4000 Inj. GV is used for volumes > 35 ml.

The BA 4000 Inj. KV is used for gas volumes <35 ml. This analyser is operated by an external vacuum pump.

The optional pressure gauge allows for comparison measurements in vacuum packaging. With the electronic correction when using the pressure gauge, no zero gas is required for zero gas calibration. In addition, the zero point may be corrected between N_2 and CO_2.

- Paramagnetic cell measuring principle
- Long measuring cell life
- O_2 analysis in modified atmosphere packaging
- Easy to use
- Quick, accurate and reliable O_2 analysis
- Optional pressure gauge

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Measuring with the BA 4000 Inj.

The device has a tube equipped with an injection needle at its end. To check a package, apply a self-adhesive piece of rubber to the package to be tested. Depending on the equipment version, this adhesive septum is used to evacuate the analyser or to seal off atmospheric air. With the BA 4000 Inj. KV, the injection needle is now inserted into the rubber piece until the side bore in the needle is covered. After evacuating, the injection needle is pushed all the way through the rubber piece and into the package.

Residual gas flows from the package through the needle and into the measuring cell in the analyser and the measurement can be read on the analyser display. Switch the toggle switch at the front of the unit to display the internal pressure when using the optional pressure gauge. These values can be used to calculate the actual O_2 concentration.

On the BA 4000 Inj. GV version the needle is inserted all the way through the rubber piece and sample gas extracted from the package by switching on the internal pump.

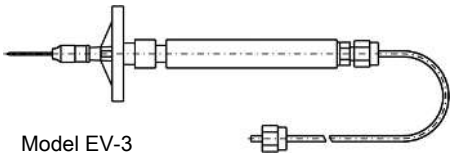
Technical Data

Technical Data	
Measuring component:	Oxygen
Measuring range (specify when ordering):	0 ... 25 Vol. %
Measuring principle:	paramagnetic cell measuring principle
Measuring Data	
Accuracy:	0.1 % O_2 absolute
Reproducibility:	± 0.05 % O_2
Response time:	T_{90} <10 s
Zero drift:	± 0.1 Vol.% O_2 per week
Sensitivity drift:	± 1% of measuring span per week
Gas inlet conditions	
Gas temperature:	41 °F to 104 °F
Sample gas conditioning	
Dew point:	at least 41 °F below ambient temperature
Dust particles:	Equipment filter with replaceable 8 µ filter element
Calibration	
Zero point:	with nitrogen (technically pure), optionally with vacuum
Endpoint:	with ambient air or test gas, depending on the measuring range
Climatic conditions	
Ambient temperature:	50 °F to 113 °F
Transport and storage temperature:	-13 °F to 149 °F
Relative humidity:	<75 % annual average
Measurement output	
Current signal:	4...20 mA (max. 400 Ω)
Voltage signal:	0...1 V (min. 1 k Ω) optional
Displays	
Measurement display:	LCD 3½ digits
Power supply	
Wall power supply:	100 - 240 V, 50/60 Hz
Construction	
Housing:	Aluminium housing with handle
Housing protection class:	IP20 (standard)
Dimensions (h x w x d):	6.1 x 9.3 x 11 in
Weight	approx. 10 lb

Puncture device

EV-3

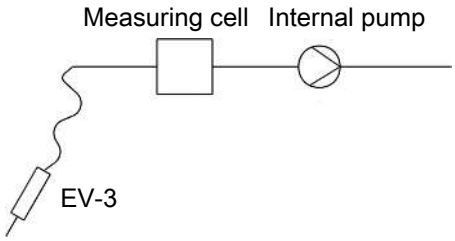
Puncture device with fixed needle. Suitable for sampling gas from soft packaging of modified atmosphere packed products. The additional fine mesh filter also makes it suitable for sampling packages with powdered products, e.g. coffee.



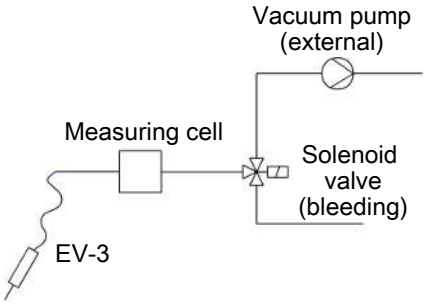
Model EV-3
for soft packaging

Flow charts

BA 4000 Inj. GV



BA 4000 Inj. KV



Ordering instructions

Device model

Item no.	Description
5511993	BA 4000 Inj. GV
5511991	BA 4000 Inj. KV

Accessories

Item no.	Description
6570520	Vacuum pump 230 V
6570521	Vacuum pump 115 V
55110994	Pressure gauge
65709021	EV-3
6570901	Needles for EV-3
65709012	Needles for EV-1
6570971	Septum for EV-3 (10 m / 32.8 ft)
65709471	Septum for EV-1 (33 m / 108.3 ft)
65709033	Pre-filter for EV-3
6570975	Water Stop fine mesh filter
55110992	Wall power supply for GV 100-240 V AC, 12 V DC
9112000014	Wall power supply for KV 100-240 V AC, 15 V DC

Portable O2-Analyzer BA 4510

The portable analyser BA 4510 is used to measure traces of oxygen in inert gas. At the core of this unit is a tried and tested, maintenance-free zirconium dioxide measuring cell.

This oxygen-ion conductor combines the advantage of high selectivity with high mechanical stability and consistency. As the oxygen content drops in inert gases, the voltage zirconium oxide cells supply increases, making it particularly easy to measure traces.

An internal processor converts the measuring signal to oxygen concentration, displays it on the LCD screen, and can be output as an analogue current signal. An internal switchable gas pump provides the necessary flow rate if the primary pressure of the sample gas is too low.

The unit is menu-driven using membrane keys at the front.

A special version (BA4510 KIZ) is available for measuring gases with flammable components.

- calibration- and virtually drift-free measuring cell
- 4 – 20 mA output signal
- RS 232 interface
- internal, switchable pump
- easy to navigate menu
- programmable limits
- no test gas required

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Technical Data

Technical Data	
Measuring components	
Measuring component:	Oxygen
Measuring range	0 Vol.-ppm ... 20.9 Vol.-% O_2
Measuring principle:	Zirconium dioxide
Measuring Data	
Accuracy:	< 5 % (from measured value)
Reproducibility:	< 1.5 % O_2
Detection limit:	0.1 vpm O_2
Response time (T_{50})	< 5 s
Linearity deviation	< 0.4 vpm O_2
Zero drift	< 0.2 vpm O_2 per week
Sensitivity drift	< 0.02 % from measured value per week or 200 vpb per week, whichever is higher
Gas inlet conditions	
Gas temperature:	41 °F to 176 °F
Gas overpressure.	max: 0.29 psig
Gas flow without pump:	0.08 ... 0.17 lpm (regulated to 0.12 lpm when using the internal pump)
Sample gas conditioning	
Dew point:	at least 41 °F below ambient temperature
Climatic conditions	
Ambient temperature:	50 °F to 113 °F
Transport and storage temperature:	-4 °F to 140 °F
Relative humidity:	< 80 % at 68 °F
Signal outputs	
Current signal:	0/4 ... 20 mA (on error near 0 mA); scalable
Alarm relay:	1x limit, 200 VDC, 0.5 A, 10 W
Serial port:	RS 232
Keyboard and displays	
Measurement display:	LCD plain text display
Keyboard:	3 keys
Power supply	
Voltage:	100 - 240 V AC, 47 - 63 Hz
Power input:	20 VA
Construction	
Housing:	Aluminium housing with handle
Dimensions (h x w x d):	5.31 x 3.94 x 9.45 in
Sample gas inlet:	3 mm (0.12 in) screw-in connection
Sample gas outlet:	Stainless steel hose nipple for hose with 4 mm (0.16 in) inside diameter
Housing protection class:	IP40
Weight:	approx. 6.6 lb

Ordering instructions

Device model

Item no.	Description
55 15 000	BA 4510
55 15 001	BA 4510 KIZ

10 Stationary Analyzers

Zirconia Oxygen Analyser BA 1LT

The BA 1LT oxygen analyser is designed to determine concentrations of residual oxygen content in flue gas of furnaces (max. 350 °C/662 °F) and to measure the oxygen concentration in air and inert gas mixtures (N_2, CO_2, noble gases).

Its strengths further include use in hard to reach areas and in self-contained systems (ventilation pipes, containers, etc.).

- Low energy consumption
- Not temperature dependent
- 4 – 20 mA output signal
- No zero drift
- High measuring accuracy
- Long life
- Versatile
- No reference gases required
- No calibration gases required

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Functional principle

The BA 1LT oxygen analyser measures the oxygen partial pressure directly in the gas mixture, the absolute oxygen content. At a constant pressure the measurement value equals the oxygen concentration in Vol.%. The measuring method is based on a dynamic process using two zirconium dioxide discs forming a hermetically sealed chamber.

The entire measuring range is linear.

The sinter protects the sensor element from dust. Available in two styles:

- Full sinter, with enlarged surface, thus faster response time.
- Internal sinter, enhanced draining properties (condensate protection), slower response time.

Since the measuring system monitors the function during operation and alerts to hardware and sensor malfunctions and further features a diagnostic function, it can be operated safely as needed. No second oxygen sensor required for this purpose!

Can be calibrated without reference gas, using atmospheric air.

Measurement values are output via analogue 4-20 mA channel, and error messages via digital channel.

Technical Data

Transmitter		
Power supply	7-pin plug contact	IP 67 round plug
	Voltage / tolerance	24 V DC ± 20 %
	Output	< 13 W
Signal transmission	Up to 300 metre distance	For cables with 1.5 mm (0.06 in)^2 strands
Connections	Pin 1	24 V DC
	Pin 2	0 V
	Pin 3	Sense
	Pin 4	Test
	Pin 5	K1 analogue output 4-20 mA
	Pin 6	K2 digital I/O impulse and error, electric calibration
	Pin 7	Functional earth
Transmitter ambient temperature	-20 °C to +60 °C (-4 °F to 140 °F)	Please note sunlight!
Permissible humidity	5 to 95% relative humidity	not condensed
Output	4-20 mA, max. burden 500 W	
Resolution	DAC resolution 12 bit	
Housing	Makrolon 8030 (30% GV), UL94 V-1	red
Housing degree of protection	IP 65	
Housing weight	approx. 150 g (0.3 lb)	without rod sensor
Housing dimensions	approx. 105L x 42W x 62.3H mm (L4.1 x W1.7 x H2.4 inch)	without rod sensor

Sensor/rod sensor	Full sinter	Internal sinter
Measuring ranges	0.1 – 25 Vol.% oxygen at 1013.25 hPa 1 – 253.31 hPa (O_2)	0.1 – 25 Vol.% oxygen at 1013.25 hPa 1 – 253.31 hPa (O_2)
Gas ingress	Via diffusion through full sinter or internal sinter	Via diffusion through full sinter or internal sinter
Heat-up time	approx. 10 min (at a flow rate of 0 m/s)	approx. 10 min (at a flow rate of 0 m/s)
Accuracy K1	±2% full scale at 25 °C (77 °F) and 1013.25 hPa	±2% full scale at 25 °C (77 °F) and 1013.25 hPa
Reproducibility K1	±1% full scale at 25 °C (77 °F) and 1013.25 hPa	±1% full scale at 25 °C (77 °F) and 1013.25 hPa
Temperature	up to +350 °C (662 °F)	up to +350 °C (662 °F)
Flue gas speed	up to 5 m/s	up to 5 m/s
Sensor degree of protection	IP40	IP40
Response times		
T20	10 s	15 s
T60	12 s	26 s
T90	18 s	50 s
T95	25 s	60 s
Probe length L1 (±4 mm/±0.16 in)		
200 (350 °C/662 °F)	197 mm (7.8 in)	211.5 mm (8.3 in)
Diameter	approx. 12 mm (0.5 in)	approx. 12 mm (0.5 in)
Material	Tube stainless steel 1.4301 Sinter stainless steel 1.4404	Tube stainless steel 1.4301 Sinter stainless steel 1.4404

Ordering Instructions

Item no.	Description
55015001	BA 1LT O_2 Analyser, 24V DC, L: 220 mm (8.7 in), internal sinter
55015002	BA 1LT O_2 Analyser, 24V DC, L: 220 mm (8.7 in), full sinter
55015001-SEN	Replacement probe for BA 1 LT O2 analyser, L: 220 mm (8.7 in), internal sinter
55015002-SEN	Replacement probe for BA 1 LT O2 analyser, L: 220 mm (8.7 in), full sinter

Drawing

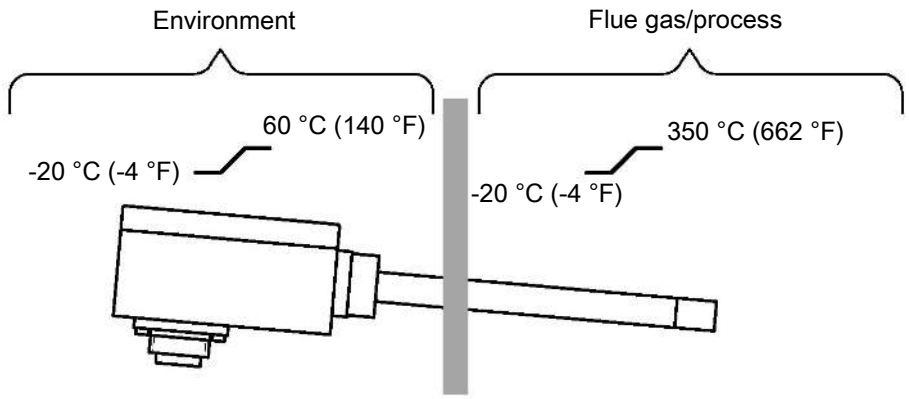

Fig. 1: Installation BA 1LT

Oxygen Flue Gas Analyzer BA 2000

Some combustion processes, e.g. process heaters, steam boilers or heating furnaces the air required to achieve optimal system efficiency can easily fluctuate. And the economic optimum of the process fluctuates within a relatively narrow range. Both elevated NO_x or SO_x emission due to an excess supply of air (excess O_2) as well as energy loss within the system due to incomplete combustion (lack of O_2) require measuring the oxygen level in the flue gas of the combustion process. Sampling near the combustion chamber is therefore just as vital as using a rapid response sensor to allow for responding to changes in the combustion gas temperature and/or other variables in the combustion process promptly.

The BA 2000 was developed specifically for this application.

- Fast response time
- Tool-less filter change
- Easy handling
- Flue gas temperatures up to 1600 °C (2912 °F)
- Durable ZrO_2 measuring cell
- Display includes O_2
- 4-20 mA output signal
- Ambient temperature -20 to +70 °C (-4 to 158 °F)
- No reference gas required
- No test gas required
- No gas conditioning required
- Calibration with instrument air

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Description

The injector built into the filter housing constantly supplies the ZrO_2 sensor with fresh process gas. The self-regulating probe part is heated to 180 °C (356 °F) to prevent condensation. The ZrO_2 sensor in the BA 2000 provides accurate, extremely fast measurements.

No reference gas needed for operation. The sensor's 1-point calibration uses instrument air also needed to operate the injector. If necessary, 2-point calibration may also be performed. The test gas additionally needed for calibration in this case should ideally correspond with the O_2 concentration of the sample gas.

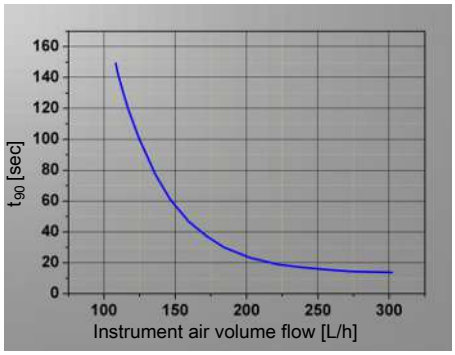
A filter built into the probe protects the measuring cell from dust exposure. The filter can be changed in seconds without tools by simply turning the handle 90°.

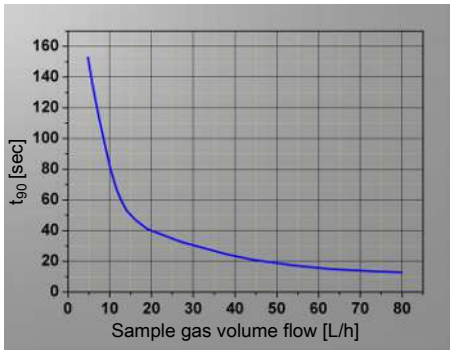
The filter elements are available in ceramic, sintered or star-pleated stainless steel.

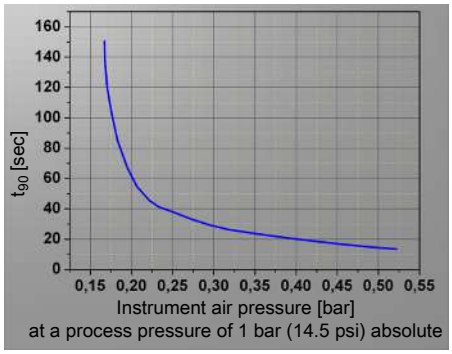
Together with the filters listed, the BA 2000 can be used for gases with a dust load of up to approx. 2 g/m³.

The BA 2000 will provide all the information required for safe operation. The controller features a display with key pad for entering commands, alarm output, calibration function and 4 - 20 mA output signal.

t_{90} times depending on volume flow and pressure







Oxygen measurement principle with ZrO_2 cells

The NERNST equation serves as the basis for determining the oxygen concentration in gases by zirconium dioxide measuring cell.

(I) $$U = \frac{RT}{4F} \ln \frac{p_{O_2,\,air}}{p_{O_2,\,sample\ gas}}$$

U	Cell voltage in V
R	Universal gas constant, R = 8.31447 J/(mol·K)
T	Measuring temperature in K
F	Faraday-constant, F = 96485.34 C/mol
$p_{O_2,\,air}$	Partial pressure of oxygen at the reference electrode in dry air in Pa
$p_{O_2,\,Sample\ gas}$	Partial pressure of oxygen at the reference electrode in dry air in Pa

The conductivity of the oxide ions of zirconium oxide increases exponentially with the temperature and reaches adequate values above 600 °C (1112 °F).

Provided the total pressures of the gases are about equal on both electrodes (in this case volume concentrations can be used in place of partial pressures), after adding the numeric values for the constants in equation (I) results in the following equation for the oxygen concentration.

(II) $$\varphi_{O_2} = 20{,}9 \cdot e^{(-46{,}42 \cdot \frac{U}{T})}$$

φ_{O_2}	Oxygen concentration in sample gas in Vol.-%
U	Potential difference in mV
T	Measuring temperature in K
$20{,}9$	Oxygen concentration in dry air in Vol.-%

The BA 2000 uses a potentiometric cell. The reference and the sample gas electrode are located in two different gas chambers with different oxygen partial pressure. The two chambers are separated by the gas-tight ZrO_2 tube. The electrodes generate e.m.f. (electromotive force) proportional to the partial pressure difference of the oxygen. The NERNST equation applies.

Technical Data

BA 2000 Technical Data	
Sampling tube length:	0.5...2 m (1.6...6.6 ft)
Voltage:	115 or 230 V, 50/60 Hz
Probe heat output:	400 W
Measuring range:	0.1 to 21 Vol.-% O_2
Output signal:	4-20 mA = 0-21 Vol.-% O_2 (scalable 0-2.5/0-5/0-10/0-15)
Accuracy:	relative error < 5 %
Sensor T_{90} time:	< 15 sec
Alarm Sensor:	Upper and lower limit of nominal value for heating (fixed) Upper and lower limit of O_2 concentration (adjustable)
Probe alarm:	Insufficient temperature
Ambient temperature:	-20 ... +70 °C (-4 ... 158 °F)
Process temperature:	up to 1600 °C (2912 °F), depending on sampling tube
Probe operating temperature:	max. 200 °C (392 °F)
Probe material:	1.4571
Test gas 1-point calibration:	Instrument air 20.9 Vol.-% O_2
Test gases 2-point calibration:	Instrument air 20.9 Vol.-% O_2 and test gas 0.1 to 15 Vol.-% O_2

Ordering instructions

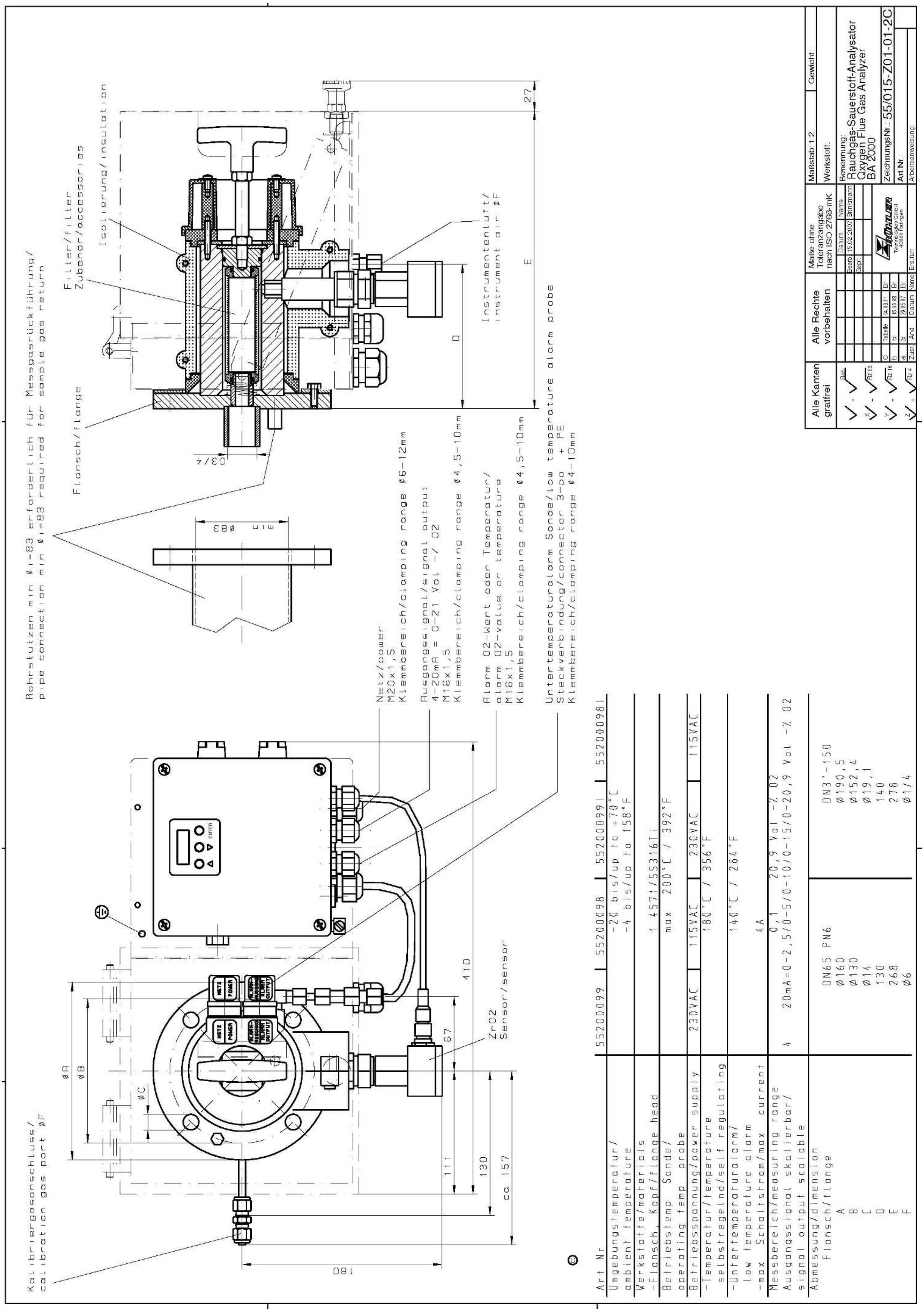
Item no.	Description
55200099	BA 2000, 230 V 50/60Hz
55201099	BA 2000-MF, 230 V 50/60Hz
55202099	BA 2000-SE, 230 V 50/60Hz
55200098	BA 2000, 115 V 50/60Hz
55201098	BA 2000-MF, 115 V 50/60Hz
55202098	BA 2000-SE, 115 V 50/60Hz
55200098I	BA 2000I, 115 V 50/60Hz, US sized
55201098I	BA 2000I-MF, 115 V 50/60Hz, US sized
55202098I	BA 2000I-SE, 115 V 50/60Hz, US sized
55200099I	BA 2000I, 230 V 50/60Hz, US sized
55201099I	BA 2000I-MF, 230 V 50/60Hz, US sized
55202099I	BA 2000I-SE, 230 V 50/60Hz, US sized

MF = separate sample gas recovery
SE = separated electronics up to approx. 15 m (49.2 ft)

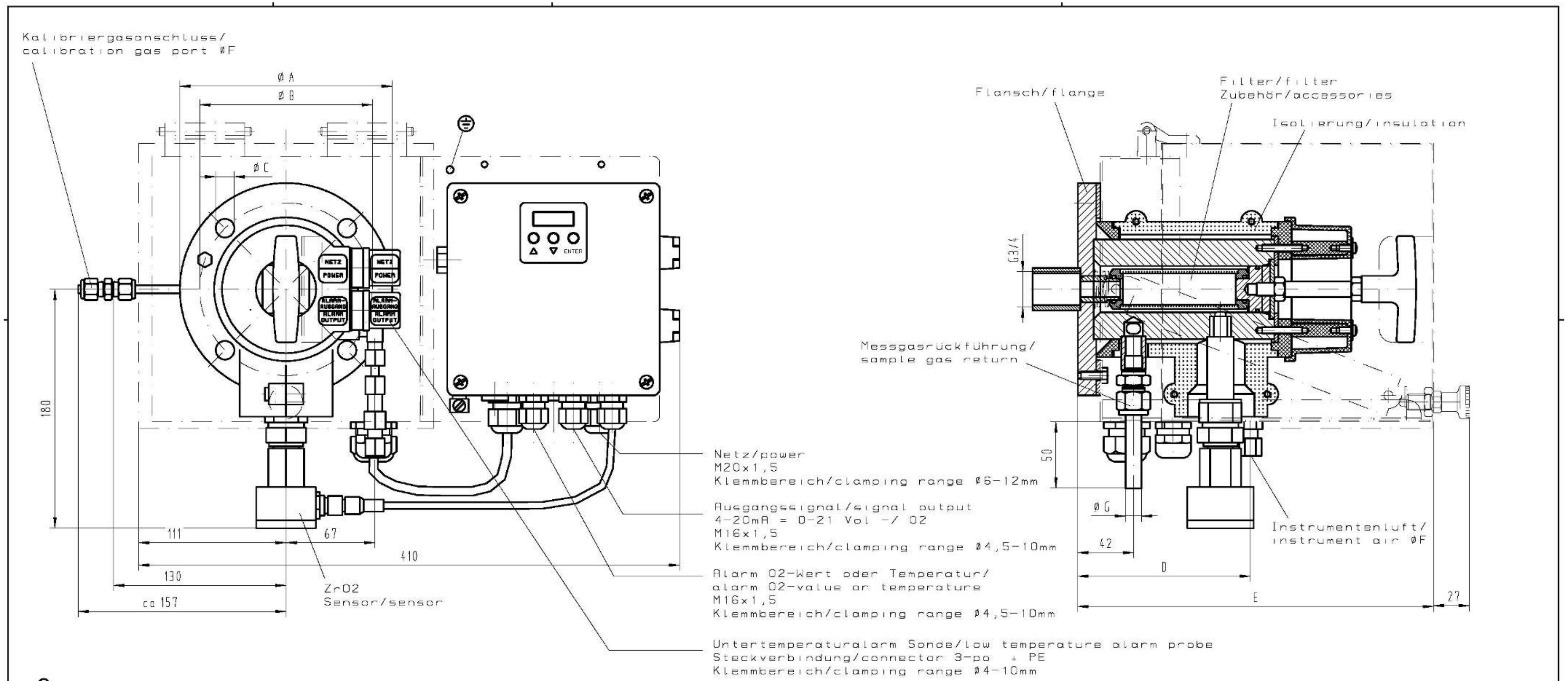
Adapter flanges

Item no.	Description
55200001	Adapter flange DN65 PN6 to Servomex
55200002	Adapter flange DN65 PN6 to Thermox
55200001I	Adapter flange DN3-150 to Servomex
55200002I	Adapter flange DN3-150 to Thermox

Drawings



Kalibriergasanschluss/ calibration gas port ØF
ØA
ØB
ØC
180
111
67
130
ca 157
410
ZrO2 Sensor/sensor
Rohrstutzen min Øi=83 erforderlich für Messgasrückführung/ pipe connection min Øi=83 required for sample gas return
Flansch/flange
Filter/filter
Zubehor/accessories
Isolierung/insulation
Ø83
min
G3/4
Netz/power
M20x1,5
Klemmbereich/clamping range Ø6-12mm
Ausgangssignal/signal output
4-20mA = 0-21 Vol -/ O2
M16x1,5
Klemmbereich/clamping range Ø4,5-10mm
Alarm O2-Wert oder Temperatur/
alarm O2-value or temperature
M16x1,5
Klemmbereich/clamping range Ø4,5-10mm
Untertemperaturalarm Sonde/low temperature alarm probe
Steckverbindung/connector 3-po + PE
Klemmbereich/clamping range Ø4-10mm
D
E
27
Instrumentenluft/ instrument air ØF
Art Nr | 55200099 | 55200098 | 55200099I | 55200098I
Umgebungstemperatur/ ambient temperature | -20 bis/up to +70°C | -4 bis/up to 158°F
Werkstoffe/materials -Flansch, Kopf/flange head | 1.4571/SS316Ti
Betriebstemp Sonde/ operating temp probe | max 200°C / 392°F
Betriebsspannung/power supply | 230VAC | 115VAC | 230VAC | 115VAC
-Temperatur/temperature selbstregelnd/self regulating | 180°C / 356°F
-Untertemperaturalarm/ low temperature alarm | 140°C / 284°F
-max Schaltstrom/max current | 4A
Messbereich/measuring range | 0,1 20,9 Vol -% O2
Ausgangssignal skalierbar/ signal output scalable | 4 20mA=0-2,5/0-5/0-10/0-15/0-20,9 Vol -% O2
Abmessung/dimension Flansch/flange | DN65 PN6 | DN3"-150
A | Ø160 | Ø190,5
B | Ø130 | Ø152,4
C | Ø14 | Ø19,1
D | 130 | 140
E | 268 | 278
F | Ø6 | Ø1/4
Alle Kanten gratfrei
Alle Rechte vorbehalten
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab: 1:2
Gewicht:
Werkstoff:
Benennung:
Rauchgas-Sauerstoff-Analysator
Oxygen Flue Gas Analyzer
BA 2000
Bearb. 15.02.2007 Brinkmann
Zeichnungs Nr.: 55/015-Z01-01-2C
Art.Nr.:
Arbeitsanweisung:



Art Nr	55201099	55201098	55201099I	55201098I
Umgebungstemperatur/ ambient temperature	-20 bis/up to +70°C -4 bis/up to 158°F			
Werkstoffe/materials -Flansch, Kopf/flange head	1.4571/SS316Ti			
Betriebstemp. Sonde/ operating temp. probe	max. 200°C / 392°F			
Betriebsspannung/power supply	230VAC	115VAC	230VAC	115VAC
-Temperatur/temperature selbstregelnd/self regulating	180°C / 356°F			
-Untertemperaturalarm/ low temperature alarm	140°C / 284°F			
-max. Schaltstrom/max. current	4A			
Messbereich/measuring range	0,1 ... 20,9 Vol.-% O2			
Ausgangssignal skalierbar/ signal output scalable	4 ... 20mA=0-2,5/0-5/0-10/0-15/0-20,9 Vol.-% O2			
Abmessung/dimension Flansch/flange	DN65 PN6		DN3"-150	
A	Ø160		Ø190,5	
B	Ø130		Ø152,4	
C	Ø14		Ø19,1	
D	130		140	
E	268		278	
F	Ø6		Ø1/4	
G	Ø12		Ø1/2	

Alle Kanten gratfrei | Alle Rechte vorbehalten | Maße ohne Toleranzangabe nach ISO 2768-mK | Maßstab: 1:2 | Gewicht:

Werkstoff:

Bearb.: 15.09.2008 Brinkmann | Gepr.

b Tabelle 05.08.11 Br
a 2x 26.11.08 Br
Zust. Änd. Datum Name Ers. für:

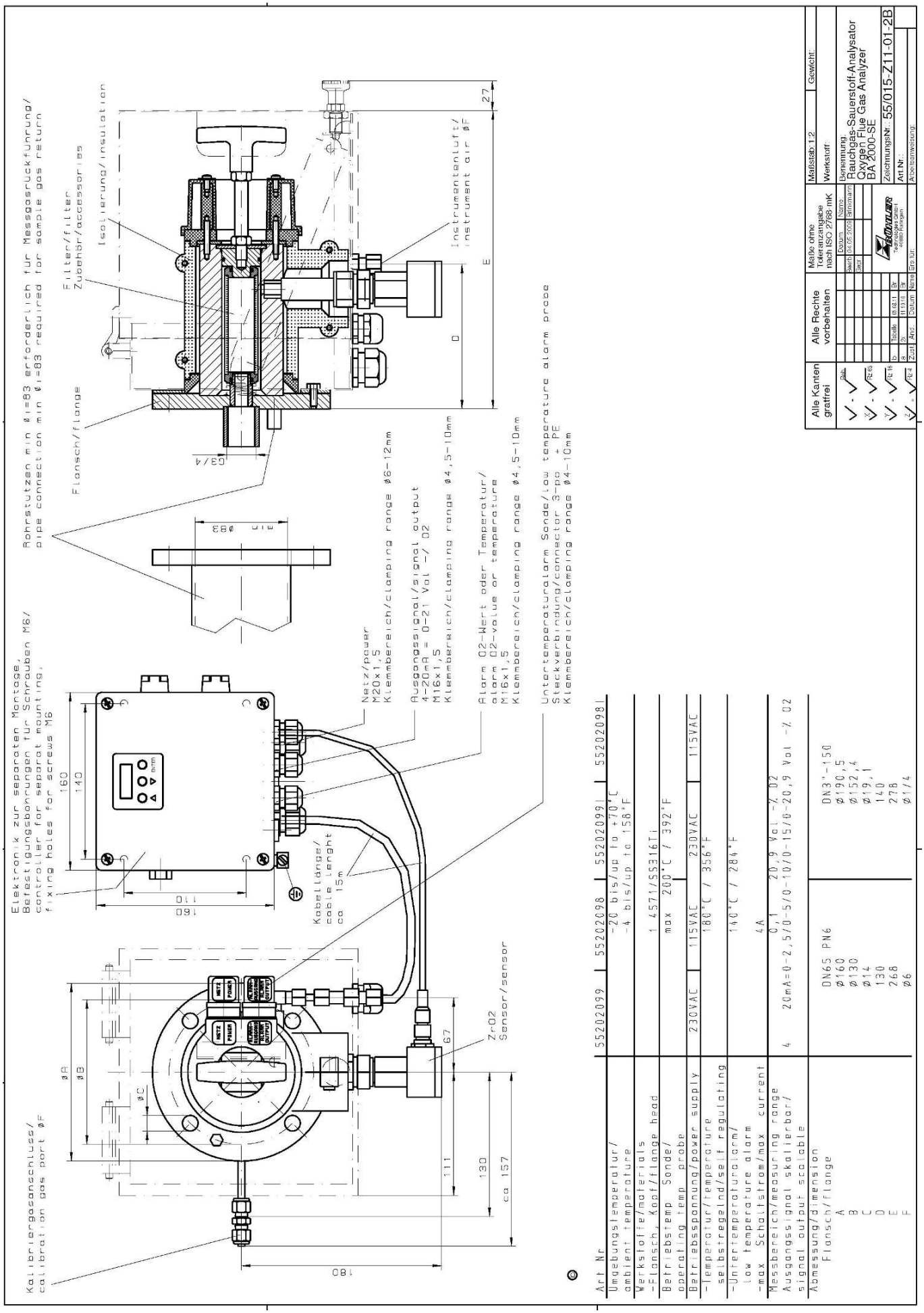
Benennung: Rauchgas-Sauerstoff-Analysator
Oxygen Flue Gas Analyzer
BA 2000-MF

Bühler Technologies GmbH 40880 Ratingen

ZeichnungsNr.: 55/015-Z09-01-2B

Art.Nr.:

Arbeitsanweisung:



Art Nr	55202099	55202098	55202099i	55202098i
Umgebungstemperatur/ ambient temperature	-20 bis/up to +70°C -4 bis/up to 158°F			
Werkstoffe/materials -Flansch, Kopf/flange head	1.4571/SS316Ti			
Betriebstemp. Sonde/ operating temp. probe	max. 200°C / 392°F			
Betriebsspannung/power supply	230VAC	115VAC	230VAC	115VAC
-Temperatur/temperature selbstregelnd/self regulating	180°C / 356°F			
-Untertemperaturalarm/ low temperature alarm	140°C / 284°F			
-max. Schaltstrom/max. current	4A			
Messbereich/measuring range	0,1 ... 20,9 Vol.-% O2			
Ausgangssignal skalierbar/ signal output scalable	4 20mA=0-2,5/0-5/0-10/0-15/0-20,9 Vol.-% O2			
Abmessung/dimension				
Flansch/flange	DN65 PN6		DN3"-150	
A	ø160		ø190,5	
B	ø130		ø152,4	
C	ø14		ø19,1	
D	130		140	
E	268		278	
F	ø6		ø1/4	

Modbus TCP

Multi Component Gas Analyser BA 3 select

The BA 3 select is a gas analyser for 19" rack mounting with a modular design which can be expanded from 1-channel all the way to 3-channel O_2 analyser.

One specific advantage of the analyser is the modularity. This also allows for easily upgrading measuring cells. The user is then able to adapt his equipment to changing measuring requirements inexpensively.

The analyser comes standard with touch screen. Along with a clear menu structure this ensures intuitive, particularly user-friendly equipment operation.

Of course the user is provided the digital status-, limit- and alarm messages required for effective monitoring in analog form, in form of a 4 - 20 mA signal, or as a digital interface. The process control can access the process and diagnostic data via the Modbus TCP communication protocol as well as configure the device settings. Extensive analysis functions (e.g. interfering gas correction and graphic display of response characteristics) complete the ease of use.

- Up to three separate gas paths
- O_2 measurement paramagnetic, electro-chemical and/or ZrO_2
- Modular, maintenance-friendly layout
- User-friendly touch screen
- Signal output 4 - 20 mA or Modbus TCP
- All relevant limit- and status alarms
- Optional: Graphic flow display via screen
- Optional: Up to three float flow meters
- Optional: Up to three built-in pumps

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Technical Data

General

Housing	Dimensions:	19" rack mount housing, 3 HE
	H x W x D, style 1:	5.2 x 17.3 x 16.7 in
	H x W x D, style 2:	5.2 x 17.3 x 13.2 in
	Protection class:	IP 20
	Weight:	max. 15 lb
	Display and control:	4.7" touchscreen display
Electric supply	Voltage:	230 V AC or 115 V AC *(note type plate on the unit)*
	Mains frequency:	50/60 Hz
	Max. Power input:	69 W
Ambient parameters	Ambient temperature:	50 °F ... 113 °F
	Relative humidity:	< 75 %
	Ambient pressure:	12.7 PSI to 17.4 PSI
	Transport and storage temperature:	41 °F - 149 °F
Internal solenoid valves for auto calibration Function	Optional for each measuring channel (zero gas + span gas)	
Warm up time	Minimum 30 min (up to 2 h recommended for high-precision measurements)	

Sample gas connections

Gas paths	Max. three separate gas paths (with auto cal. function)	
	Screw-in connection:	6 mm PVDF for 4/6 tube
Inlet parameters	Gas inlet temperature:	41 °F to 122 °F
	Sample gas pressure (absolute):	12.7 PSI to max. 26.1 PSI, reduced to max. 17.4 PSI with internal pump
	Sample gas conditioning:	purified/ filtered (<15 µ filtration) sample gas with dew point < 50 °F (always 5 K below ambient temperature).

Signal inputs and outputs

Analog output:	0-20 mA / 4-20 mA / 0-10 V / 2-10 V inside unit variable by channel
Limit relay:	2x per measuring channel (125 V AC, 0.5 A / 30 V DC, 1 A)
Status relay:	Error, service, calibration, measuring range (125 V AC, 0.5 A / 30 V DC, 1 A)
Binary inlets:	1x per channel + 2x per device designed for 24 V, potential-free
24 Volt output:	1x per channel (to supply binary inputs), with T250 mA fuse
Digital interface:	Modbus TCP (optional)

Parts in contact with sample gas

Component	Materials in contact with media		
Pump	PET, PPS		
Flow regulator	PTFE, stainless steel (1.4571)		
Gas lines	FPM (Viton), stainless steel (1.4571)		
Solenoid valves	PVDF or stainless steel (1.4571)		
Gas ducts	PVDF or stainless steel (1.4571)		
Flow meter	PVDF, borosilicate glass		
Measuring cell	ZrOx cell	Paramagnetic cell	EC cell
	1.4571, ZrOx ceramic	1.4401 Borosilicate glass Platinum-iridium alloy	ABS

Measuring cells

Measuring cell	ZrOx cell*	Paramagnetic cell	EC cell
Largest measuring range (MR)	0-10000 vpm (0-21 Vol.%)**	0-100 %	0-25 %
Smallest measuring range	0-10 vpm	0-1 %	0-10 %
Response time t90***	< 4 sec	< 5 sec	< 15 sec
Linearity deviation	< 1 % FS (< 2 % FS within the smallest MR)	< 0.2 Vol.%	< 1 % FS
Zero drift	< 1 % FS /week	< 0.2 Vol.% /week	< 2 % FS /week
Measurement value drift	< 0.3 % FS / week	< 0.2 % MW /week	< 2 % FS /week
Repeatability	1 % FS (2 % within the smallest MR)	1 % FS	1 % FS
Detection limit	0.1 vpm within MR 0-10 vpm	0.1 %	0.2 %
Pressure compensation	optional	yes	yes
Thermal stabilisation	yes	yes	-

* Two cell types available: (A) catalytically active cell (CAC) => not for flammable carrier gases. (B) catalytically inactive cell => suitable if traces of flammable gases are present (< 10 vpm H2, CO, CH4)

** Optional for unit with modified calibration routine

*** Signal damping adjustable fr. 1 sec to 20 sec

Abbreviations:

FS ...from span

MW ...from measurement

r.F. ...relative error

Oxygen measurement

There are three different cells available for measuring oxygen. The most cost-efficient electrochemical O2 cell can be used for measuring in the %-range.
A maintenance flap at the front of the housing for easy access to the cell ensures low-cost, easy maintenance. In addition, extra durable and ultra-precise paramagnetic cells may be used for measuring in the %-range. A zirconium dioxide (ZrO2) cell may be selected for accurate oxygen trace measurement. This is also available in a catalytic inactive version.

Options for integration

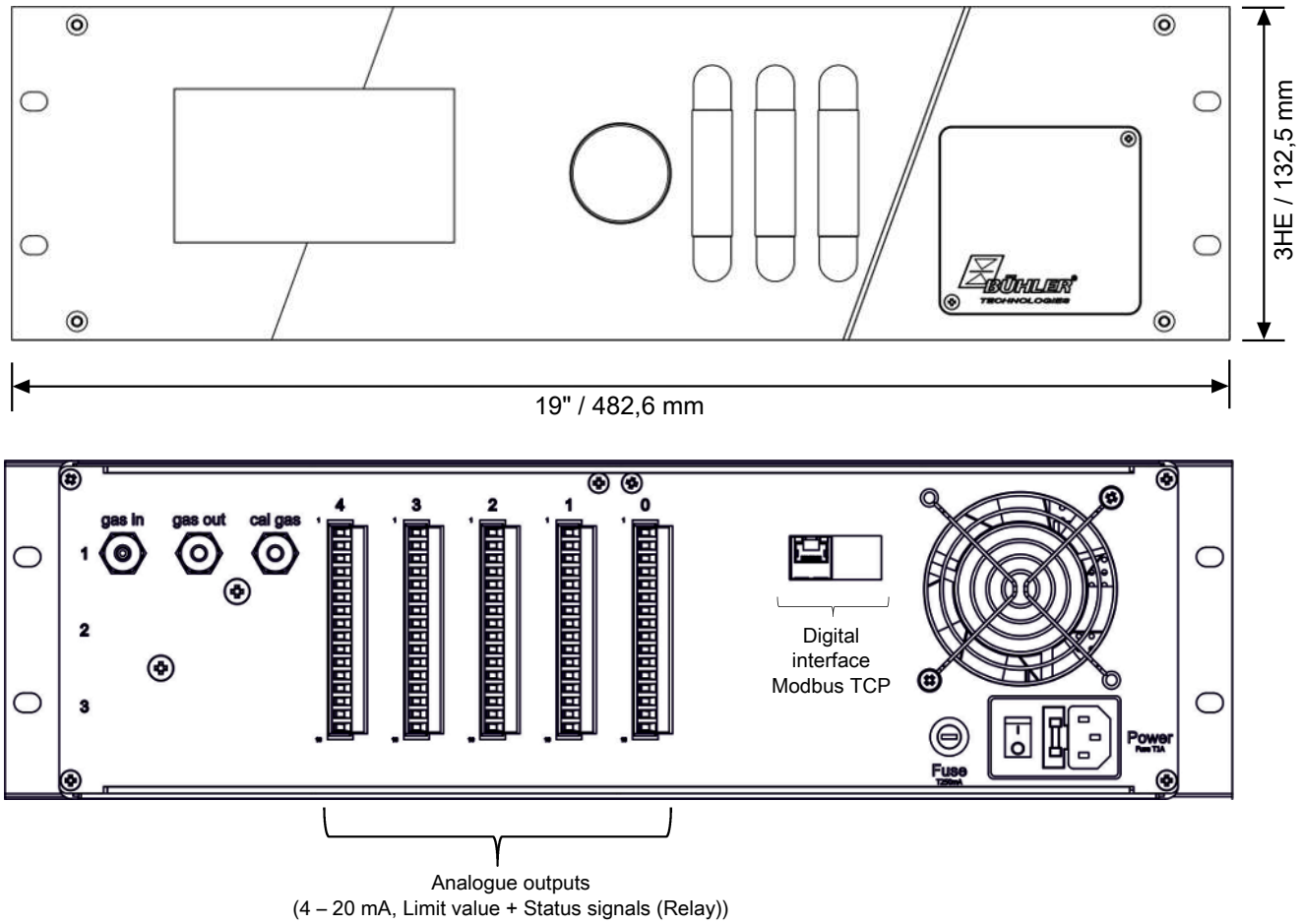
Options currently available:

- Built-in pump(s)
- Gas analysis filter
- Float flow meter and/or
- Graphic flow display via screen

Gas connections

- up to 3x pipe fitting (Ø6 mm)
- up to 3x PVDF hose screw connections (Ø4/6 mm)

Equipment overview



ModbusTCP

Gas Analyser for maritime emission monitoring BA 3 MA

Greenhouse gases and pollutants emitted into the atmospheres makes maritime a key contributor to worldwide emissions. Particularly CO_2 and SO_2 are responsible for ocean acidification, thus destroying this habitat. The BA 3 MA gas analyser is developed specifically for measuring these two components in the extreme environmental conditions of **maritime applications**.

The BA 3 MA is **DNV certified** (Statement of Compliance) as per regulation **MEPC 259(68)** and is therefore particularly optimised for monitoring emissions of maritime pollutant emission control system (SO_2 scrubbers). SO_2 traces are measured by NDUV spectroscopy, which is particularly insusceptible to interfering gas. Along with the vibration-protected mounting of the gas sensors therefore makes the device optimal for measuring minimal SO_2 traces.

The standard pressure compensation and thermostatization of the gas sensors ensure high signal stability, even in highly fluctuating ambient temperatures. In addition to the SO_2 and CO_2 gas concentrations, this also shows the important SO_2/CO_2 quotient in the display and is output via **4 - 20 mA-** and **Modbus TCP output signals**.

- MEPC 259(68) certified for measuring maritime emissions
- EMC and vibration-protected sensors
- Safe for use in ambient temperatures between 41 °F and 113 °F
- Smallest measuring range SO_2: 0 - 100 ppm, NDUV
- Smallest measuring range CO_2: 0 - 10 Vol.%, NDIR
- SO_2/CO_2 quotient display and output [ppm/Vol.-%]
- Modbus TCP and 4 – 20 mA output signals
- Low T-Drift due to heated gas sensors
- Pressure-compensated SO_2 and CO_2 measurement values
- User-friendly touch screen with intuitive menu navigation
- Optional: Internal sample gas pump and flow meter
- Optional: Internal solenoid valves

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Technical Data

General

Housing	Dimensions:	19" rack mount housing, 3 HE
	H x W x D:	5.2 x 17.3 x 16.7 in
	Protection class:	IP 20
	Weight:	max. 22 lb
	Display and control:	4.7" touchscreen display
Electric supply	Voltage:	230 V AC or 115 V AC *(note nameplate on the unit)*
	Mains frequency:	50/60 Hz
	max. power input:	< 150 W
Ambient parameters	Ambient temperature:	41 °F ... 113 °F
	Relative humidity:	< 75 %
	Ambient pressure:	13 psi to 17 psi
	Transport and storage temperature:	41 °F - 149 °F
AUTO cal. Function	Optional: Zero gas + span gas	
Warm up time	At least 30 min (up to 3 h recommended for high-precision SO_2 measurements in the lower ppm range)	

Sample gas connections

Gas paths	One gas path (with auto cal. function)	
	Screw-in connection:	6 mm (0.04 in) PVDF for 4/6 tube
Inlet parameters	Gas inlet temperature:	41 °F to 122 °F
	Sample gas pressure (absolute):	13 psi to max. 26 psi, reduced to max. 17 psi with internal pump
	Sample gas conditioning:	purified/ filtered (< 10 µm filtration) sample gas with dew point < 50 °F (always 5 K below ambient temperature).

Signal inputs and outputs

Analog output:	4 - 20 mA per channel
Limit relay:	2x per measuring channel (125 V AC, 0.5 A/30 V DC, 1 A)
Status relay:	Error, service, calibration, measuring range (125 V AC, 0.5 A/30 V DC, 1 A)
Binary inlets:	1x per channel + 1x per device
24 Volt output:	1x per channel (to supply binary inputs)
Digital interface:	Modbus TCP

Parts in contact with sample gas

Component	Materials in contact with media	
Pump:	PET, PPS	
Flow regulator:	PTFE, stainless steel (1.4571)	
Gas lines:	FPM (Viton), stainless steel (1.4571)	
Solenoid valves:	PVDF or stainless steel (1.4571)	
Gas ducts:	PVDF or stainless steel (1.4571)	
Flow meter:	PVDF, borosilicate glass	
Measuring cell:	NDUV (SO_2)	NDIR (CO_2)
	Stainless steel (SU316), quartz glass, FKM, PTFE, CaF_2 glass, Nylon 66 GF30 %	

Measuring cells

Measuring cell	NDUV (SO_2)*	NDIR (CO_2)*
Largest measuring range (MR)**:	0 - 500 vpm	0 - 15 Vol.%
Smallest measuring range (MR)**:	0 - 100 vpm	0 - 10 Vol.%
Response time t90:	< 12 sec	< 15 sec
Linearity deviation:	< 2 % MW or 0.3 % FS (depending on greater value)	< 2 % MW or 0.3 % FS (depending on greater value)
Zero point long-term stability:	< 2 ppm/day or < 1 % FS/day (depending on greater value)	< 1 % FS/day
Span long-term stability:	< 2 % FS/week	< 1 % FS /week
Repeatability:	< 1 % FS	< 1 % FS
Detection limit (2.5σ***):	< 0.3 % FS	< 0.3 % FS
Temperature drift:	< 1 % FS/10K	<1 % FS/10K
Thermostatization:	Yes	Yes

* Measurement performance in accordance with IMO regulation MEPC 259(68)

** Measuring ranges configurable between max. and min.

*** σ = standard deviation at zero point

Abbreviations:

FS = Full Scale (upper range value)

MW = measurement value

Options for integration

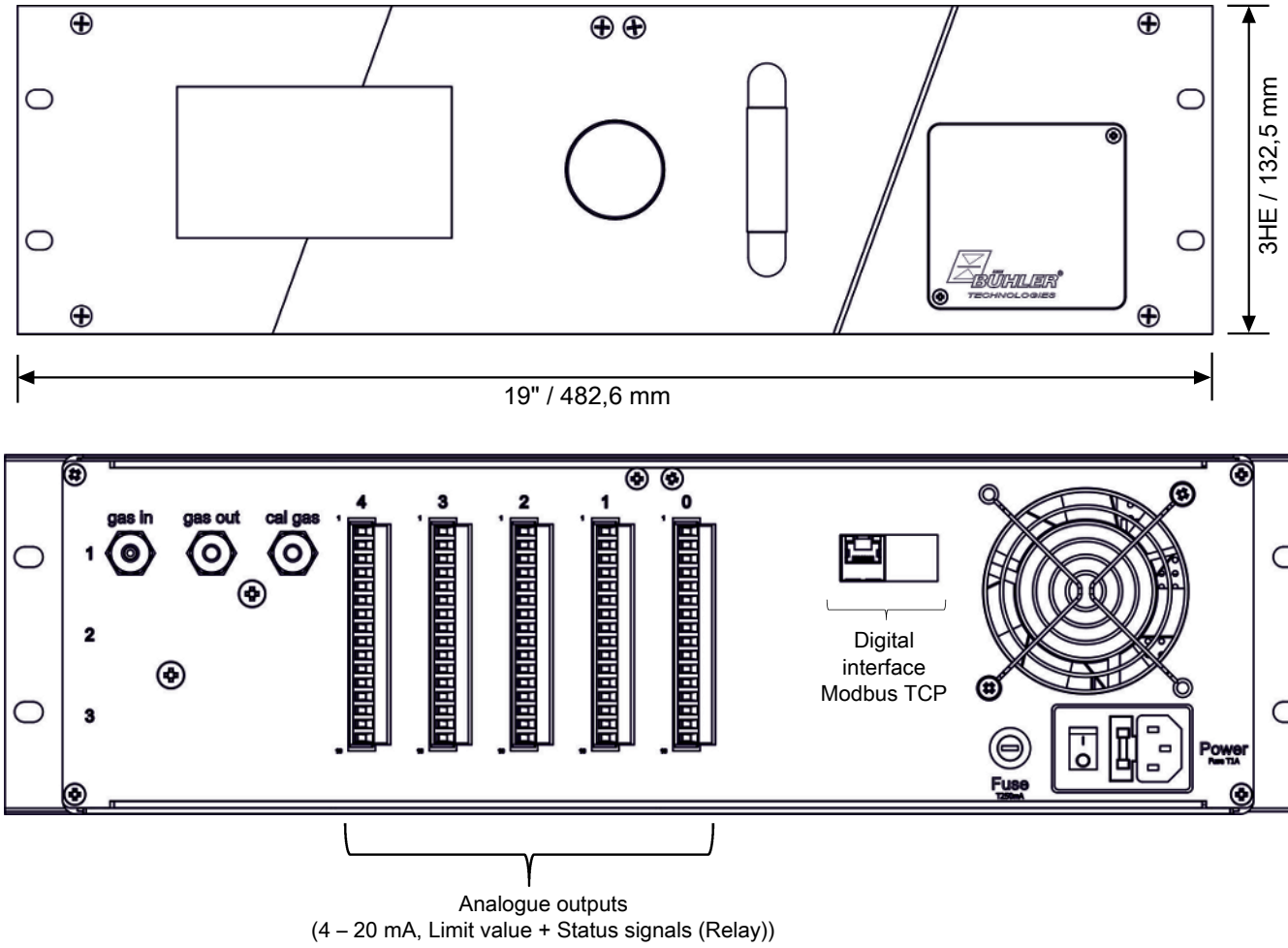
Options currently available:

- Built-in pump
- Gas analysis filter
- Float Flow Meter
- Internal auto-calibration 3/2 way solenoid valve (internal switchover between test gas and process gas)

Gas connections

- Pipe fitting (Ø6 mm)
- PVDF hose screw connections (Ø4/6 mm)

Equipment overview



Gas analyser for IR-absorbing gases and oxygen BA 5000

The BA 5000 gas analyser is suitable to continuously measure gas concentrations, e.g. CO, CO_2, NO, SO_2, CH_4. The analyser can measure up to three of these components plus O_2 at the same time. For oxygen analysis purposes the BA 5000 can optionally be equipped with electrochemical or paramagnetic cell.

This gas analyser can be used in emission measurement equipment as well as for monitoring processes and safety.

TÜV-approved versions of the BA 5000 are available for measuring CO, NO, SO_2 and O_2.

Use in non-explosive areas.

- Sturdy 19" sheet steel housing.
  Option: Desktop version with handles
- NAMUR-based operation
- Quick and easy parametrisation and setup
- AUTOCAL with ambient air for virtually maintenance-free operation
- Adjustment with test gas only required every six to twelve months depending on application
- Two measuring ranges per component
- Automatically corrects fluctuations in barometric pressure
- Monitors the sample gas flow rate
- Two programmable limits
- Up to four analogue outputs 4-20 mA, electrically isolated

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Application examples

- Optimising firing in packaged boilers,
- Monitoring the flue gas concentration in furnaces using any type of fuel (oil, gas and coal) as well as in-service measurement in waste incineration,
- Biogas plants,
- Monitoring ambient air,
- Monitoring air in fruit storage, greenhouses, fermenting cellars and warehouses,
- Monitoring process control.

Technical Data

General Technical Data	
Measuring components:	maximum 4, with up to three IR-sensitive gases and oxygen
Analogue outputs:	maximal 4, potential-free, 0/2/4 to 20 mA, linearised
Load:	≤ 750 Ω
Characteristic:	linearised
Control panel:	LCD with LED backlight and contrast control, function keys
Display:	80 characters (4 lines/ 20 characters)
EMC immunity:	conforms to standard requirements of NAMUR NE21 (05/93) or EN 50081-1, EN 50082-2, EN 61010
Position of use:	Front panel vertical
Relay outputs:	8, for e.g. malfunction, maintenance request, limit, function control, AC/DC 24 V / 1 A
Binary inputs:	3, potential-free for pump ON/OFF, start AUTOCAL and synchronise
Serial port:	RS 485
Warm-up time:	approx. 30 min (at room temperature) (the technical specification is maintained after 2 hours)
AUTOCAL function:	automatic device calibration with ambient air, cycle time adjustable from 1 to 24 hours
Dimensions:	Portable unit: 6.7 x 18.3 x 15.4 in (H x W x D) Frame 19", 4 HE: 7.0 x 19.0 x 14.2 in (H x W x D)
Weight:	about 22 lb
Gas connections for sample gas inlet and outlet as well as reference gas:	Tube diameter 6 mm or 1/4”
Degree of protection:	IP 21 (EN 60529)
Auxiliary energy:	AC 100 V, +10% / -15%, 50 Hz AC 200 V, +10% / -15%, 50 Hz AC 230 V, +10% / -15%, 50 Hz AC 100 V, +10% / -15%, 60 Hz AC 120 V, +10% / -15%, 60 Hz AC 230 V, +10% / -15%, 60 Hz
Power input	about 60 VA
Gas inlet conditions	
Sample gas pressure:	without pump, pressure-free (< 1200 hPa, absolute) with pump, pressure-free suction, factory preset with 2 m (6.6 ft) hose at sample gas outlet, a different restrictor will require adjusting the end value (800 ... 1050 hPa, absolute)
Sample gas flow rate:	72 to 120 L/h (1.2 to 2 L/min)
Sample gas temperature:	0 bis 50 °C (32 to 122 °F)
Sample gas humidity:	< 90% RH[1)] or varies by measuring task
Climatic conditions	
Permissible ambient temperature during operation:	+5 bis +45 °C (41 to 133 °F)
Permissible ambient temperature during storage and transport:	-20 bis +60 °C (-4 to 140 °F)
Permissible ambient humidity:	< 90% RH [1)], during storage and transport
Permissible pressure fluctuations:	600 to 1200 mbar

[1)] relative humidity

Technical data for infrared measurement

Influencing variables	
– Drift with AUTOCAL: without AUTOCAL:	 negligible < 2 % of smallest measuring range/week
– Temperature:	max. 2% of the smallest possible measuring range per type plate per 10 K at an AUTOCAL cycle time of 3 h
– Air pressure:	< 0.2% of span per 1% change in pressure, corrected by internal pressure sensor
– Residual gases:	minimised through selections
– Voltage:	< 0.1 % of the output signal range at a change of ± 10 %
– Mains frequency:	± 2 % of span at a frequency variance of ± 5 %
Response time (T_{90} time):	varies by dead time and parametrisable damping
Damping:	adjustable from 0 to 99.9 s (electric time constant)
Output signal noise:	< ± 1 % of the smallest possible span (see type plate)
Display resolution:	varies by measuring range setting; the number after the decimal can be changed
Output signal response:	< 0.1 % of the output signal span
Characteristic:	linearised
Linearity deviation:	in the largest measuring range: < 1% of span in the smallest measuring range: < 2% of span
Repeatability:	≤ 1 % of smallest measuring range

Technical data for oxygen measurement by electrochemical sensor

Measuring range:	0 to 5 % or 0 to 25 % O_2, parametrisable
Influencing variables	
– Drift with AUTOCAL: without AUTOCAL:	 negligible 1 % O_2/ year in air, typical
– Temperature:	< 0.5 % O_2 per 20 K, based on a measurement at 20 °C (68 °F)
– Air pressure:	< 0.2 % of measuring range per 1 % change in pressure
– Residual gases:	Carrier gases containing heavy metal, H_2S and halogen will cause failures; O_2 concentrations < 0.5 % only permissible briefly
O_2 error:	when measuring flue gases: < 0.05 % O_2
Output signal noise:	< 0.5 % of span
Response time (T_{90} time):	varies by dead time and (T_{90} time) parametrisable damping, but not < 30 s at approx. 1 L/min sample gas flow rate
Display resolution:	< 0.2 % of span
Life:	approx. 2 years at 21 % O_2
Repeatability:	≤ 0.05 % O_2

Technical data of paramagnetic oxygen measurement

Measuring components:	maximal 4, of which up to 3 IR-active gases and one oxygen component
Measuring range:	0 to 5 % or 0 to 25 % O_2, parametrisable
Influencing variables	
– Zero drift:	MB 2 %: max. 0.1 % with weekly zero point adjustment MB 5 %: max. 0.1 % with weekly zero point adjustment MB 25 % or greater 0.5 % with monthly zero point adjustment
– Temperature error:	< 2 % / 10 K based on 5 % measuring range < 5 % / 10 K based 2 % measuring range
– Humidity error for N_2 at 90% relative humidity after 30 min.:	< 0.6 % at 50 °C (122 °F)
– Air pressure:	< 0.2 % of measurement per 1 % change in pressure
Output signal noise:	< 1% of the smallest measuring range
Response time (T_{90} time):	< 60 s
Repeatability:	≤ 1 % of the smallest measuring range

11 Portable probes and conditioning systems

Portable probes and gas conditioning systems

System description

Portable probes are ideal **for mobile applications** in changing locations. They are particularly suitable for use with portable sample gas conditioning, e.g. for control or sample measurements.

We offer **small, compact gas conditioning systems** as the optimal upgrade for the respective probe. These systems are available inside a **sturdy, lightweight bag** or inside a **sturdy case with optional trolley version**.

PORTABLE PROBES

Type	Baseline	Smartline
		
Sampling line:	Unheated	Heated
Heater:	no	Self-regulating (248 °F) temperature-controlled (up to max. 356 °F [1])
Mounting options:	Mounting flanges, tapers and plugs, Suspension 6.6 ft chain and carabiner	Mounting flanges, tapers and plugs, Mounting bracket with 6.6 ft chain
Pressure:	Atmosphere	max. 87 psi
Weight:	approx. 0.8 lb	approx. 5.1 lb (length 9.8 ft) approx. 8.2 lb (length 16.4 ft)
Exhaust gas temperature:	max. 1112 °F [2]	max. 752 - 1922 °F [3]
Data sheet no.:	464001	464002

Type	Smart Sample Tube
	
Sampling line:	Heated
Heater:	Temperature-controlled (140 °F to 365 °F [4])
Mounting options:	Mounting bracket with 6.6 ft chain
Pressure:	max. 87 psi
Weight:	approx. 4.2 lb (length 1.6 ft) - approx. 8.8 lb (length 6.6 ft)
Exhaust gas temperature:	max. 392 °F
Data sheet no.:	464004

[1] Separate temperature controller required.

[2] Applies at sampling tube.

[3] Varies by sampling tube. Gas inlet temperature at filter: max. 392 °F.

[4] Built-in temperature controller.

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PORTAL GAS CONDITIONERS

Type	PCS.base	PCS.smart (+)
		
Version:	Sturdy, lightweight shoulder bag	Aluminium frame case
Cooling capacity: (rated cooling capacity at 77 °F and 41 °F dew point)	52 Btu/h	76 Btu/h
Gas inlet temperature:	max. 176 °F	max. 284 °F
Dimensions:	approx. 18.9 x 10.6 x 10.2 in	approx. 18.1 x 14.2 x 10.2 in (without line)
Weight:	approx. 15 lb (without accessories)	approx. 29.8 lb (standard version)
Options:	Moisture detector, flow meter, condensate pump	Moisture detector, flow meter, sample gas pump, regulator and connection for heated line and trolley style
Data sheet no.:	464003	464005

Please refer to the respective data sheets for additional information.

In addition to portable gas conditioning systems, we also offer a mobile analysis system (MAS). Please refer to chapter Gas conditioning systems for the data sheet (no. CS0003).

Portable sample probes type Baseline

In addition to stationary analysers, gas analysis for monitoring emissions also uses portable methods. The actual measuring task determines the complexity of the sampling/analysis units. Since not all control points are easy to access, operators are interested in suitable and light equipment with a small pack size. Even under this premise, extracting the sample gas must meet high standards to ensure the measurements are reliable.

The portable Baseline series gas probe has a light weight, a compact size and a convenient range of accessories.

- Designed for sample measurements
- Also suitable for control measurements
- Unheated version
- Unheated 10 ft NBR hose
- Also ideal for service companies
- Easy to handle
- Low weight
- Reduced maintenance
- Ideal for combining with PCS.base series portable sample gas conditioning
- Optional accessories

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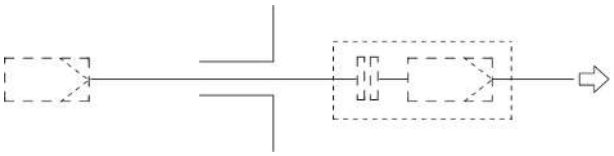
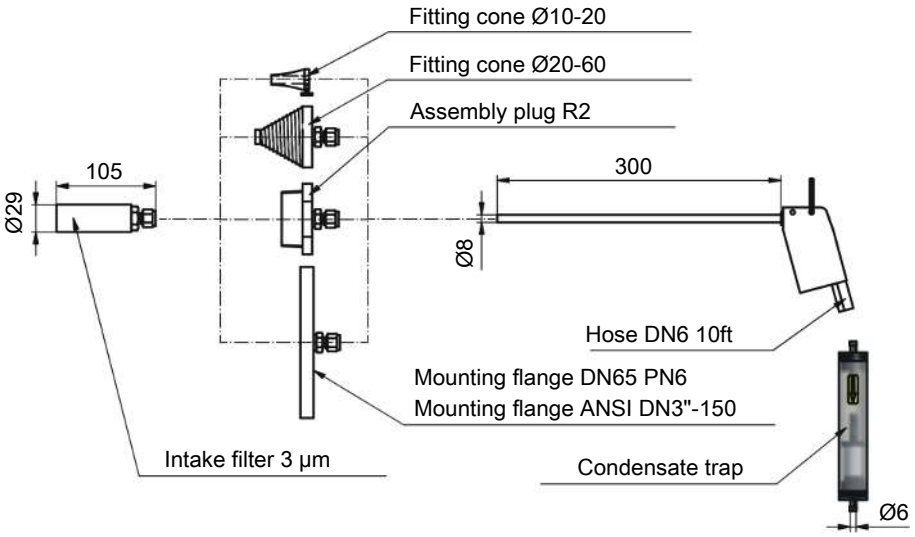
Flow chart



Technical Data

Technical Data Baseline	
Weight:	12 oz
Material tube: handle: hose:	 stainless steel polyamide NBR
Temperature inside stack:	max. 1112 °F
Pressure:	atmospheric
Dust load:	max. 2 g/m³ using the intake filter
Fixed probe tube length:	300

Drawing



Spare parts and accessories

Item no.	Description
	Probe and accessories
46760100000	Probe Baseline
46760008	Mount 6.5 ft chain and karabiner; Material: Galvanized steel
46760007	Condensate trap ø30x155; Tube: Plexiglas PMMA; Cover: PVC; Seal: NBR; Filter element: Fiberglass
	Filter / filter elements
46760020	Filter element for condensate trap; Material: Fiberglass
46760030	Filter element for condensate trap; Material: PTFE
46760006	Sintered metal intake filter 3 µm; Material: Stainless steel
	Mounting accessories
46760001	Tapered assembly plug ø10-20; Material: 11SMnPb30
46760002	Tapered assembly plug ø20-60; Material: 1.4571
46760003	Assembly plug R2; Material: 1.4571
46760004	Mounting flange DN65 PN6; Material: 1.4571/1.4401/PTFE
46760005	Mounting flange ANSI DN3"-150; Material: 1.4571/1.4401/PTFE

Special mounts on request!

Portable sample probes type Smartline

In addition to stationary analysers, gas analysis for monitoring emissions also uses portable methods. The actual measuring task determines the complexity of the sampling/ analysis units. Since not all control points are easy to access, operators are interested in suitable and light equipment with a compact size. Even under this premise, extracting the sample gas must meet high standards to ensure the measurements are reliable.

The Smartline series of portable gas sampling probes features a lightweight, self-regulating or temperature controlled heated sample gas line with built-in particle filter.

- Portable probe and heated line as all-in-one solution for mobile applications
- Designed for sample measurements
- Also suitable for control measurements or continuous sampling
- Self-regulating or temperature-controlled heated
- Also ideal for service companies
- Built-in, heated filter element
- Low weight
- Reduced maintenance
- Stack mounting possible
- Tool-less filter element change
- Space-saving version for sampling with high moisture content
- Option: Test gas function option on input end
- Option: Transport case

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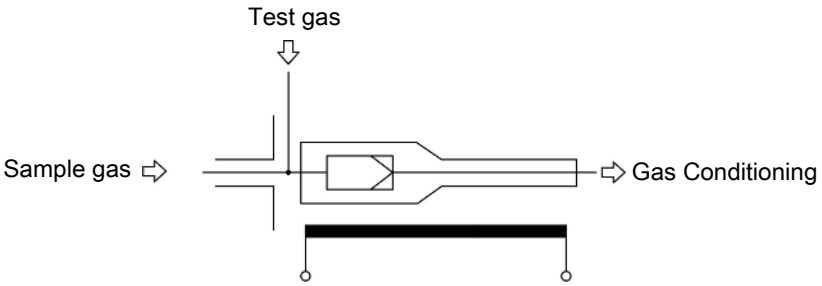
Flow chart



Technical Data

Smartline Technical Data	
Warm up time at 77 °F	approx. 30 minutes
Ambient temperature	-4 °F to 104 °F
Max. operating temperature	Varies by heating tube type, see type plate
Heater	controllable with Pt100, 100 W/m, max. 356 °F self-regulating, 60 W/m, 248 °F
Dust load	max. 2 g/m³
Temperature inside stack	max. 752 °F – 1922 °F, varies by sampling tube, see spare parts and accessories
Pressure	max. 87 psi
Protection class	IP 54

Electrical specifications

Electric supply	
Voltage (optional supply via portable conditioning PCS.smart)	230 V AC - 60 W/m or 100 W/m +/- 10% 115 V AC - 60 W/m or 100 W/m +/- 10%
Length	1 m (3.2 ft)

Mechanical specifications

Heating tube diameter	approx. 1.26 in
Heating tube length	3 (9.8 ft) or 5 m (16.4 ft)
Weight	approx. 5.1 lb at 3 m (9.8 ft) length approx. 8.2 lb at 5 m (16.4 ft) length

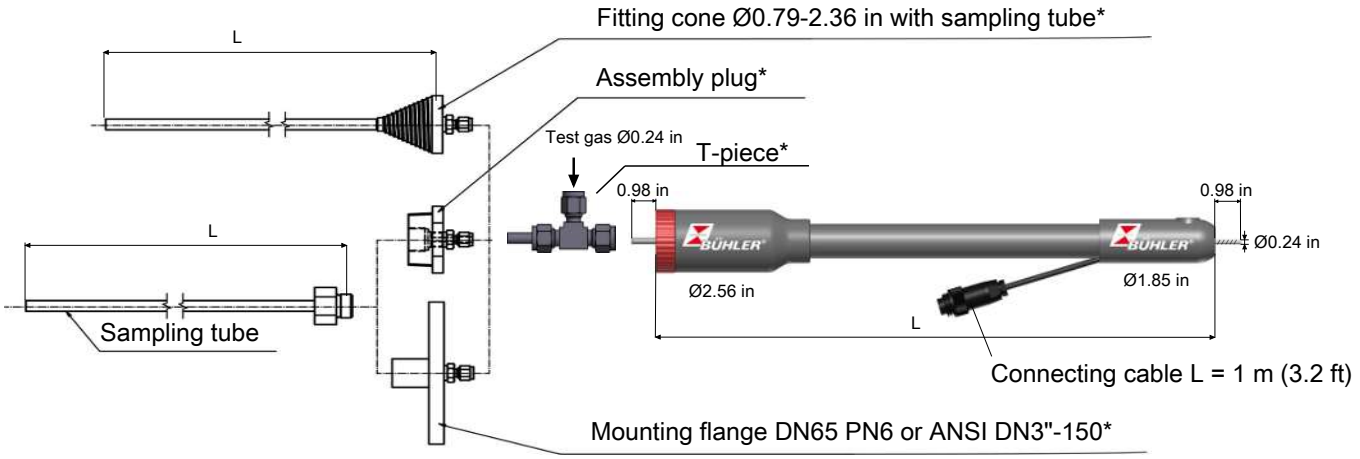
Materials

Material	Silicone, PTFE, stainless steel, polyamide
Parts in contact with mediums	Stainless steel 1.4571, 1.4404, 1.4305, PTFE
Bend radius	min. 5.51 in
PTFE core	DN 4/6
End termination	Stainless steel, Ø0.24 in

Transport case (accessory)

Outside dimensions	approx. 22.64 in x 18.5 in x 8.07 in
with space for the following parts	Smartline 3 m (9.8 ft)/5 m (16.4 ft), 3 x filter element, 2 x sampling tube, 2 x assembly plug, 2 x mounting flange, mounting bracket with chain, T-piece with insulation, 2 x compartment for small parts, operating instructions

Drawing



Mounting bracket with 2 m (6.6 ft) chain*

Insulating sleeve for T-piece 0.24 in*

*optional

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key.

Item no.							Smartline
4677	X	X	X	X	0	0	**Product Characteristics**
							Voltage
	1						115 V AC
	2						230 V AC
							Length
		3					3 m (9.8 ft)
		5					5 m (16.4 ft)
							Temperature control
			1				self-regulating (120 °C/248 °F)
			2				regulated (max. 180 °C/356 °F) [1]
							End termination
				1			Ø6 mm tube
				2			Quick-Lock female (ideal for PCS.smart)

[1] Temperature controller required.

Other lengths and styles available upon request!

Filter element required for operation (see notes under "Spare Parts and Accessories").

Spare parts and accessories

Item no.	Description
46770070	Transport case
	Filter elements
46770020	Sintered metal filter element incl. seals; Material: 1.4404/Viton
46770030	Ceramic filter element incl. seals; Material: Ceramic/Viton
	Sampling tubes
467700030500	Tapered assembly plug ø20-60 (0.79-2.36 in) with sampling tube; Material: 1.4571/1.4401; length 500 mm (19.69 in)
467700060500	Tapered assembly plug ø20-60 (0.79-2.36 in) with sampling tube; length 500 mm (19.69 in) Material: Hastelloy/1.4571/1.4401
462220010500	Sampling tube length 500 mm (19.69 in), material: 1.4571, T_{max} 600 °C
462220060500	Sampling tube length 500 mm (19.69 in), material: Hastelloy, T_{max} 400 °C
462220040500	Sampling tube length 500 mm (19.69 in), material: Inconel, T_{max} 1050 °C
	For more sampling tubes see accessory data sheet for sample gas probes DB461099
	Mounting accessories
46770004	Assembly plug R2; Material: 1.4571/1.4401
46770001	Mounting flange DN65 PN6; Material: 1.4571/1.4401
46770002	Mounting flange ANSI DN3"-150; Material: 1.4571/1.4401
46770005	Mounting bracket with 2 m (6.6 ft) chain; EPDM/galvanised steel
46770060	T-piece, 6 mm (0.24 in), stainless steel material for test gas
46770050	Insulating sleeve for T-piece
467700202	Seal kit, Viton material for FE sintered metal
467700302	Seal kit, Viton material for FE ceramic
9146100267	Flange socket 6-pin + PE
467707	Screw cap O-ring

Gas Analysis

Portable sample gas conditioning PCS.base

In addition to stationary analysers, gas analysis for monitoring emissions also uses portable methods. The actual measuring task determines the complexity of the sampling/ analysis units. Since not all control points are easy to access, operators are interested in suitable and light equipment with a small pack size. Even under this premise, extracting the sample gas must meet high standards to ensure the measurements are reliable.

Depending on the application, this also requires conditioning the sample gas on site.

The PCS Base portable gas conditioning system has a gas cooler to lower the dew point and separate condensation, particle filter, condensate trap and pump. The entire unit comes inside a compact, light carrying bag which also has room for electric lines and the simple Baseline sample gas probe.

- Developed for mobile gas analysis
- Optimal for probe type Baseline
- Compact design
- Ideal for service, comparison- and sample measurement
- System and accessories built into a lightweight transport bag
- Consists of cooler with condensate trap, filter, and pump
- Moisture detector, flow meter, condensate pump, and various accessories optional
- Selectable Delta-T control for optimal cooling capacity
- Adjustable outlet dew point and alarms

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Description

Accurate gas analyses in changing locations require compact gas conditioning systems. PCS.base was developed for these applications.

The low weight and small dimensions of the system are ideal for e.g. service engineers using sample- or comparison measurements.

A carrying bag provides reliable protection from the weather and mechanical damage to the product and allows for convenient system transport.

The base version of the gas condition system consists of a gas cooler with condensate trap, a gas pump and filter. For more accessories and options please refer to the table in the data sheet.

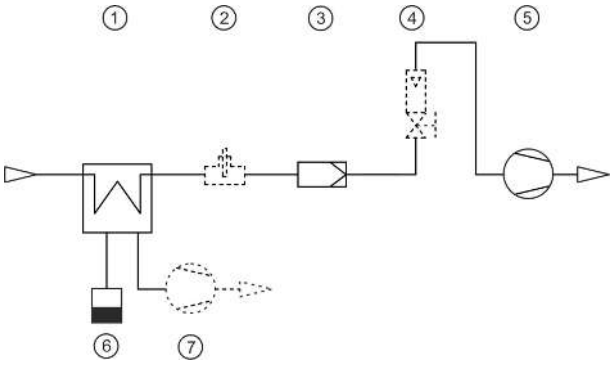
The sample gas is cooled to the preset dew point (factory preset 41 °F) regardless of the ambient temperature. This safely falls below the dew point and moisture in the sample gas is separated as condensate. A safety circuit only starts the gas pump once the operating point of the cooler has been reached. The optional moisture detector communicates with the sample gas pump, switching it off in the event of water burst or cooler overload.

Additional options or variations are also available if necessary.

Consists of:

- Connection hose nipple (inlet DN6; output DN4)
- TC-MINI with control
- Condensate trap or optional condensate pump
- Filter
- Pump
- Flow meter 0-2 L/min optional
- Moisture detector optional
- Transport bag in a fire retardant high quality material for transporting the Baseline probe and various accessories, e.g. mounting flanges and plugs, and spare filter elements
- Operation with open transport bag

Flow chart



1	Cooler	5	Pump
2	Moisture detector (optional)	6	Condensate trap
3	Filter	7	Condensate pump (optional)
4	Flow meter with needle valve (optional)		

Delta-T Control

The PCS.base generally provides the operator with two options to adapt the system function to the ambient conditions or the main areas of measurement.

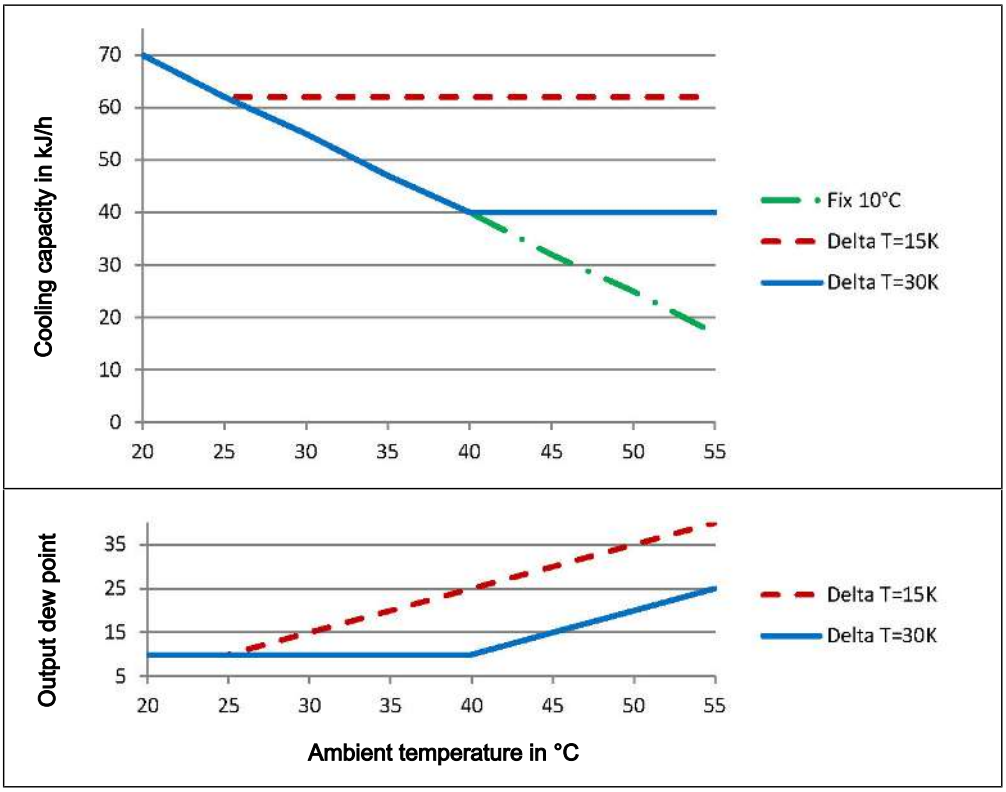
Sturdy dew point conditions inside the gas cooler are seen alongside against safe gas drying whilst utilising the maximum cooling capacity.

1. **Adjustable output dew point**

   An output dew point of 37 °F, 41 °F, 50 °F or 59 °F can be set to reach the specified values. Here it's important the ambient temperature is always ABOVE the output dew point setting, or condensation may form in the lines after the cooler. So the ambient temperature range is limited.

2. **Delta-T Control**

Here the electronics regulate the output dew point to a value about 59 °F or 86 °F lower, but no less than the dew point set under 1). This extends the potential cooling capacity to the limits of the heat exchanger. Here it's important to note the output dew point fluctuates along with the ambient temperature and a stable dew point cannot be a prerequisite for the measurement.



Technical Data

General

Technical Data PCS.base	
Ready for operation	at TU = 77 °F after approx. 10 minutes
Ambient temperature	41 °F to 113 °F
Gas inlet temperature	176 °F
Gas output dew temperature, preset	41 °F
Dew point stability	± 0.2 K
Max. pressures	14.5 PSI
Flow rate	1.83 lpm max.
Rated cooling capacity at 77 °F and dew point	41 °F: 52 Btu/h 50 °F: 57 Btu/h 59 °F: 62 Btu/h

Electrical specifications

Electric supply	
Power supply	110 - 260 V AC, 50/60 Hz (for version: with condensate trap) 115 V AC, 60 Hz oder 230 V AC, 50 Hz (for version: with condensate pump)
Electrical connection	IEC connector

Mechanical specifications

Hose connections	Inlet: DN 6 PVDF hose nipple Output: DN 4 PVDF hose nipple
Weight excl. accessories	15 lb
Weight incl. probe and accessories	approx. 23.1 lb
Dimensions (w x h x d)	approx. 18.9 x 10.6 x 10.2 in

Materials

Parts in contact with mediums	
Heat exchanger, filter, tubing, pump	PVDF, PC, PTFE, Viton, EPDM, PP, PVC
Optional moisture detector	PVDF, stainless steel 1.4571 / 1.4576, epoxy resin
Optional flow meter	PP, glass, Viton
Optional condensate pump	Norprene

Dimensions

Dimensions: approx. 18.9 x 10.6 x 10.2 in (w x h x d)

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

CSPB1	X	X	X	0	0	Product Characteristics
						Moisture detector
	0					No
	1					Yes
						Flow meter
		0				No
		1				Yes
						Condensate drain
			0			Condensate trap*
			1			Condensate pump 115 V
			2			Condensate pump 230 V

*When selecting the condensate trap the system can be operated at a 110-260 V voltage range.

Spare parts and accessories

Item no.	Description
	Spare filter
41 15 00 90	AGF-FE-1T, 2 µm, 80 °C (176 °F), Unit: 5 count
	Connection hoses
90 14 033	PVC hose DN 4/6 (for gas outlet)
90 14 136	Viton hose DN 4/6 (for gas outlet)
90 14 036	PVC hose DN 6/8 (for gas inlet)
90 14 138	Viton hose DN 6/8 (for gas inlet)
44 92 00 35 012	Condensate pump replacement hoses

For more information on the Baseline probe and suitable accessories please refer to data sheet 464001.

Portable sample gas conditioning PCS.smart

Carrying out accurate and reliable gas analyses in changing locations requires a small, compact gas conditioning system. We developed a complete sample gas conditioning system protected inside a case for this application.

The basic version of this system consists of a gas cooler with condensate pump and a filter. A gas pump, moisture detector, flow meter or temperature controller are optional.

The sample gas cooler cools the sample gas to the preset dew point (factory preset 41 °F) regardless of the ambient temperature. The safety circuit only activates the sample gas pump once the cooler has reached its operating point.

The selected materials are fit for conditioning corrosive gases. This also applies to the filter element.

- Adjustable outlet dew point and alarm thresholds
- TC-Standard OEM Cooling system with 76 Btu/h nominal capacity
- Optional moisture detector, sample gas pump, flow meter, bypass
- Optimal for Smartline heated line or alternative heated lines
- Optionally available with built-in controller up to max. 1600 W
- Successor of the TGAK3

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Description and Function

The PCS.smart series portable gas conditioners offer a variety of options and other useful features for a variety of applications.

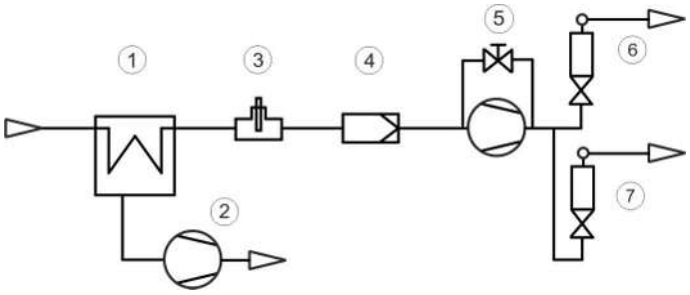
An optional built-in type P1 sample gas pump with bypass valve and flow meters is available to supply up to two gas outputs separately.

A heated line can be connected directly. An unregulated or regulated sample gas line can be connected. The PCS.smart will also control the temperature. The Smartline is specially coordinated and as a heated line with panel filter can simultaneously also be used as a portable probe. We offer a variety of gas inlet or outlet fittings which can be mixed and matched.

The "cold start" function ensures it is ready for use quickly if the storage temperature before use is 41 °F.

Flow chart

PCS.Smart, Item No. CSPS 1xxx



1	Cooler	5	Sample gas pump with bypass (optional)
2	Condensate pump	6	Flow meter (optional)
3	Moisture detector (optional)	7	Flow meter (optional)
4	Filter		

Technical Data

Technical Data PCS.smart	
Ambient temperature:	41 °F to 122 °F [1]
Gas output dew point: Warning thresholds:	adjustable, 36 °F ... 68 °F adjustable, -3 ... -1 K and +1 ... +7 K around dew point
Flow rate:	approx. 0.8 ... 4.7 lpm [2]
Operating pressure:	3 ... 29 psi abs. [2]
Dew point static throughout the range:	0.1 K ±1.5 K
Max. inlet dew point:	158 °F [1]
Gas inlet temperature:	max. 356 °F [1] [4]
Rated cooling capacity (at 77 °F):	76 Btu/h [2] [3]
Electric supply:	230/115 V, 50/60 Hz
IEC connector, termination length:	8.2 ft
Power input:	max. 250 VA (without heated line)
Status output switching capacity:	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free
Operational readiness:	after approx. 10 min.
Dimensions without line (h x w x d):	approx. 18.1 x 14.2 x 10.2 in
Weight standard version:	approx. 29.8 lb
Parts in contact with media:	PVDF, glass, stainless steel, PTFE, Norprene, Viton, epoxy resin, sintered PTFE [2]
IP rating:	IP 20 D

[1] Considering the available total cooling capacity (see Technical Data TC-Standard OEM). Please also refer to our calculation program or contact our sales department for guidance.

[2] May vary due to optional add-on parts.

[3] Subject to installation conditions

[4] Varies by device configuration.

Technical Data - Options

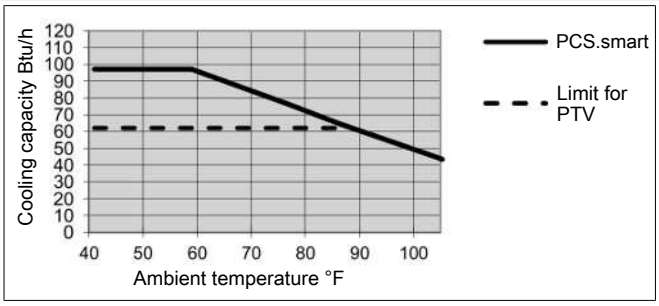
Technical Data Sample Gas Pump P1	
Inlet:	7 ... 19 psi abs.
Outlet:	Back-pressure max. 15 psi rel.
Nominal output:	4.7 lpm (at p = 15 psi abs.)

Technical Data DK 702 Flow Meter	
Standard measuring tubes:	Air 68 °F, 17 psi abs.
Meas. range:	25 ... 250 NL/h
Options:	Built-in needle valve

Technical Data Controller for heated line	
Temperature, preset: adjustable:	 212 °F 104 °F ... 392 °F
Motor power:	max. 1600 W (230 V) / 800 W (115 V)
Sensor type:	Pt100, 2-wire
Connection:	693 series socket, 7-pin

Output

PCS.smart	
Rated cooling capacity (at 77 °F)	76 Btu/h
Max. Ambient temperature	122 °F
Dew point fluctuations static in the entire specification range	 ± 0.1 K ± 1.5 K



Remark: The limit curve for the heat exchanger applies to a dew point of 104 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

Heat exchanger	PTV
Version / Material	PVDF
Flow rate v_{max} [1)]	4.2 lpm
Inlet dew point $\tau_{e,max}$ [1)]	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1)]	284 °F
Max. Cooling capacity Q_{max}	85 Btu/h

[1)] Max. cooling capacity of the cooler must be considered.

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

PCS.smart

CSP	S	1	X	3	1	X	X	X	1	X	X	X	0	X	X	Product characteristic
																Supply voltage
			1													115 V AC
			2													230 V AC
																Heat exchanger
				3												PVDF
																Filter
					1											Panel filter, AGF-FE-4
																Moisture detector
						0										without moisture detector
						1										with moisture detector
																Sample gas pump and flow meter
							0	0								none
							0	3								without P1, 1x flow meter with needle valve
							2	0								P1 with bypass, without flow meter
							2	1								P1 with bypass and 1x flow meter
							2	4								P1 with bypass and 2x flow meters with needle valve [1]
							2	5								P1 with bypass, 1x flow meter and 1x flow meter with needle valve
																Condensate pump
									1							CPsingle with angled adapter
																Gas inlet
										0						Screw connection, metric, PVDF, DN 4/6 [2]
										1						Screw connection, US, PVDF, 1/4" / 1/6" [2]
										2						Screw connection, metric, stainless steel, 6 mm [3]
										3						Screw connection, US, stainless steel, 1/4" [3]
										4						Quick-coupler with counter piece, metric, PVDF, DN 4/6 [2]
										5						Quick-coupler with counter piece, US, PVDF, 1/4" / 1/6" [2]
										6						Quick-Lock [2]
																Gas outlet
											0					Screw connection, metric, PVDF, DN 4/6
											1					Screw connection, US, PVDF, 1/4" / 1/6"
											2					Screw connection, metric, stainless steel OD, 6 mm
											3					Screw connection, US, stainless steel, 1/4"
											4					Quick-coupler with counter piece, metric, PVDF, DN 4/6
											5					Quick-coupler with counter piece, US, PVDF, 1/4" / 1/6"
											6					Quick-Lock
																heated line
												0	0			none
												2	0			heated line
																Signal outputs
														0		status output only
														1		Analog output, 4..20 mA, incl. status output
																Trolley
															0	No
															1	Yes

[1] Version 2 x SM with needle valve includes an additional bypass gas outlet. The connection corresponds with the selected gas outlet configuration.

[2] Maximum medium temperature 284 °F.

[3] Recommended for connecting a heated line.

Spare parts and accessories

Item no.	Description
CS PX 00012	Removable trolley case with 50 mm (2") casters; aluminium
44 92 00 35 012	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple
41 15 10 50	FE-4 spare filter, 8 count
42 28 00 3	Bellow for P1 pump
90 09 39 8	O-ring for bypass P1 pump
42 28 06 6	Set inlet/outlet valves 70 °C (158 °F) for P1 pump
see data sheet 4640002	Smartline

Portable sample gas conditioning PCS.smart+

Carrying out accurate and reliable gas analyses in changing locations requires a small, compact gas conditioning system. We developed a complete sample gas conditioning system protected inside a case for this application.

The basic version of this system consists of a gas cooler with condensate pump and a filter. A gas pump, moisture detector, flow meter or temperature controller are optional.

The sample gas cooler cools the sample gas to the preset dew point (factory preset 41 °F) regardless of the ambient temperature. The safety circuit only activates the sample gas pump once the cooler has reached its operating point.

The sample gas cooler in the PCS.smart+ features a new generation heat exchangers with a particularly low scrubbing effect of water-soluble components and are specifically suitable for measuring emissions. The PCS.smart+ can therefore be used for measurements according to EN 15267-4.

- Low scrubbing effects of water-soluble gas components
- Particularly suited for sample measurement in emissions monitoring
- Adjustable outlet dew point and alarm thresholds
- TC-Standard OEM Cooling system with 76 Btu/h nominal capacity
- Optional moisture detector, sample gas pump, flow meter, bypass
- Optimal for Smartline heated line or alternative heated lines
- Optionally available with built-in controller up to max. 1600 W

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Description and Function

The PCS.smart series portable gas conditioners offer a variety of options and other useful features for a variety of applications.

An optional built-in type P1 sample gas pump with bypass valve and flow meters is available to supply up to two gas outputs separately.

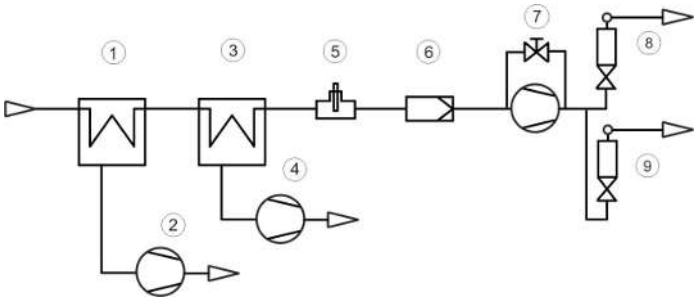
A heated line can be connected directly. An unregulated or regulated sample gas line can be connected. The PCS.smart will also control the temperature. The Smartline is specially coordinated and as a heated line with panel filter can simultaneously also be used as a portable probe. We offer a variety of gas inlet or outlet fittings which can be mixed and matched.

The "cold start" function ensures it is ready for use quickly if the storage temperature before use is 41 °F.

Unlike the PCS.smart (see data sheet no. 464005), the PCS.smart+ has two heat exchangers. The special configuration of the PCS.smart+ reduces scrubbing of water-soluble gas components. This makes the PCS.smart+ particularly suited for sample measurement when monitoring emissions.

Flow chart

PCS.Smart+, Item No. CSPS 2xxx



1	Cooler	6	Filter
2	Condensate pump	7	Sample gas pump with bypass (optional)
3	Cooler	8	Flow meter (optional)
4	Condensate pump	9	Flow meter (optional)
5	Moisture detector (optional)		

Technical Data

Technical Data PCS.smart	
Ambient temperature:	41 °F to 122 °F [1]
Gas output dew point: Warning thresholds:	adjustable, 36 °F ... 68 °F adjustable, -3 ... -1 K and +1 ... +7 K around dew point
Flow rate:	approx. 0.8 ... 4.7 lpm [2]
Operating pressure:	3 ... 29 psi abs. [2]
Dew point static throughout the range:	0.1 K ±1.5 K
Max. inlet dew point:	158 °F [1]
Gas inlet temperature:	max. 356 °F [1] [4]
Rated cooling capacity (at 77 °F):	76 Btu/h [2] [3]
Electric supply:	230/115 V, 50/60 Hz
IEC connector, termination length:	8.2 ft
Power input:	max. 250 VA (without heated line)
Status output switching capacity:	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free
Operational readiness:	after approx. 10 min.
Dimensions without line (h x w x d):	approx. 18.1 x 14.2 x 10.2 in
Weight standard version:	approx. 29.8 lb
Parts in contact with media:	PVDF, glass, stainless steel, PTFE, Norprene, Viton, epoxy resin, sintered PTFE [2]
IP rating:	IP 20 D

[1] Considering the available total cooling capacity (see Technical Data TC-Standard OEM). Please also refer to our calculation program or contact our sales department for guidance.

[2] May vary due to optional add-on parts.

[3] Subject to installation conditions

[4] Varies by device configuration.

Technical Data - Options

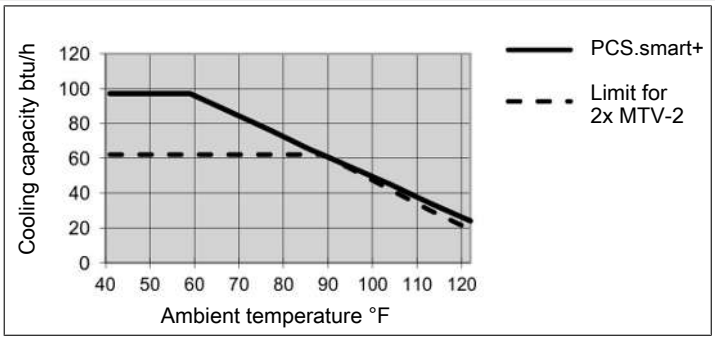
Technical Data Sample Gas Pump P1	
Inlet:	7 ... 19 psi abs.
Outlet:	Back-pressure max. 15 psi rel.
Nominal output:	4.7 lpm (at p = 15 psi abs.)

Technical Data DK 702 Flow Meter	
Standard measuring tubes:	Air 68 °F, 17 psi abs.
Meas. range:	25 ... 250 NL/h
Options:	Built-in needle valve

Technical Data Controller for heated line	
Temperature, preset: adjustable:	 212 °F 104 °F ... 392 °F
Motor power:	max. 1600 W (230 V) / 800 W (115 V)
Sensor type:	Pt100, 2-wire
Connection:	693 series socket, 7-pin

Output

PCS.smart+	
Rated cooling capacity (at 77 °F)	76 Btu/h
Max. Ambient temperature	122 °F
Dew point fluctuations static in the entire specification range	 ± 0.1 K ± 1.5 K
Temperature difference between heat exchangers	< 0.5 K



Remark: The limit curve for the heat exchanger applies to a dew point of 122 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Volume flow temperature chart

T_e	V_{max} [NL/h]*
40 (104 °F)	205
50 (122 °F)	180
65 (149 °F)	100

*at 25 °C (77 °F) ambient temperatures.

Heat exchanger overview

Heat exchanger	2x MTV-2 in-line
Version / Material	PVDF
Flow rate v_{max} [1)]	1.7 lpm
Inlet dew point $\tau_{e,max}$ [1)]	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1)]	284 °F
Max. Cooling capacity Q_{max}	85 Btu/h

[1)] Considering the maximum cooling capacity of the cooler

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

PCS.smart+

CSP	S	2	X	8	1	X	X	X	2	X	X	X	0	X	X	Product characteristic
																Supply voltage
			1													115 V AC
			2													230 V AC
																Heat exchanger
				8												PVDF
																Filter
					1											Panel filter, AGF-FE-4
																Moisture detector
						0										without moisture detector
						1										with moisture detector
																Sample gas pump and flow meter
							0	0								none
							0	3								without P1, 1x flow meter with needle valve
							2	0								P1 with bypass, without flow meter
							2	1								P1 with bypass and 1x flow meter
							2	4								P1 with bypass and 2x flow meters with needle valve [1]
							2	5								P1 with bypass, 1x flow meter and 1x flow meter with needle valve
																Condensate pump
									2							2x CPsingle with angled adapter
																Gas inlet
										0						Screw connection, metric, PVDF, DN 4/6 [2]
										1						Screw connection, US, PVDF, 1/4" / 1/6" [2]
										2						Screw connection, metric, stainless steel, 6 mm [3]
										3						Screw connection, US, stainless steel, 1/4" [3]
										4						Quick-coupler with counter piece, metric, PVDF, DN 4/6 [2]
										5						Quick-coupler with counter piece, US, PVDF, 1/4" / 1/6" [2]
										6						Quick-Lock [2]
																Gas outlet
											0					Screw connection, metric, PVDF, DN 4/6
											1					Screw connection, US, PVDF, 1/4" / 1/6"
											2					Screw connection, metric, stainless steel OD, 6 mm
											3					Screw connection, US, stainless steel, 1/4"
											4					Quick-coupler with counter piece, metric, PVDF, DN 4/6
											5					Quick-coupler with counter piece, US, PVDF, 1/4" / 1/6"
											6					Quick-Lock
																heated line
												0	0			none
												2	0			heated line
																Signal outputs
														0		status output only
														1		Analog output, 4..20 mA, incl. status output
																Trolley
															0	No
															1	Yes

[1] Version 2 x SM with needle valve includes an additional bypass gas outlet. The connection corresponds with the selected gas outlet configuration.

[2] Maximum medium temperature 284 °F.

[3] Recommended for connecting a heated line.

Spare parts and accessories

Item no.	Description
CS PX 00012	Removable trolley case with 50 mm (2") casters; aluminium
44 92 00 35 012	Condensate pump replacement hose, Tygon (Norprene), angled hose nipple
41 15 10 50	FE-4 spare filter, 8 count
42 28 00 3	Bellow for P1 pump
90 09 39 8	O-ring for bypass P1 pump
42 28 06 6	Set inlet/outlet valves 70 °C (158 °F) for P1 pump
see data sheet 4640002	Smartline

Portable Heated Sample Tube <Smart-Sample-Tube>

In addition to stationary analysers, gas analysis for monitoring emissions also uses portable methods. The actual measuring task determines the complexity of the sampling/ analysis units. Since not all control points are easy to access, operators are interested in suitable and light equipment with a compact size. Even under this premise, extracting the sample gas must meet high standards to ensure the measurements are reliable.

The Smart Sample Tube series portable heated sample tube is ideally operated with the Smartline. Since it is heated, the Smart Sample Tube can be used for sample gases in challenging measurements and when thermal bridges occur at the sample point. The temperature can be set up to 365 °F to even safely sample gas with high acid dew points.

Combining the Smart Sample Tube with the Smartline allows particle filtration near the sampling point. However, other heated lines can also be connected with universal insulation.

Designed to connect to Smartline
Compact size and light weight
Temperature-controlled - setting range 140 °F - 365 °F
Heat-up phase indicated by status LED
3 m connection cable with CEE-7/7 Euro Schuko plug
Calibrating gas connection sold separately
Threaded G3/8" connection for inlet filters or unheated sample tubes
Universal insulation for connecting other heating line sold separately
Mounting bracket with chain sold separately

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Flow chart

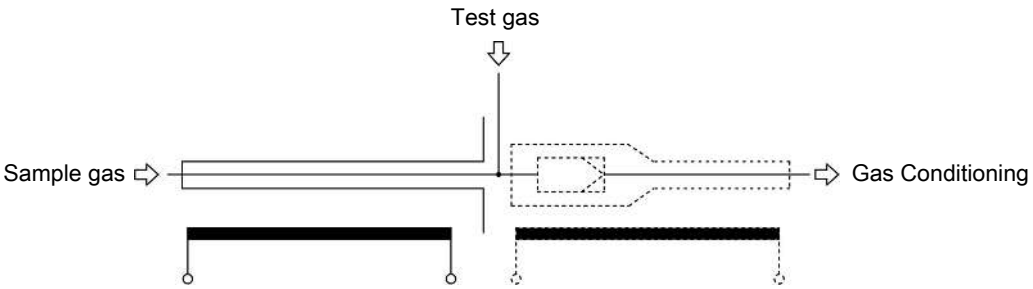
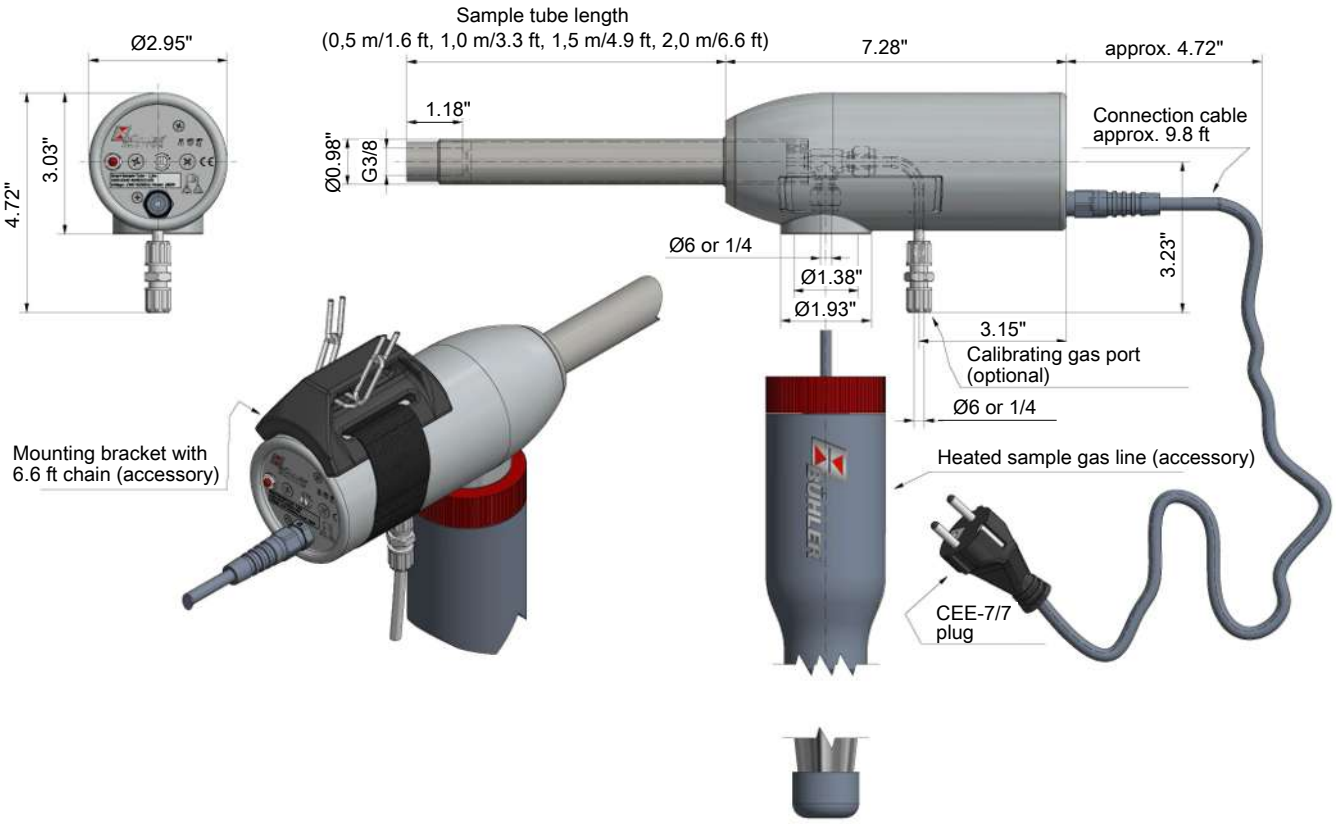


Fig. 1: Example with Smartline connection (dashed line drawing)

Technical Data

Technical Data		
Heat-up time for 77 °F:	approx. 10 minutes (regulating point thermostat)	
Ambient temperature:	-4 °F to 122 °F	
Max. Process temperature:	392 °F	
Heater:	Temperature-controlled from 140 °F to 365 °F	
Pressure:	max. 87 psi	
IP rating:	IP 44 (with properly installed heated line type Smartline)	
Protection class:	I	
Voltage:	230 V AC, 50/60 Hz 115 V AC, 50/60 Hz Output varies by sample tube length:	
	230 V	115 V
	1.6 ft (0.5 m) = 115 W 3.3 ft (1.0 m) = 280 W 4.9 ft (1.5 m) = 500 W 6.6 ft (2.0 m) = 450 W	1.6 ft (0.5 m) = 103 W 3.3 ft (1.0 m) = 200 W 4.9 ft (1.5 m) = 450 W 6.6 ft (2.0 m) = 400 W
Lengths:	1.6 ft (0.5 m); 3.3 ft (1 m); 4.9 ft (1.5 m); 6.6 ft (2 m)	
Weight:	approx. 4.2 lb at 1.6 ft length approx. 5.7 lb at 3.3 ft length approx. 7.3 lb at 4.9 ft length approx. 8.8 lb at 6.6 ft length	
Parts in contact with media:	Stainless steel 1.4571, 1.4401 (with calibrating gas port additionally PVDF, PTFE)	

Dimensions



Ordering instructions

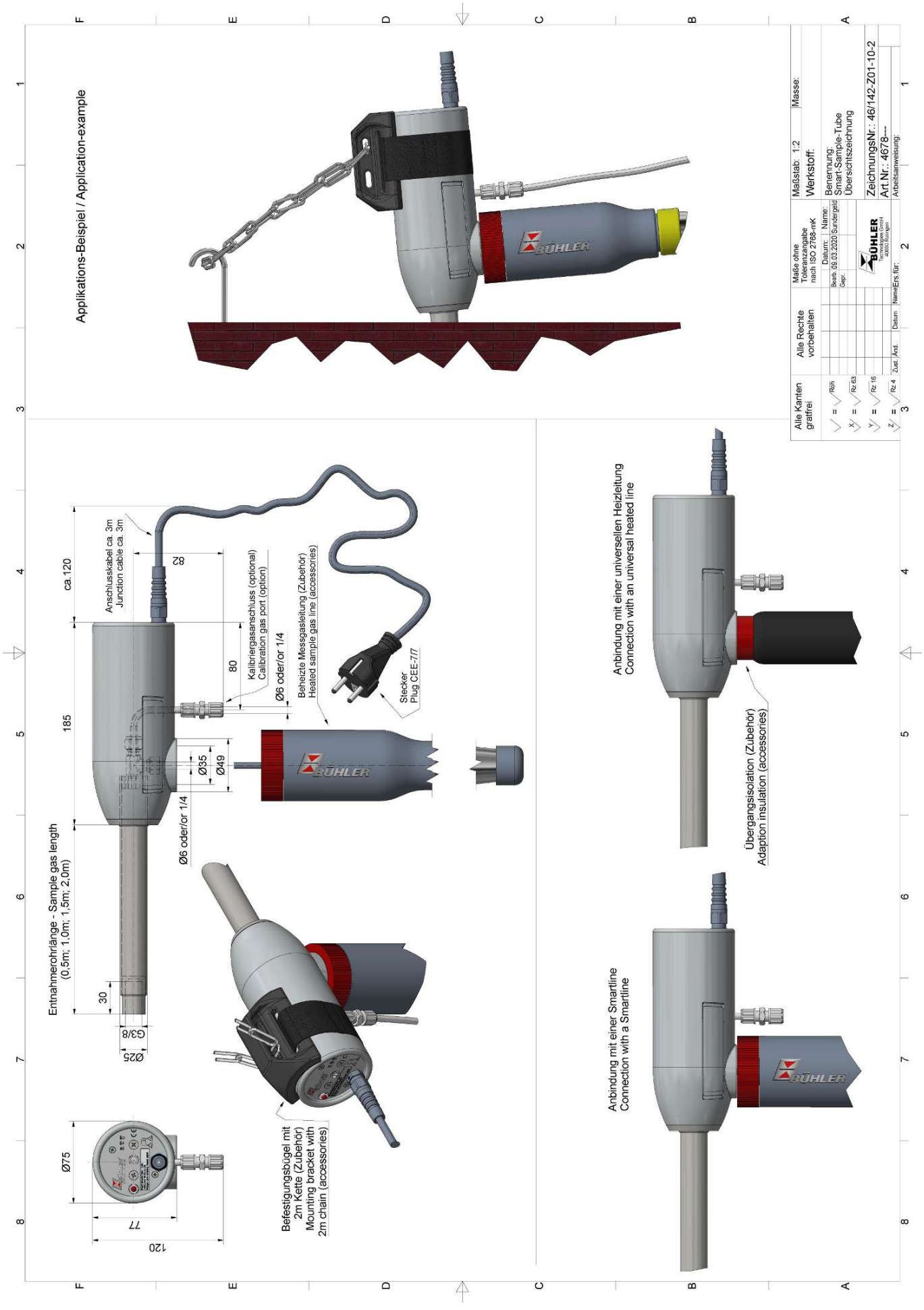
The item number is a code for the configuration of your unit. Please use the following model key.

4678	X	X	X	1	X	0	0	Product Characteristics
								Voltage
	1							115 V AC
	2							230 V AC
								Sample tube length
		0	5					1.6 ft (0.5 m)
		1	0					3.3 ft (1.0 m)
		1	5					4.9 ft (1.5 m)
		2	0					6.6 ft (2.0 m)
								Temperature control
				1				Regulated (control range 140 °F - 365 °F)
								Connection for heated line / calibrating gas port
					1			Pipe fitting Ø6 mm / none
					2			Pipe fitting Ø6 mm / hose coupling DN 4/6
					3			Pipe fitting Ø1/4" / none
					4			Pipe fitting Ø1/4" / hose coupling 1/4"-1/6"

Spare parts and accessories

Item no.	Description
46770005	Mounting bracket with 6.6 ft (2 m) chain; EPDM/galvanised steel
4678010	Transition insulation – hose: Outside Ø1.57" (Ø40 mm); inside Ø0.79" (Ø20 mm); length 3.94" (100 mm); customisable; silicone material (max. 200 °C/392 °F) Required when using universal heating line to prevent thermal bridges.
4300010	Check valve 5R400TA DN 4/6 hose connection both ends
4300011	Check valve 5R400TA DN 1/4"-1/6" hose connection both ends
see data sheet 461099	Gas sample tubes see probe accessories
see data sheet 464002	Smartline
see data sheet 464006	PCS.smart+

Drawing


Applikations-Beispiel / Application-example
Maßstab: 1:2
Masse:
Werkstoff:
Benennung:
Smart-Sample-Tube
Übersichtszeichnung
ZeichnungsNr.: 46/142-Z01-10-2
Art.Nr.: 4678----
Alle Kanten gratfrei
Alle Rechte vorbehalten
Maße ohne Toleranzangabe nach ISO 2768-mK
Anschlusskabel ca. 3m
Junction cable ca. 3m
ca.120
82
80
185
Kalibriergasanschluss (optional)
Calibration gas port (option)
Ø6 oder/or 1/4
Beheizte Messgasleitung (Zubehör)
Heated sample gas line (accessories)
Stecker
Plug CEE-7/7
Ø35
Ø49
Ø6 oder/or 1/4
Entnahmerohrlänge - Sample gas length
(0,5m; 1,0m; 1,5m; 2,0m)
30
G3/8
Ø25
Ø75
77
120
Befestigungsbügel mit
2m Kette (Zubehör)
Mounting bracket with
2m chain (accessories)
Anbindung mit einer universellen Heizleitung
Connection with an universal heated line
Übergangsisolation (Zubehör)
Adaption insulation (accessories)
Anbindung mit einer Smartline
Connection with a Smartline

12 Gas Conditioning Systems

Conditioning Systems

Analysentechnik

System description

Precise measurement of gasses in various locations or even sites requires a suitable **analyser** and reliable **sample gas conditioning**. Both must be relatively simple and most importantly allow safe and protected transport to the sampling site.

In gas analysis it's important to condition gas before feeding it into the analyser. This requires components such as gas cooler, gas pump, filter, condensate pump and flow meter. Additional functions - e.g. feeding calibrating gasses - may be required depending on the application.

When designing the **19" sample gas conditioning system SCS** we set great value upon modularity to allow it to easily be adapted to various tasks at a low cost. The control is adapted to the respective application and can be operated manually or externally. The system status is indicated via displays at the front and can also be retrieved externally.

The **mobile MAS type systems** use a 19" analyser and sample gas conditioning inside a sturdy case, with a sample gas cooler, filter, pump, flow meter, etc. configuration based on the application.

Conditioning and Analysis Systems

Model	Sample Gas Conditioning System SCS	Mobile Analysis System MAS
		
Layout	19" rack mount	robust, mobile 19" transport housing
Built-in analyser	No	Yes
Gas paths	1 or 2	1 or 2
Condensate pre-separator	Yes	Yes
Cooler type	Peltier or compressor	Peltier or compressor
Configurable	Number of gas paths Cooling capacity Number of calibrating gases	Number of gas paths Cooling capacity Number of calibrating gases
Data sheet	CS0001	CS0003

Please refer to the respective data sheets for additional information.

Aside from these conditioning systems, we also offer additional **portable systems**. Please refer to data sheet 450021 for an overview.

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Internet: www.buhlertech.com

19" sample gas conditioning system SCS

In gas analysis, it's important to condition gas before feeding it into the analyser. This requires components such as a sample gas cooler, sample gas pump, filter, condensate pump and flow meter. Additional functions – e.g. feeding calibrating gases -– may be required depending on the application.

All of these components are combined in the 19" sample gas conditioning system SCS. Modularity was given high priority when designing this unit, as it allows the unit to easily be adapted to various tasks at a low cost. The control is adapted to the respective application and can be executed manually or externally. The system status is indicated on displays at the front and can also be retrieved externally. Combining the SCS with a sample gas probe and an analyser allows a complete gas analysis system to be quickly and easily assembled. With the addition of a control unit programmable from memory, this system can then also be automated. All components requiring maintenance (e.g. filters) can easily be accessed from the front.

This data sheet describes one possible system variant. Please refer to the separate questionnaire for different variation options.

Our sales team will be happy to assist you with building a conditioning system suitable for your application. You can find the relevant contacts on our website www.buehler-technologies.com.

- Includes all required gas conditioning components
- Modular design makes it cost-effective
- Easy to install: fully assembled and fully wired
- Simple design for low maintenance costs
- 1 or 2 gas paths
- 2 gas cooler performance levels
- 2 standard volume flows
- Up to 5 calibrating gases
- Materials in contact with media safe for aggressive media
- Optional acid meter
- Manual or external control
- Self-monitoring
- Integrated programmable calibration and blowback control
- Virtually any number of connections

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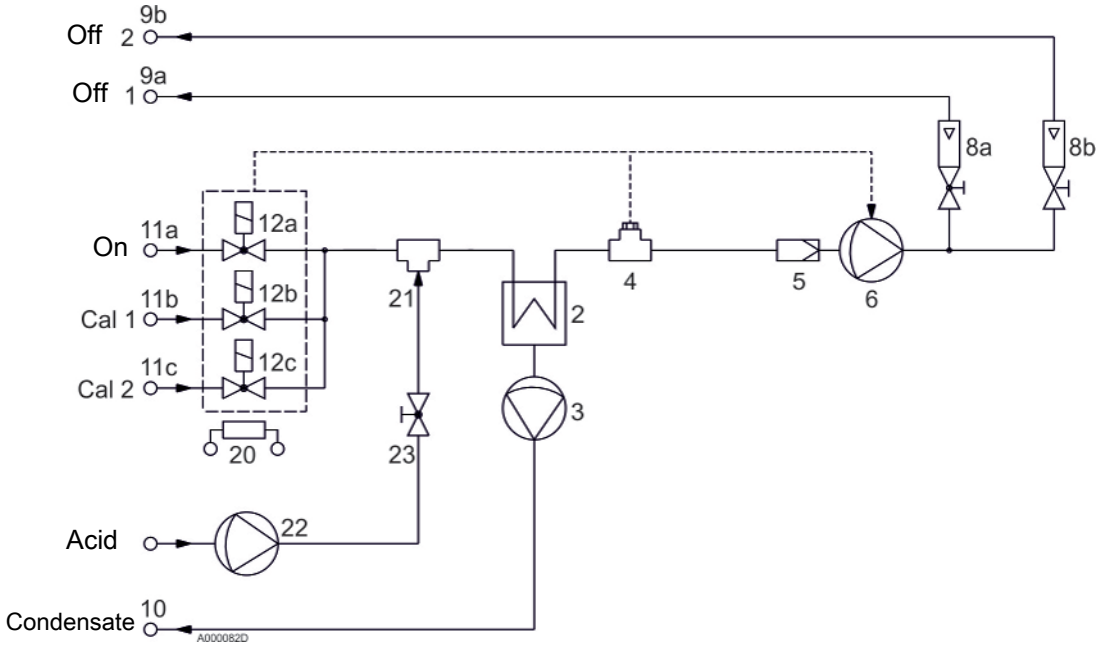
Description

The modular design allows for a wide range of circuits and control versions. It is not possible to list these all here. Therefore, the system shown in the large photo is described below as an example. The views and dimensions are shown on the last page. Not all parts described here are required in every system (e.g. acid metering).



During measurement, the sample gas is drawn through the heated valve block (12) and the sample gas cooler (2) using a sample gas pump (6). The moisture contained in the gas condenses in the glass heat exchanger of the sample gas cooler (2). The condensate pump (3) discharges the condensate. Phosphoric acid is added upstream of the cooler via the pump (22), which is controlled by a throttle valve (23), in order to reduce the leaching of sulphur dioxide in the sample gas cooler (2).

The cooling block temperature of the sample gas cooler (2) is shown on the display at the front of the housing. If the cooler is overloaded, and thus outside the permissible cooling block temperature of 3 K around the set output dew point, an error message will appear and the sample gas pump (6) will be stopped to prevent damage downstream along the gas path.

As a further safety measure, a humidistat (4) installed downstream from the sample gas cooler (2) triggers an alarm and switches off the sample gas pump (6) as soon as small amounts of moisture are present. This is also displayed as an error message.

A fine filter (5) mounted on the front panel of the system protects downstream components and analysers from contamination by particles. The flow meters (8) with needle valve (in this case 2 pieces) form the end of the gas path.

To calibrate the system, calibration gases (in this case 2) can be applied to the input of the measuring system with the solenoid valves (12b, 12c). These sit with the inlet valve (12a) on a heated manifold block. The temperature is monitored by the control unit.

This system contains the following materials in contact with media: stainless steel, FKM, Novoprene, Tygon (Norprene), PVDF, PTFE, PP. The tubing is made of FKM.

The basic system shown here is controlled by a rotary switch with which the functions “external control”, “calibration gas 1”, “calibration gas 2” and “measurement” can be selected. The condensate pump can be switched off using a toggle switch to allow the pump hose to be changed easily.

All status signals of the measuring system are displayed on the front panel and can be monitored via an electrical connection on the rear of the system. All system statuses can also be controlled externally via a second connection.

Technical Data

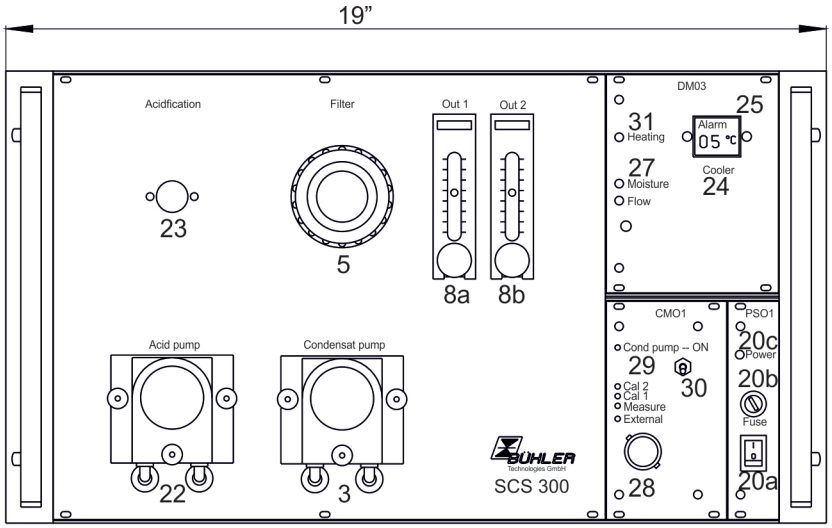
Key data of the 19" SCS sample gas conditioning system

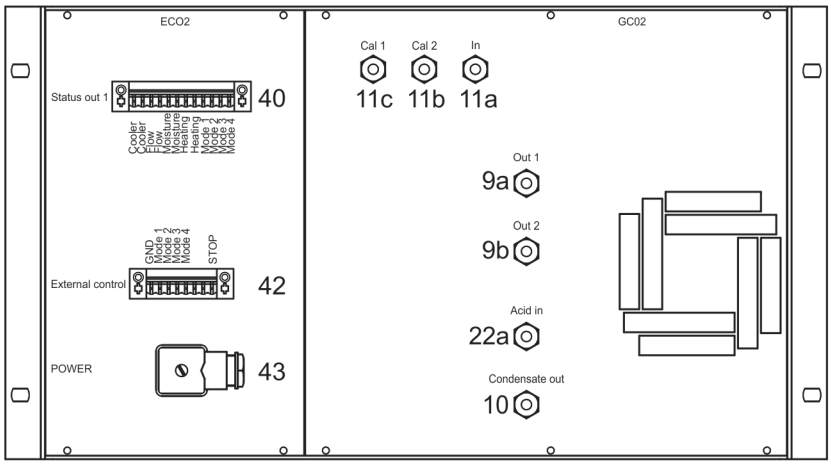
Possible sample gas coolers (number of gas paths)	TC-Standard (1 path)	RC 1.1 (1 path)	RC 1.1 (2 paths)
Gas paths			
Number of outputs/calibration gases	Varies by application		
Materials in contact with media, standard [2]	FKM, PTFE, stainless steel, Novoprene, Tygon (Norprene), PVDF, PP [2]		
Maximum pressure [3]	Depends on applications and assembly		
Gas connections (standard)	Hose couplings DN 4/6		
Standard flow rates free-flowing	5 lpm	9 lpm	2 x 5 lpm
At -2.2 psi rel. at inlet At +1.7 psi rel. at output	2.5 lpm	5.8 lpm	2 x 2.5 lpm
Dead volume (varies by version)	5.2 cu. in.	6.1 cu. in.	4.3 cu. in. each
Electrical specifications			
Electrical control connections	Switched by contact, common supply		
Electrical status outputs max.	230 VAC/150 VDC; 0.5 A; 50 VA, potential-free		
Power supply	115 V/60 Hz or 230 V/50 Hz		
Power input (varies by version)	200...350 VA	450...550 VA	500...600 VA
Cooler Data			
Cooling capacity at 77 °F (104 °F) [1]	66 (28) Btu/h	340 (95) Btu/h	340 (95) Btu/h
Maximum flow rate [1] (steel/glass)	5 lpm	6.7 lpm	2 x 3.3/2.1 lpm
Max. Gas inlet temperature [1]	355 °F	355 °F	355 °F
Max. Input dew point (1 bar abs.) [1]	150 °F	175 °F	175 °F
Ambient temperature [1]	120 °F	120 °F	120 °F
Output dew point	Standard 41 °F; factory-set 37...60 °F		
Dew point stability static	0.2 K	0.2 K	0.2 K
General Data			
Dimensions	see table below		
Weight (varies by version)	33...44 lb	33...44 lb	55...66 lb
Ready for use after max.	10 min	15 min	15 min

[1] Maximums vary in a complex manner, not only by the ambient temperature and the corresponding cooling capacity, but also by the heat exchanger materials used and the actual gas parameters. Once the application has been defined, we will calculate the required cooler slot. For additional information about these relationships, we suggest reading the “Help” section in our gas cooler configuration program.

[2] The choice of material for the gas paths can also be restricted according to your requirements.

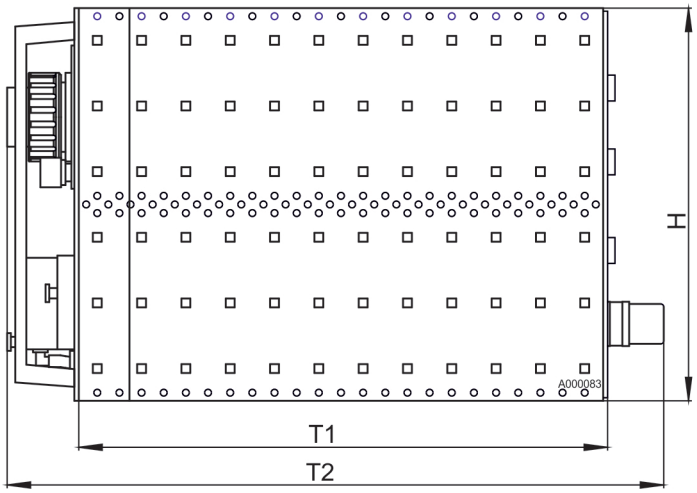
[3] The pressure values depend on the required component configuration. Internal piping for higher pressures is possible if required.





Legend

3	Condensate pump
5	Filter
8 a,b	Flow meter outputs
9 a,b	Gas outputs
10	Condensate output
11 a	Gas input
11 b,c	Calibration gas inputs
20 a	Mains switch
20 b,c	Main fuse and LED
22,23	Dosing pump and valve
22 a	Acid connection
24,25	Cooler display with alarm LED
27	Humidity alarm LED
28	Selector switch
29	System mode display
30	Condensate pump switch
31	Heating LED
40	System status and mode outputs
42	External control inputs
43	Mains connection



Legend

SCS with cooler

	TC-Standard	RC1.1 (1 path)	RC1.1 (2 paths)
H	6 He	6 He	9 He
T1	14.98"	18.70"	18.70"
T2 approx.	16.5"	21.3"	21.3"

Ordering instructions

Please complete the separate form for your application. You can download the form from our website www.buehler-technologies.com or contact our sales team. Based on the information you provide in the form, we will create a customised system selection for you.

For a treatment system with 2 gas paths, please complete one form for each gas path. When selecting the extensions, please note that the space for the front panel elements is limited.

Please use the second page for explanations/comments and number them consecutively. Please enclose existing or additional specifications and data such as material flow plans.

Questionnaire for
19” Sample Gas Conditioning Systems SCS

Project:

Page of pages

Please use the following pages for explanations and number them. Already existing specifications and data e.g. gas flow charts should be added.

Send the papers to:

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1030 Hamlin Road
Rochester Hills, MI 48309

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Fax 248.652.1598
e-mail: sales@buhlertech.com

Customer: Company:_____

_____

_____

Person to call: _____

Phone:_____ Fax:_____

e-mail: _____

Description of the application:

_____

_____

_____

_____

_____

_____

O System with 2 gas paths: Please fill in one questionnaire for each path. Please keep in mind that the number of components may be limited by the front panel dimensions.

Note: Systems with one gas path are 6HU high, and systems with two gas paths are 9 HU high.

Unit labelling: **O** German **O** English
Documentation: **O** German **O** English

Project:

Page of pages Gas path no.:_____

Gas composition: _____

_____

Gas inlet parameter: Gas inlet dew point _____°F (°C) or moisture content _____ vol%
Gas inlet temperature: _____°F (°C)
Particle content:_____

Pressure: Gas inlet: _____ psi (bar) Gas outlet: _____ psi (bar)

Ambient conditions: Temperature inside of rack max _____ °F (°C); Other: _____

Volume flow at outlet: **O** 3 lpm (200 l/h) **O** 6.7 lpm (400 l/h) **O** _____lpm

Probe blowback: **O** None **O** Magnetic valve only **O** With pressure gauge **O** With pressure regulator

			Flow switch:	
Outlets:	**1**	Range flow meter 1:_____ at pressure: _____psi (bar)	**O** Yes	**O** No
	2	Range flow meter 2:_____ at pressure: _____psi (bar)	**O** Yes	**O** No

O additional outlet with pressure regulator (compensation of atmospheric variations)

Gas terminals:	**O** DN 4/6 tube/ hose fittings	**O** 3/8" internal thread	**O** 1/4" internal thread	**O** NPT 1/4" internal thread

Panel filter	**O** Yes	**O** No
Moisture detector	**O** Yes	**O** No
Peristaltic pump	**O** Yes	**O** No

Materials NOT allowed	**O** Viton	**O** PTFE	**O** 1.4571	**O** 1.4401	**O** Novopren
materials in gas path:	**O** PVDF	**O** PP	**O** PC	**O** Glas	**O** _____

Project:

Page of pages Gas path no.:_____

Electrical control: **O** Rotary switch **O** Single switches **O** _____

O External control only **O** no external control
(please specify external control)

O Electrical terminal for heated line wanted

Power supply: **O** 230V 50Hz **O** 115V 60Hz

Calibration gases: **O** None **O** Switched to inlet **O** Switched to probe

	Cal. Gas 1	Cal. Gas 2	Cal. Gas 3
Gas			
Pressure (psi / bar)			
Flow meter	O	O	O
With needle valve	O	O	O
Range			

Explanations and additional notes:

Mobile Analysis System MAS

Precise measurement of gasses in various locations or even sites requires a suitable analyser and reliable sample gas conditioning. Both must be relatively simple and most importantly allow safe and protected transport to the sampling site. Type MAS systems use a 19” analyser and a sample gas conditioning system configured for the application with sample gas cooler, filter, pump, flow meter, etc. inside a sturdy case.

The case is a “housing-in-housing” style with shock absorption, rollers, carrying handles, and a handle for pulling the housing make the MAS easy to move.

A locking drawer to store lines, cables, documentation, etc. is optional. The connections are quick couplers.

- Analyser and sample gas conditioning inside a housing
- Choose any analyser
- Programmable sample gas conditioning
- Fully interconnected
- Quick couplings
- Sturdy shock absorbing “flight case" with rollers and handles
- Locking accessory drawer available

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System example

The analyser is a BA 5000 multi component analyser for measuring CO, NO, SO_2 and O_2 per 13th BImSchV and TA-Luft.

Sample gas conditioning consists of a condensate pre-separator, a Peltier cooler, a moisture detector with control unit, acid-proof filter, a gas pump and a condensate pump. The system statuses and the cooling temperature can be read from displays. The gas connections and the condensate drain have self-locking quick couplers.

An accessory drawer with 2 heights holds connection hoses, mains cable and documentation.

The MAS stands on 4 large wheels, has handles at the sides and an extending handle for pulling the system at the back.

Technical Data

Technical data for the system example shown	
Ambient temperature:	32...122 °F
Weight:	approx. 121 lb
Supply voltage:	230 V
Total flow rate:	approx. 2 lpm

Dimensions

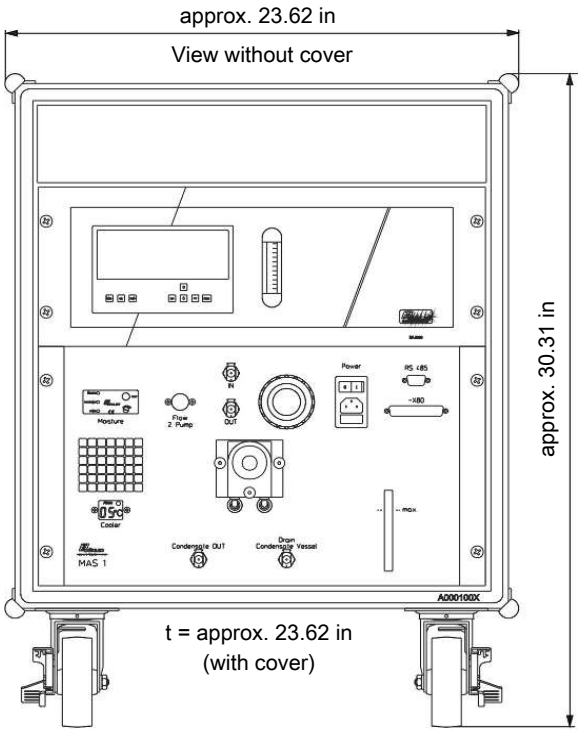

Fig. 1: System example dimensions

Configuration of a MAS

HOUSING

The housing dimensions mainly depend on the built-in components. Also available with a single wall housing, which reduces the dimensions.

ANALYSERS

All 19" rack mount analysers may be used:

- Oxygen analyser: BA 3000 and BA 6000-O_2
- Multi component analysers: BA 3500, BA 5000 and BA 6000-IR

SAMPLE GAS CONDITIONING

The sample gas conditioning is freely configurable. It is based on the model SCS sample gas conditioners. For a description and configuration, please refer to the data sheet and questionnaire "19" sample gas conditioning systems".

ORDERING INSTRUCTIONS

- Choose an analyser and define the required specifications such as measuring range and equipment, etc.
- Complete the SCS 19” systems questionnaire to define the sample gas conditioning.
- Would you like the MAS with or without accessory drawer?
- Do you have special housing requirements?

Modular sample conditioning panels MSCP

The modular sample conditioning panels MSCP range provides customized systems build on panels for plug-in installation into cabinets, shelters or instrumentation rooms. Depending on the application and customer requirements the panel comprises a full conditioning system composed from the high quality range of our sample conditioning program. We draw special emphasis to the fact, that we do not compromise: all major items of the systems are developed and manufactured particularly for gas analysis applications by Bühler Technologies GmbH.

The size of the panel is depends on the number of components necessary for the individual application. Please also consider our SCS 19“ drawer solutions.

Sample conditioning panel
Prepared for easy installation into an appropriate cabinet or shelter
Flow rate adjustable, integrated bypass for response time optimization
Outlet dew point adjustable/delta-T control optional
Nominal cooling capacity 185 Btu/h (104 °F version) or 166 Btu/h (122 °F version)
Number of calibration gases and solenoid valves variable
Either tubed in PTFE or stainless steel
Various pump and cooler models available

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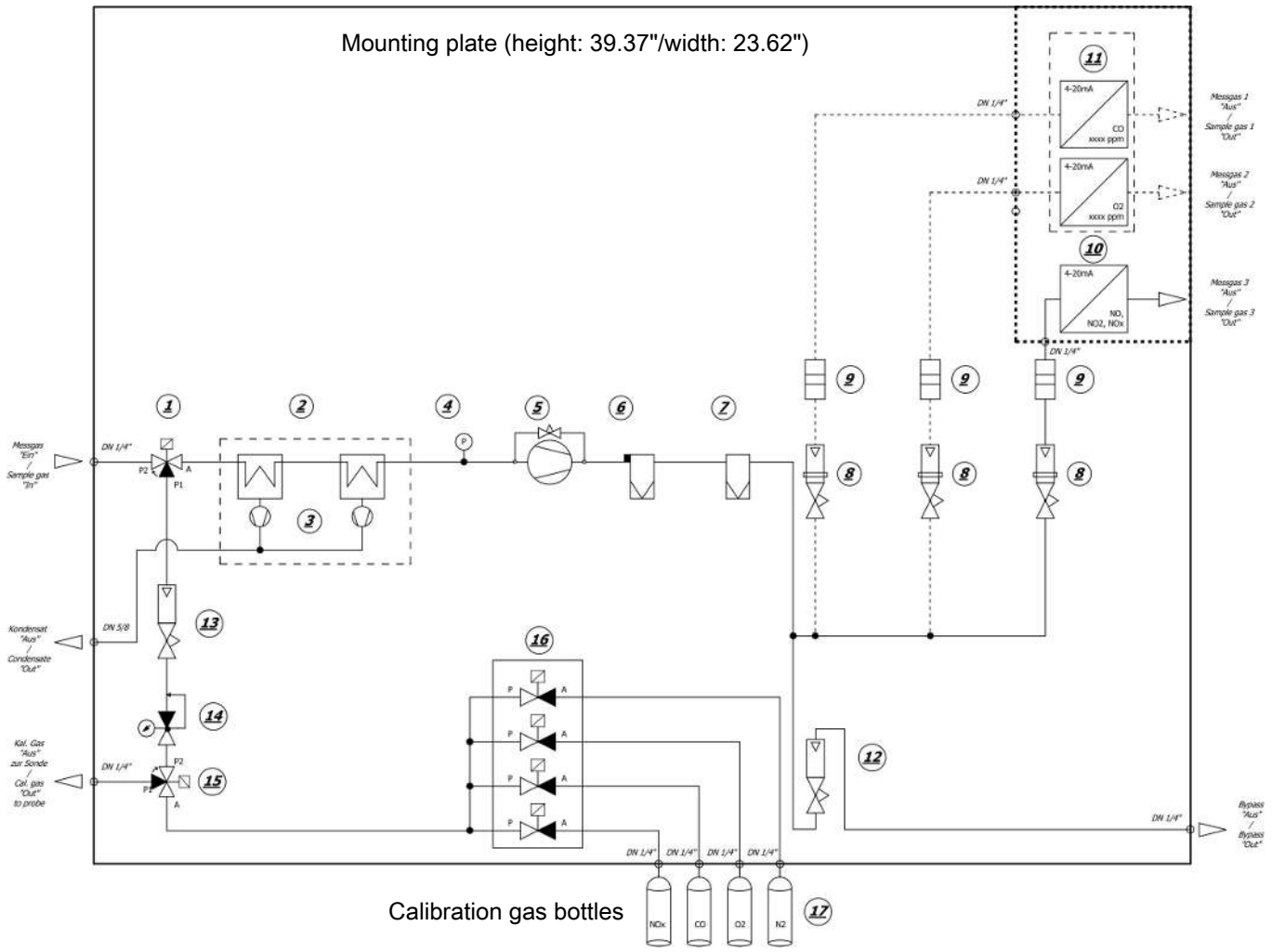
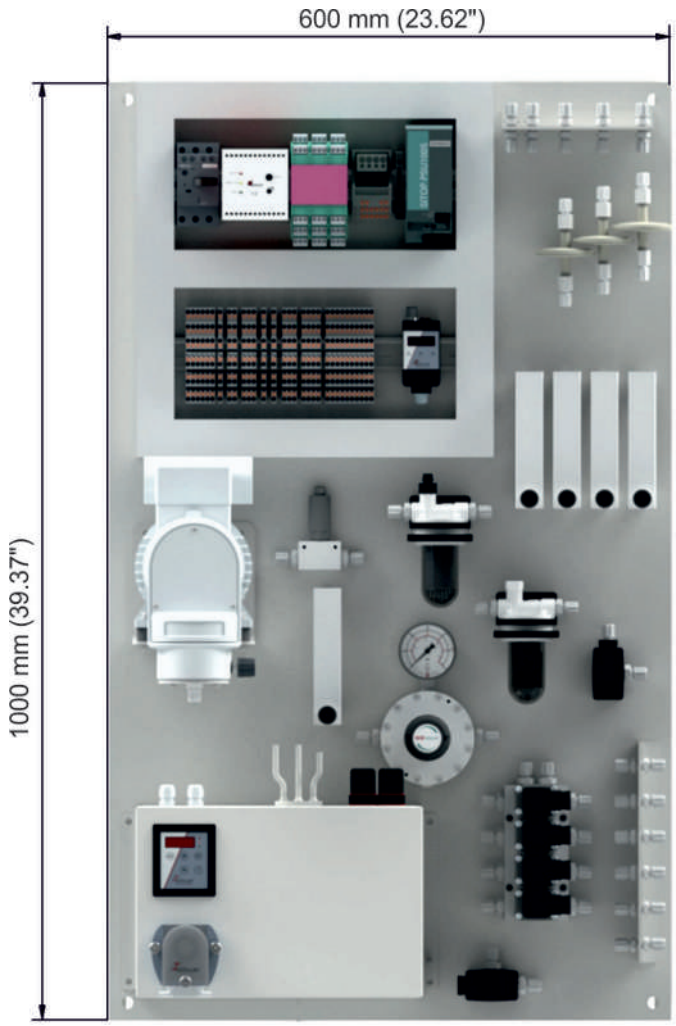
Internet: www.buhlertech.com

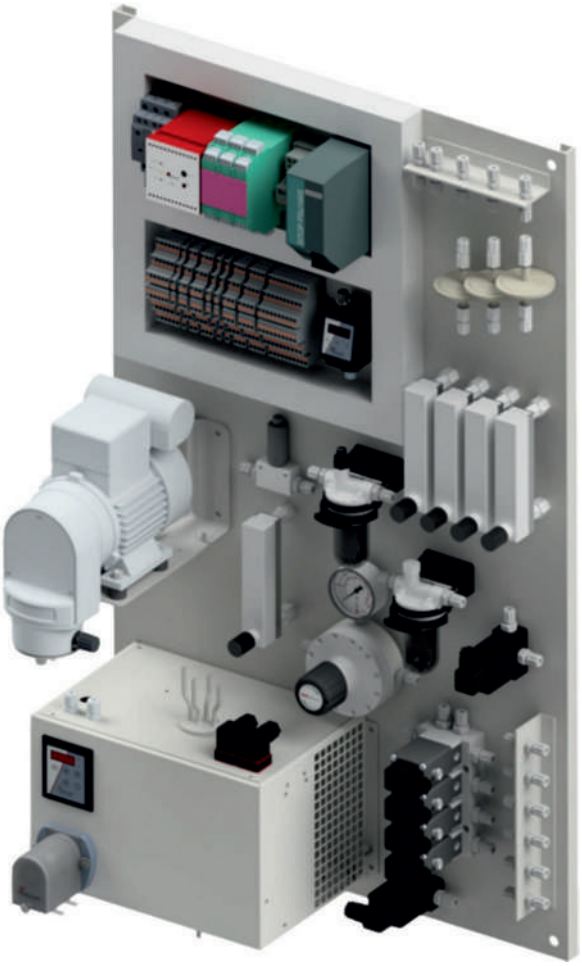
Flow diagram (example)



1	3/2-way solenoid valve (sample gas/calibration gas)	2	Sample gas cooler
3	Condensate pumps	4	Pressure gauge
5	Sample gas pump	6	Sample gas filter with moisture detector
7	Coalescing filter	8	Flow meter (analyzer gas path)
9	Waterstop filter	10	Analyzer (customer's scope)
11	Analyzer (customer's scope)	12	Flow meter (bypass gas path)
13	Flow meter (probe verification gas path)	14	Pressure regulator
15	3/2-way solenoid valve (probe verification/ direct calibration)	16	2/2-way solenoid valve (calibration gases)
17	Calibration gas bottles (customers's scope)		

System structure (example)





Technical Data

Technical data MSCP	
Mounting plate:	Dimensions: 39.37” x 23.62” (example) or according to customer’s specification Material: stainless steel 1.4401 (AISI 316)
Gas paths:	Tubed in PTFE 1/4" or DN 4/6, fittings made of PVDF Piped in stainless steel 1/4" or Ø 6 mm, fittings made of stainless steel
Scope of application:	Designed for further integration into a corresponding cabinet, shelter or instrumentation room. The sample conditioning system is delivered including a manufacturer's declaration. Can be equipped with Class I, Division 2 or ATEX/IECEx Zone 2 certified components (e.g. sample gas cooler, sample gas pump).
Max. ambient temperature:	104 °F
Max. inlet pressure:	7.3 psi
Max. sample inlet temperature[1]:	- 176 °F at sample gas inlet with option 3/2-way solenoid valves (see flow diagram (1)) - 356 °F Heat exchanger stainless steel - 284 °F Heat exchanger glass/PVDF
Max. inlet H_2O dew point:	according to cooler capacity data (see table)
Outlet H_2O dew point:	41 °F default adjustable up to 68 °F Delta-T control (option)
Material of sample wetted parts:	- Gas paths tubed in PTFE, fittings made of PVDF or piped in stainless steel, fittings made of stainless steel - Solenoid valves: PVDF/gaskets: FKM - Flow meters: PVDF/gaskets: FKM - Gas cooler: stainless steel 1.4571/1.4404 - Gas pump: PTFE/PVDF - Gas filters: PVDF, borosilicate fiber/gaskets: FKM - Pressure regulators (calibration/reference gases): brass NiCr
Power supply[2]:	230 VAC 50 Hz/115 VAC 60 Hz 654 VA (depending on specification) (cooler, pump, 24 VDC power supply, flow controller)
Signals and alarms[2]:	- Pressure gauge - Cooler temperature alarm - Moisture alarm - Low flow alarm per analyzer gas path

[1] Depending on total nominal cooling capacity, refer to cooler capacity data.

[2] Varies on configuration.

Cooler capacity data

Cooler type	Ambient temperature 77°F				Ambient temperature 90 °F				Ambient temperature 104 °F			
	Moisture content (Vol. %)				Moisture content (Vol. %)				Moisture content (Vol. %)			
	12 %	15 %	20 %	30 %	12 %	15 %	20 %	30 %	12 %	15 %	20 %	30 %
TC-STD 6111	5.2 lpm	3 lpm	3.2 lpm	1.5 lpm	2.5 lpm	2.3 lpm	1.8 lpm	1 lpm	1.7 lpm	1.3 lpm	1 lpm	0.5 lpm
TC-MIDI 6111	7 lpm	6 lpm	4.5 lpm	3 lpm	5 lpm	4.5 lpm	3.5 lpm	2.2 lpm	3.2 lpm	2.5 lpm	2 lpm	1.3 lpm

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Technical Questionnaire

Please fill in this questionaire as complete as possible. It will help for quoting you an analyser system in a short time.

Customer:

Company:	_____	Contact person:	_____
Department:	_____	Phone:	_____
Address:	_____	Fax:	_____
Signature:	_____	e-mail:	_____

Sample gas composition:

Component	Concentration			Unit	Measuring component		Remark
	min.	norm.	max.		Yes	No	
Σ		100		%			

Is the sample gas toxic? O Yes O No

Process description:

Corrosive/reactive components:

Suitable materials:

Fuel type:

Parameters of sample point (circle appropriate unit)						
Temperature (°F °C)	Min:		Norm:		Max:	
Density (kg/ m^3 lb/dscf)	Min:		Norm:		Max:	
Pressure (psi in. H_2O in. Hg)	Min:		Norm:		Max:	
Dew point (°C)	Min:		Norm:		Max:	
Particulate loading (mg/ m^3)	Min:		Norm:		Max:	
Gas velocity (m/s)	Min:		Norm:		Max:	
Flange ∅		Orientation		Breaching depth (in)		
Explosive environment	O Yes	O No	if yes, class:			

Parameters of sample return (circle appropriate unit)						
Temperature (°F °C)	Min:		Norm:		Max:	
Pressure (psi in. H2O in. Hg)	Min:		Norm:		Max:	
Explosive environment	O Yes	O No	if yes, which:			

Mounting place:						
O Indoor O Outdoor						
Ambient temperature (°C)	Min:		Norm:		Max:	
Relative humidity (%)	Min:		Norm:		Max:	
Ex- Zone	O Yes	O No	if yes, class:			
Distance: Sample probe - Analyzer (m ft):						

Additional information:
Electricity:
Pressure air:
Pressure nitrogen:

Design:				
Design according to DIN EN 15267	O Yes	O No		
Output signals:				
Required T_{90} time:				
Required protection class:				
Required Explosive protection:				
Auto Calibration	O Yes	O No		
Position sample gas line	O Top	O Bottom	O Left	O Right
Position power supply/ output signals	O Top	O Bottom	O Left	O Right

Service:		
Do you desire on-site assembly of the system?	O Yes	O No
Do you desire initial operation ?	O Yes	O No
Do you desire to enter a service contract?	O Yes	O No

Mounting
Regulations at the premisses:
special qualification required:
special training required:

Cable specifications
Indoors:
Voltage:
Signals
Outdoors:
Voltage:
Signals:

Mounting equipment		
Lifting platform	O Yes	O No
Ladder	O Yes	O No
Cable trays	O Yes	O No
Work shop	O Yes	O No
Person responsible on-site	O Yes	O No
Other		

Time restrictions at the premises:		
Are there any time restictions for working at the premises?	O Yes	O No
if yes, please specify:		

13 K-Patents

14 Particle monitors

US

V06.21

BÜHLER TECHNOLOGIES

PARTICLE MONITORING

FILTER MONITOR / FINE DUST MONITOR

TOGETHER FOR A CLEAN ENVIRONMENT

FILTER MONITOR BDA 02

Particle Monitor BDA 02

The user-friendly BDA series particle monitors are high quality systems for monitoring dust filters and separators. Monitoring and diagnosing dust leaks makes filtration system service predictable for active filter management. Depending on the version the units can be calibrated, and the measurement can be displayed in mg / m^3.

"We are able to look into your filter."

TECHNICAL FEATURES:

- Visual filter condition diagnosis on site
- 2.5" Graphics display
- Automatic service notification
- Zero point and range monitoring
- Calibratable (mg / Nm^3)
- Filter damage can be localized
- Active environmental protection
- Predictive Maintenance
- Longer safe use of bag filters and filter cartridges

HOW A BAG FILTER WORKS

A fabric filter consists of a multitude of textile filter bags, which are pulled over a wire support cage.

These filter bags are exposed on the outer surface to the particle-containing raw gas. The retained particles will form a so-called “filter cake” on the surface of the filter bags over time and it will become increasingly difficult to transport the waste gas / raw gas through the web.

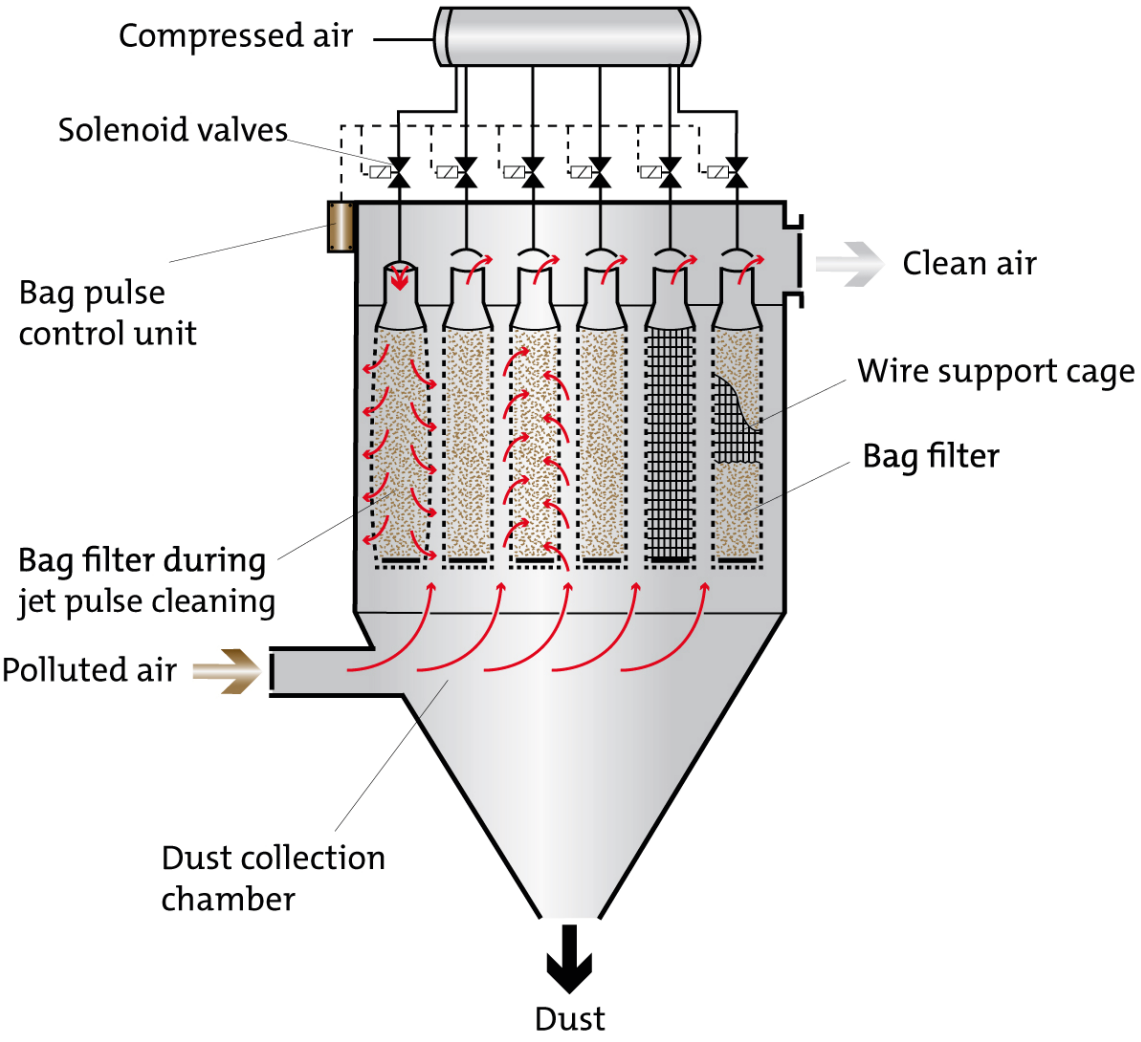
The differential pressure between the raw gas and the clean gas side increases strongly. Now the time has come for a “Bag Pulse Cleaning”.
Via a valve control, a large amount of compressed air is blown backwards into the filter bag.

The filter fabric expands outwards and the collected “filter cake” falls into the dust collection chamber.

The backflush cycle is controlled either by a fixed time interval (e. g. every 30 minutes) or by the pre-set maximum differential pressure.

As a result of this continuous movement (friction) of the textile filter tube on the wire support, small holes develop in the tissue over time, through which unfiltered raw gas can reach the clean air side.

These initially very small quantities of dust particles can already be reliably detected with the BDA 02.



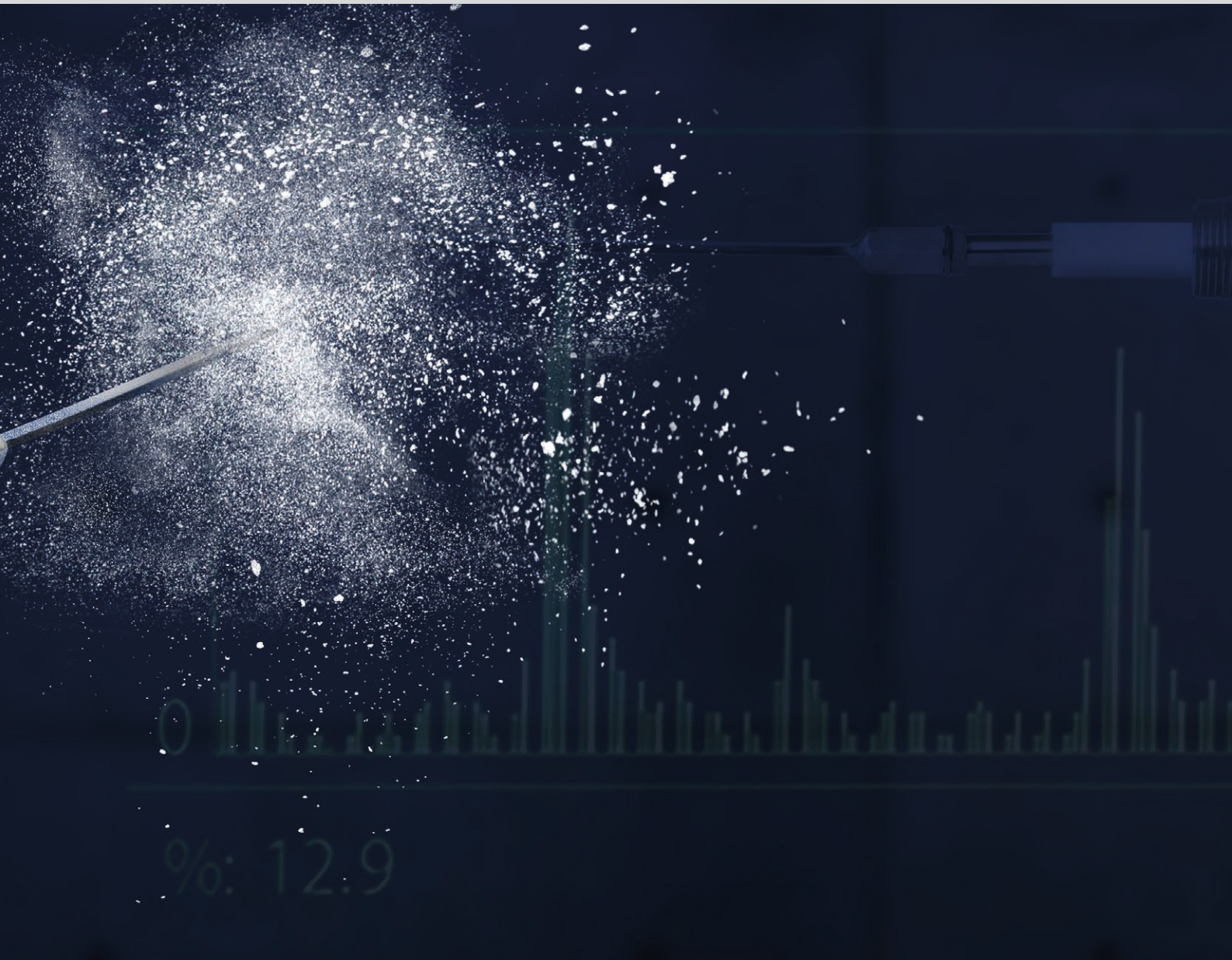
FILTER MONITOR BDA 02

“DETECTS” EACH BAG PULSE CLEANING PEAK

THE SHAPE AND HEIGHT PROVIDE INFORMATION ABOUT THE STATE OF THE FILTER

FILTER MONITORING WITH THE BÜHLER BDA 02

- **Filter damage can be localized**
  It is not always necessary to replace all filter elements; the operator can see where the problem inside the filter is caused.
- **Active environmental protection**
  Particles do not exhaust unnoticed, because normally a filter damage is only visually visible higher than 50 mg / m³.
- **Predictive Maintenance**
  The operator has the opportunity to see the real-time results before a critical value is reached and allows to forecast potential problems with minimizing or eliminating possible down time.
- **Longer safe use of filter elements**
  Manufacturers of filter elements often recommend to change the cartridge within 12-18 months.



FINE DUST MONITOR BDA 15

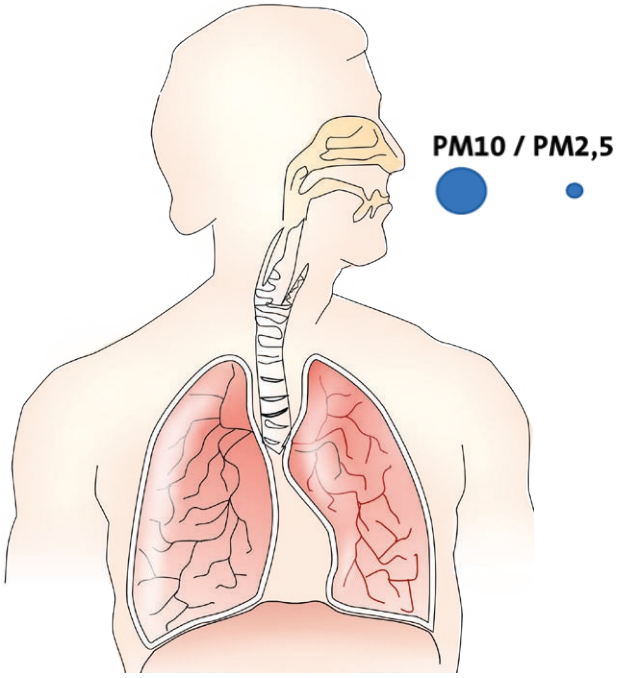
WHY DO WE NEED TO MONITOR FINE DUST?

Fine dust particles are not visible particles (solid or liquid) which float in the ambient air due to their small dimensions (<10 µm).

PM10 can invade the nasal cavity PM2.5 into the bronchi and alveoli and ultrafine particles into the lung tissue and even into the bloodstream.

Depending on the size and therefore the penetration depth, fine dust is classified as hazardous to health.

The Fine Dust Monitor BDA 15 is able to monitor the ambient air containing increasing dust levels in many production processes.



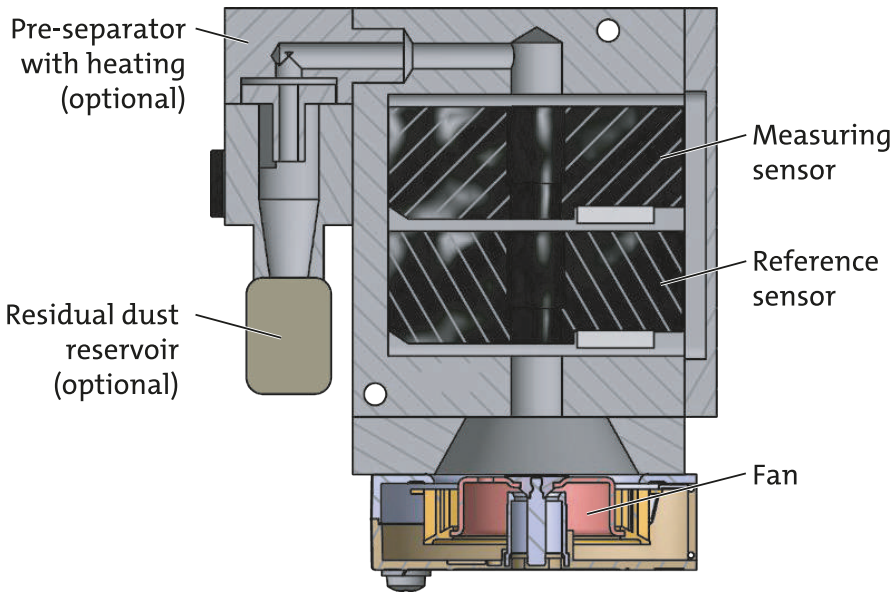
WHERE DOES FINE DUST COME FROM?

- Particulate matter is generated by combustion plants, during the production and machining of metal, and also in the manufacturing and transfer of all bulk materials.
- Fine dust is often produced by diffusion sources and can generally not be localized because a continuous monitoring 24 h / 365 days does not exist.

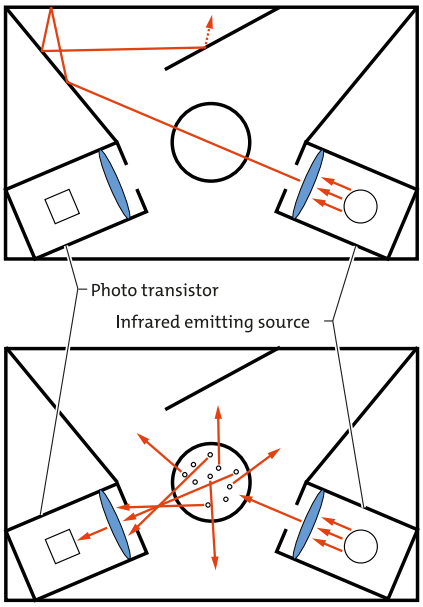
HOW DOES THE BDA 15 WORK?

- The BDA 15 determines the fine dust content based on the principle of light-scattering.
- The incoming air is preheated to 50°C. The built-in fan ensures a forced flow (2 l/min).
- The BDA 15 periodically analyzes and corrects the zero point and reference point.

Sensor design



Light path inside the sensor housing



YOUR CONTACT

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Vice President

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Particle monitor BDA 02

In many production and thermal processes, the process or exhaust air also contains dust particles of various sizes. To ensure that this dust does not enter the environment unchecked, it is separated or retained using suitable filter systems.

While manufacturing powdered milk, plastics, soot and fertilisers, for example, this primarily means recovering valuable substances. In steel production, the wood industry, foundries, crematoriums and the cement industry, as well as plasterboard production – to name just a few of the possible applications – the focus is on environmental protection.

Since the separation elements in the filter systems used wear due to more or less frequent backwashing, dust breaches or increasing particle emission often occur. It is in the operator's own interest to ensure operational safety and emission protection by using suitable residual dust monitoring devices.

The particle monitor BDA 02 is one version in a series for this scope of application.

- Unit made in Germany
- Robust, low-maintenance technology
- Easyjust installation kit for easy installation
- German/English menu navigation
- Automatic service notification
- Zero point and range monitoring
- Calibratable (mg/Nm^3)
- Visual filter condition diagnosis on site
- 2.5" Graphics display
- Low operating costs/high energy efficiency (3 W)

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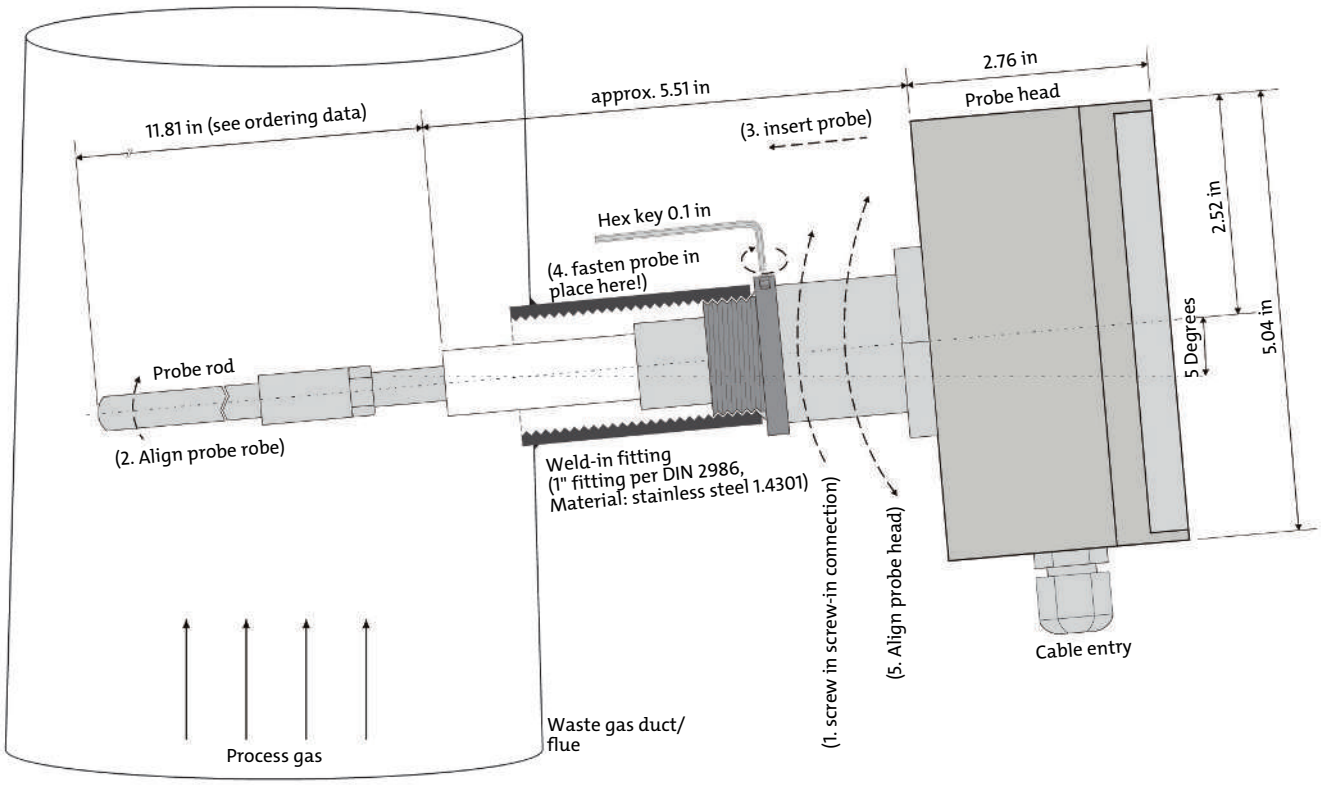
Description

Bühler particle monitors are used to monitor filters and separators in normal, moist, non-condensing exhaust gas / processes. They combine progressive signal processing with the proven triboelectric measuring principle. The interaction between particles and the sensor rod results in an electric charge crossing to the sensor rod. This does not require the particles to be in direct contact with the sensor rod. The resulting low current is analysed by the electronics and generates an analogue standard signal proportional to the dust content. The units can be calibrated in mg/m^3 through isokinetic reference measurement. The triboelectric measuring process works in flow speeds of 3 m/s and up, and is largely insusceptible to deposits on the sensor rod. Manual amplification adjustment allows the units to be adapted to a variety of systems and applications.

The directly attached control unit features a 2.5" graphics display and the four control keys. The cable inlet along with the Easyjust installation kit are standard components and make installation significantly easier. The menu features two languages - German and English. The graphics display allows for on the monitoring of the filter condition. In addition to the signals for status and limits, the BDA 02 also outputs a signal to notify of service needs.

Installation example

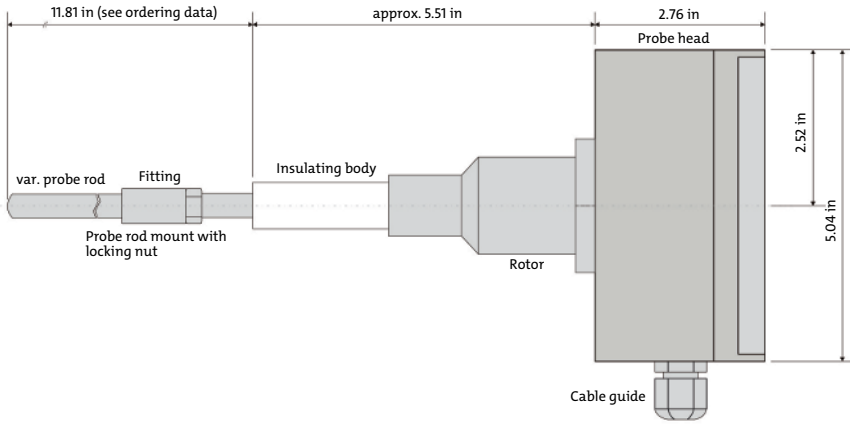


* The fitting is welded to the waste gas flue and the Conversion nipple screwed in tightly. Then insert the BDA 02 all the way and secure in the desired position by socket screw.

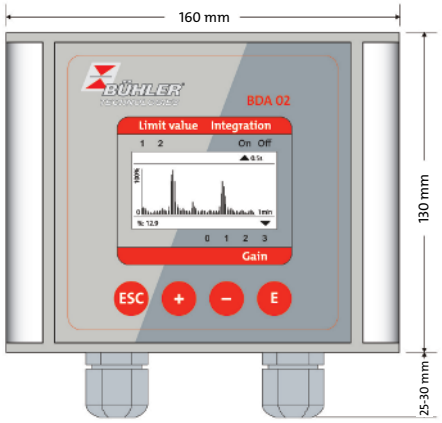
Easyjust installation kit

Dimensions

Side view



Front view



Technical data

Technical data

Housing:	Compact unit (integrated control unit); IP65, protection class 1
Dimensions:	Standard approx. 6.3 in x 6.3 in x 20.08 in (W x H x D)
Weight:	approx. 5,5 lb
Probe:	triboelectric probe consisting of probe rod and probe head
Probe rod:	electrically insulated from housing, standard length: 11.81 in (other lengths on request); optionally round, square or leaf profile;
Probe material:	Stainless steel 1.4301 (isolator PTFE)
Immersion depth:	application-dependent
Display/operation:	Graphic display (128 x 64 pixels), 4 control keys
Ambient temperature:	-4...122 °F
Relative humidity:	not particularly sensitive
Dew point difference:	min. +5 K
Sample gas temperature:	max. 392 °F (higher temperatures on request)
Flow rate:	from approx. 3 m/s
Dust measuring range:	qualitative: 0...100 %; quantitative: 0...10 mg/m³ (0...1000 mg/m³)
Amplification levels:	4
Operational readiness:	after approx. 3 min
Calibration:	by gravimetric comparative measurements (not required for trend measurements and filter analyses)
Analogue output:	4...20 mA, galvanically isolated from equipment earth, max. load impedance 500 Ω
Digital outputs:	Status signals max. 24 V DC at 0.1 A (for faults, maintenance, maintenance needs, Limit Value 1 and 2); power rating: max. 60 Vp, max. 75 mA; on-state resistance: max. 10 Ω
Process connection:	1“ welded sleeve
Cable fitting:	2x M20 x 1,5 / 0.35...0.51 in
Power supply:	230/110 V AC, 50-60 Hz, 24 V DC, 3 VA

See also

DE020010 Questionnaire [▶ 4]

Project-No.: _____

Questionnaire Filter Monitoring and Dust Measurement

BÜHLER TECHNOLOGIES

Gas Analysis

Company

Company		Name	
Street		Dept.	
ZIP code, city		Phone	
Country		Email	

Person in charge

General process information

Industry
(e. g.: Metal, Chemistry, Food, Energy, etc.)

Industry sector
(e. g.: Casting, Plastics, Powdered milk , coal-fired power plant, etc.)

Process
(e. g.: Drying, Material transport, Material processing, Material recycling, etc.)

Filter type
(e. g.: Bag filter, Cartidge filter, Cyclone, Electrofilter, etc.)

Reason for filter monitoring
(e. g.: Official requirements, active environmental protection, process control, filter monitoring, etc.)

Certificates / Approvals

Ex-Zone ☐ Yes ☐ No

Zone

Technical Data

Duct diameter [L1]: [mm]

Junction length [L2]: [mm]

Insulation thickness [L3]: [mm]

Straight length upstream [L4]: [mm]

Straight length downstream [L5]: [mm]

Velocity exhaust gas [v]: Constant? ☐ Yes ☐ No

from to [m/s]

Amount of exhaust gas [V]: [Nm³/h]

Temp. of exhaust gas [T]: [°C]

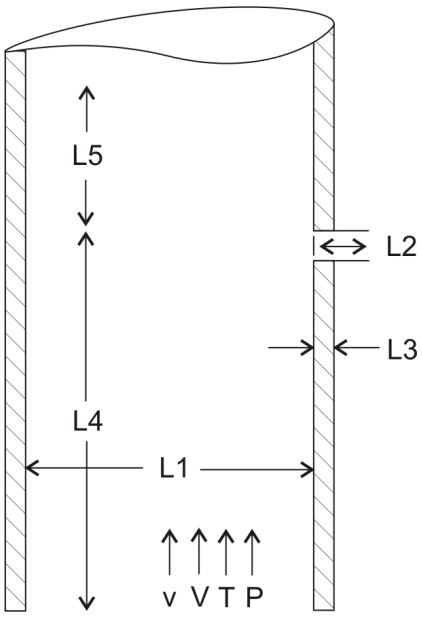
Pressure exhaust gas [P]: [mbar]

Residual dust content: [mg/Nm³]

Material of particles:

Particle size: [µm]

Relative humidity: [%]



Duct direction: ☐ horizontal
☐ vertical

flow direction: ↑ ↓ → ←
☐ ☐ ☐ ☐

Water drops contained? ☐ Yes ☐ No

Corrosive gas? ☐ Yes ☐ No

Which type:

Mains supply: ☐ 110-230 V ☐ 24 V DC

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analyse@buehler-technologies.com
Internet: www.buehler-technologies.com

Particle monitor BDA 02 Ex

In many production and thermal processes, the process or exhaust air also contains dust particles of various sizes. To ensure that this dust does not enter the environment unchecked, it is separated or retained using suitable filter systems.

While manufacturing powdered milk, plastics, soot and fertilisers, for example, this primarily means recovering valuable substances. In steel production, the wood industry, foundries, crematoriums and the cement industry, as well as plasterboard production – to name just a few of the possible applications – the focus is on environmental protection.

Since the separation elements in the filter systems used wear due to more or less frequent backwashing, dust breaches or increasing particle emission often occur. It is in the operator's own interest to ensure operational safety and emission protection by using suitable residual dust monitoring devices.

The BDA 02 Ex particle monitor is one version in a series for this scope of application.

Device made in Germany
Robust, low-maintenance technology
Easyjust installation kit for easy installation
German/English menu navigation
Automatic service notification
Zero point and range monitoring
Calibratable (mg/Nm^3)
Visual filter condition diagnosis on site
2.5" graphics display
Low operating costs / high energy efficiency (3 W)
Suitable for use in explosive areas of zone 22. Sampling permitted from zones 20, 21 and 22.

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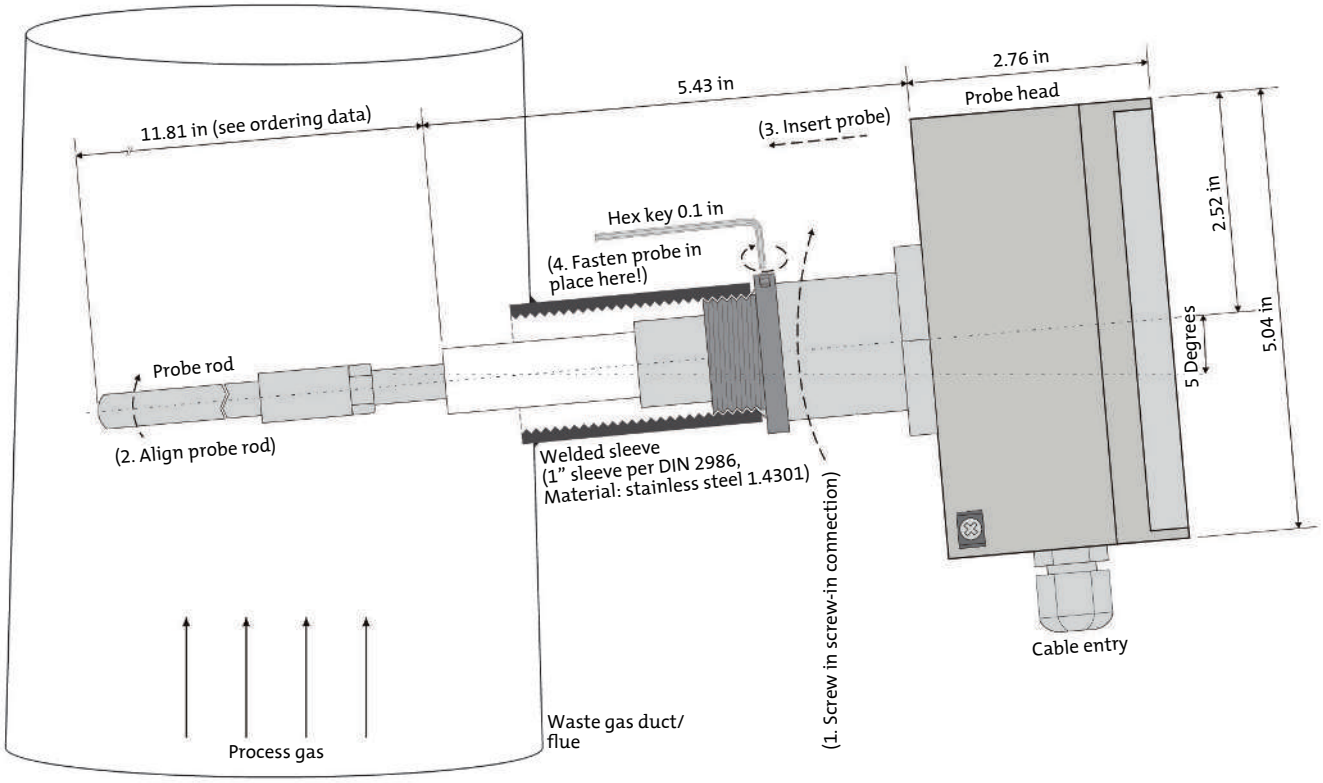
Description

Bühler particle monitors are used to monitor filters and separators in normal, moist, non-condensing exhaust gas / processes. They combine progressive signal processing with the proven triboelectric measuring principle. The interaction between particles and the sensor rod results in an electric charge crossing to the sensor rod. This does not require the particles to be in direct contact with the sensor rod. The resulting low current is analysed by the electronics and generates an analogue standard signal proportional to the dust content. The units can be calibrated in mg/m^3 through isokinetic reference measurement. The triboelectric measuring process works in flow speeds of 3 m/s and up, and is largely insusceptible to deposits on the sensor rod. Manual amplification adjustment allows the units to be adapted to a variety of systems and applications.

The directly attached control device features a 2.5" graphics display and the four control keys. The cable inlet along with the Easyjust installation kit are standard components and make installation significantly easier. The menu features two languages - German and English. The graphics display allows for on the monitoring of the filter condition. In addition to the signals for status and limits, the BDA 02 Ex also outputs a signal to notify of service needs.

Installation example

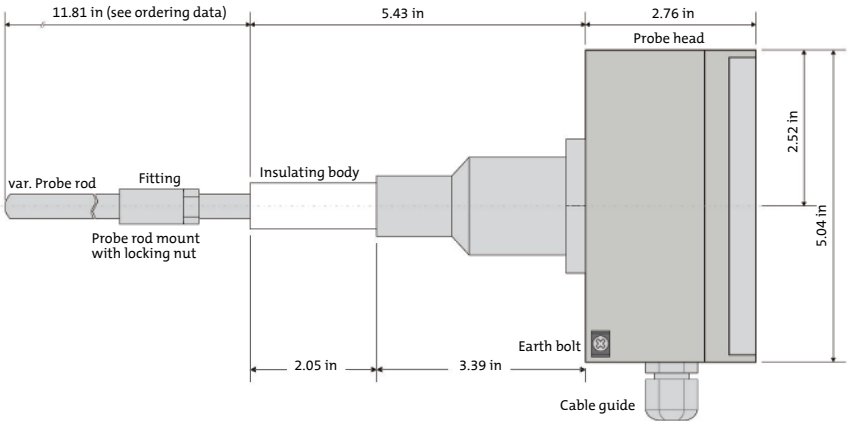


* The fitting is welded to the waste gas flue and the Conversion nipple screwed in tightly. Then insert the BDA 02 Ex all the way and secure in the desired position by socket screw.

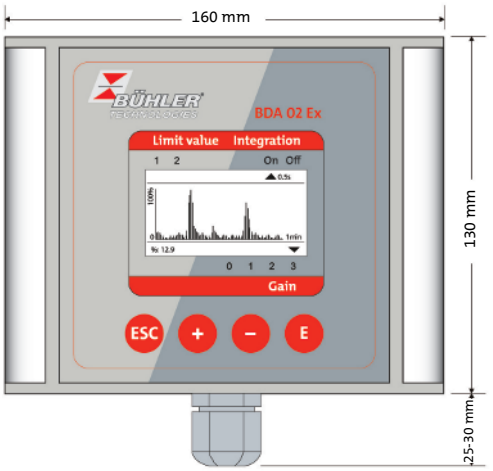
Easyjust installation kit

Dimensions

Side view



Front view



Technical data

Technical data

Housing:	Compact unit (integrated control unit); IP65, protection class 1
Dimensions:	approx. 6.3 in x 6.3 in x 20.08/27.95 in (W x H x D)
Weight:	approx. 5.5 lbs
Probe:	triboelectric probe consisting of probe rod and probe head
Probe rod:	electrically insulated from housing, standard length: 11.81 in (other lengths on request); optionally round or rectangular profile
Probe material:	Stainless steel 1.4571 (isolator PTFE)
Immersion depth:	15.75 in as standard (application-dependent)
Display/operation:	Graphic display (128 x 64 pixels), 4 control keys
Ambient temperature:	-4...122 °F
Relative humidity:	not particularly sensitive
Dew point difference:	min. +5 K
Sample gas temperature:	max. 482 °F
Flow rate:	approx. 3 m/s
Dust measuring range:	qualitative: 0...100%; quantitative: 0...10 mg/m³ (0...1000 mg/m³)
Amplification levels:	4
Operational readiness:	after approx. 5 to 15 min.
calibration:	by gravimetric comparative measurements (not required for trend measurements and filter analyses)
Analogue output:	4...20 mA, galvanically isolated from equipment earth, max. load impedance 500 Ω
Digital outputs:	Status signals max. 24 V DC at 0.1 A (for faults, maintenance, maintenance needs, Limit Value 1 and 2); power rating: max. 60 Vp, max. 75 mA; on-state resistance: max. 10 Ω
Process connection:	1" welded sleeve/Triclamp DN32
Cable fitting:	1x M20 x 1.5 / 0.35...0.51 in
Power supply:	24 V DC
ATEX mark:	Ex II 1/3 D Ex ia/tc IIIC T74 °C Da/Dc
ATEX certificate number:	IBExU16ATEX1091 X

See also

DE020010 Questionnaire [▸ 4]

Project-No.: _____

Questionnaire Filter Monitoring and Dust Measurement

BÜHLER TECHNOLOGIES

Gas Analysis

Company

Company		Name	
Street		Dept.	
ZIP code, city		Phone	
Country		Email	

Person in charge

General process information

Industry
(e. g.: Metal, Chemistry, Food, Energy, etc.)

Industry sector
(e. g.: Casting, Plastics, Powdered milk , coal-fired power plant, etc.)

Process
(e. g.: Drying, Material transport, Material processing, Material recycling, etc.)

Filter type
(e. g.: Bag filter, Cartidge filter, Cyclone, Electrofilter, etc.)

Reason for filter monitoring
(e. g.: Official requirements, active environmental protection, process control, filter monitoring, etc.)

Certificates / Approvals

Ex-Zone ☐ Yes ☐ No

Zone

Technical Data

Duct diameter [L1]: [mm]

Junction length [L2]: [mm]

Insulation thickness [L3]: [mm]

Straight length upstream [L4]: [mm]

Straight length downstream [L5]: [mm]

Velocity exhaust gas [v]: Constant? ☐ Yes ☐ No

from to [m/s]

Amount of exhaust gas [V]: [Nm³/h]

Temp. of exhaust gas [T]: [°C]

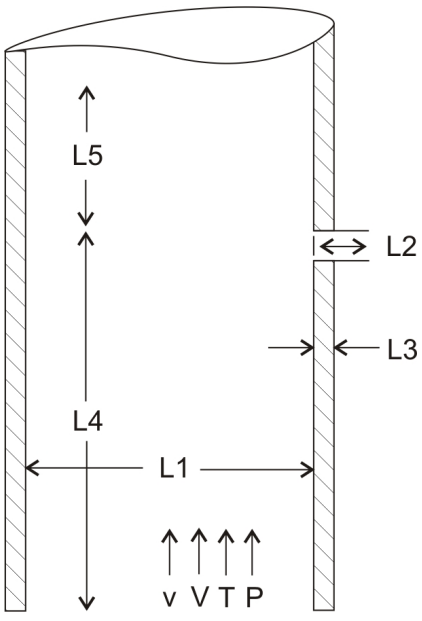
Pressure exhaust gas [P]: [mbar]

Residual dust content: [mg/Nm³]

Material of particles:

Particle size: [µm]

Relative humidity: [%]



Duct direction: ☐ horizontal
☐ vertical

flow direction: ↑ ↓ → ←
☐ ☐ ☐ ☐

Water drops contained? ☐ Yes ☐ No

Corrosive gas? ☐ Yes ☐ No

Which type:

Mains supply: ☐ 110-230 V ☐ 24 V DC

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen
Tel. +49 (0) 21 02 / 49 89-0, Fax: +49 (0) 21 02 / 49 89-20
analyse@buehler-technologies.com
Internet: www.buehler-technologies.com

Fine particle monitor BDA 15

Regardless of the emitter, fine dust particles hazardous for people and the environment. Particles in the submicron range can enter the respiratory tract and are hazardous to the health, regardless of the substance. A number of directives and standards, such as DIN EN 481, require monitoring the surrounding atmosphere.

The BDA 15 fine dust monitor will determine the dust content in shops, factory buildings, offices and public building such as schools and hospitals, as well as private areas.

The compact unit is an autonomous functional unit and can be operated as a stand-alone device or with a linked monitoring system.

The BDA 15 fine dust monitor employs the scattered light principle.

- Device made in Germany
- Sturdy construction
- Quiet operation
- Active suction
- Two sensors for long-term stability
- Multiple BDA 15 can be connected
- Network compatible, WLAN
- Easy to install without speciality tools
- Low operating costs
- Excellent price-performance ratio

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546 / 49 89-0, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Description

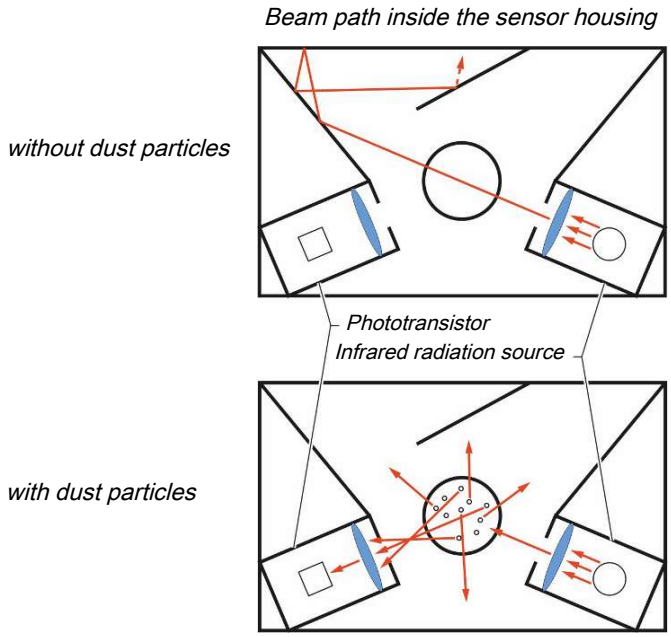
The BDA 15 fine dust monitor is an optical sensor to continuously measure and monitor fine particle concentrations. It can be built into various applications.

The BDA 15 will determine the current fine particle load in the surrounding area and detect a health hazard.

Application examples:

- Monitoring fine dust particles in the production area (shops, factory buildings, etc.),
- Monitoring the indoor air quality in offices and public buildings (hospitals, schools, etc.) or private areas,
- Monitoring the ambient air,
- Add-on for weather stations.

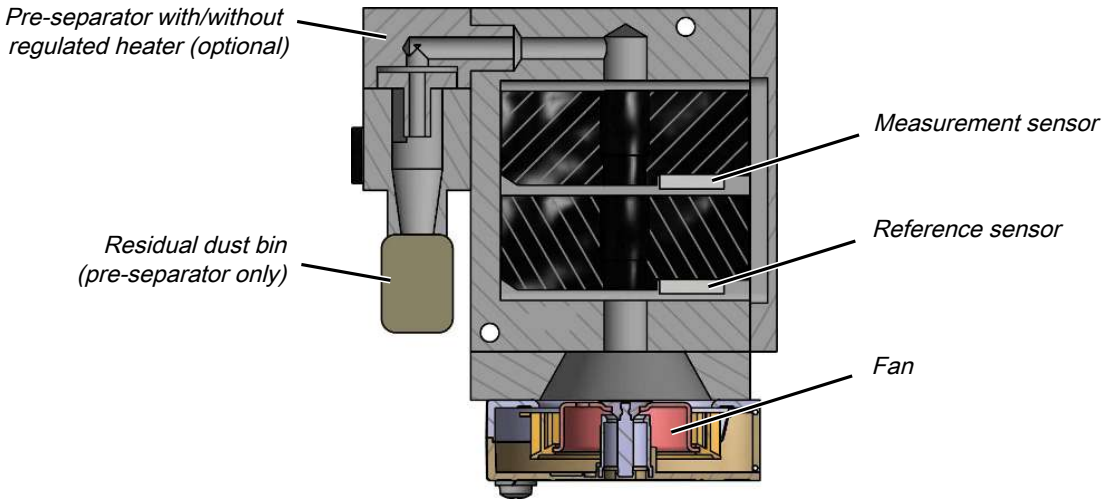
Functional principle



The BDA 15 determines the dust content based on the principle of light-scattering measurement. The incoming air is preheated to 50 °C (122 °F). A built-in fan ensures a forced flow (2 L/min). The sample gas is set to a speed which allows representative particle detection.

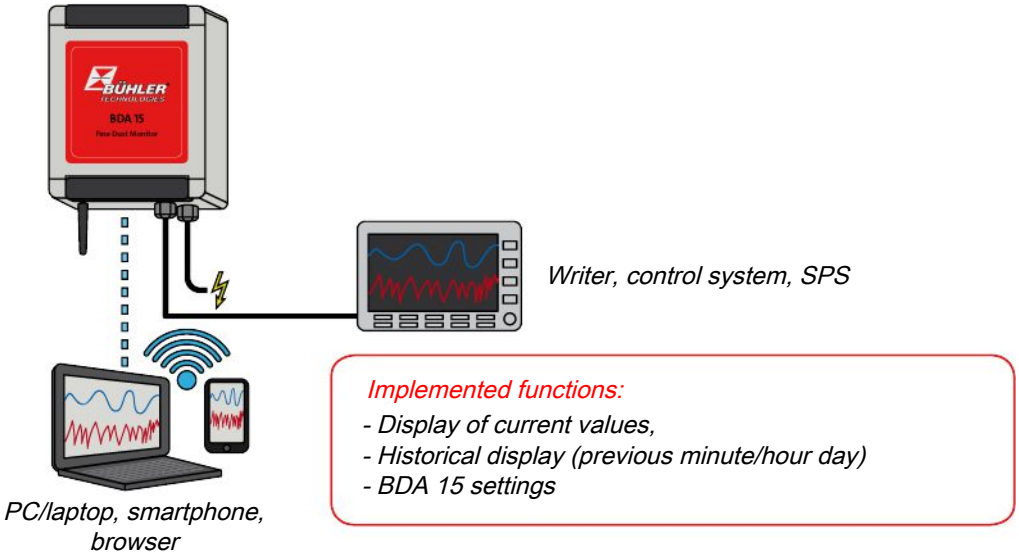
The BDA 15 periodically analyses and corrects the zero point and reference point. Analysis of the internal measurement signals ensures high zero point stability.

Layout

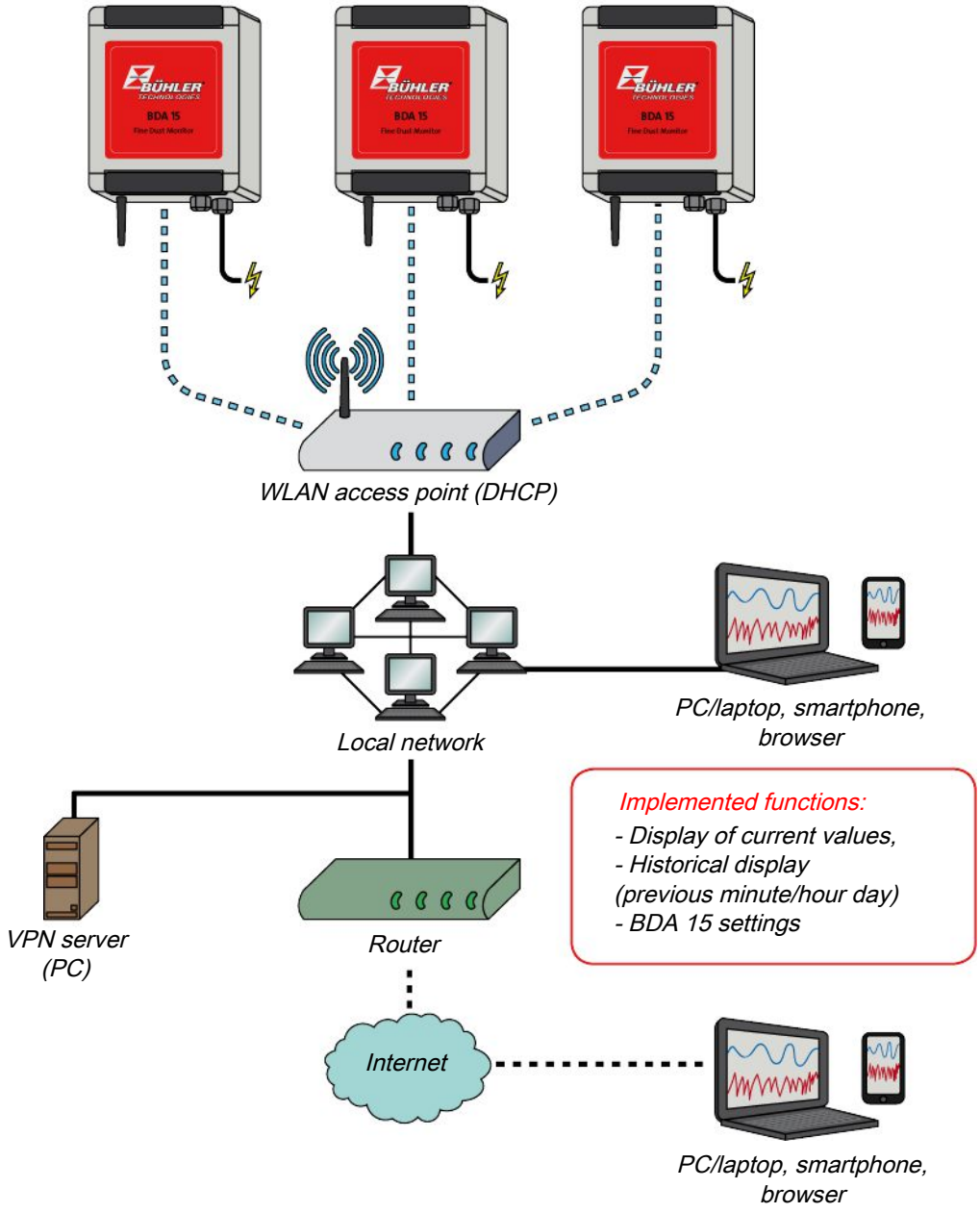


Application WLAN module (including 4-20 mA output)

a: Access Point
(Standard)



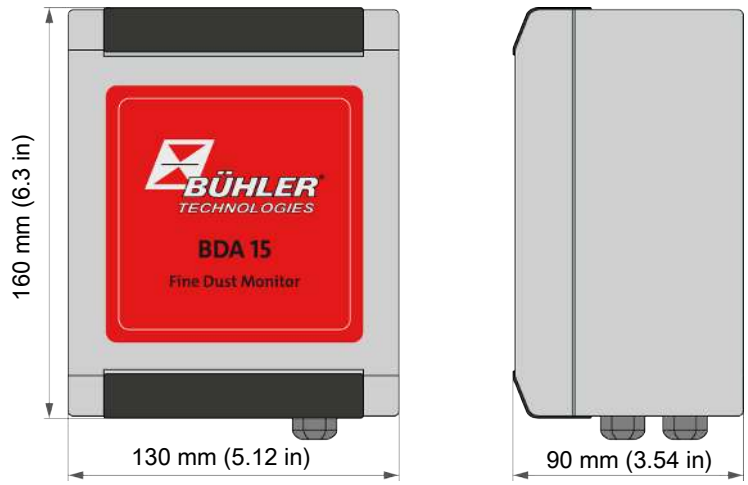
b: Station
(via setting in
access point)

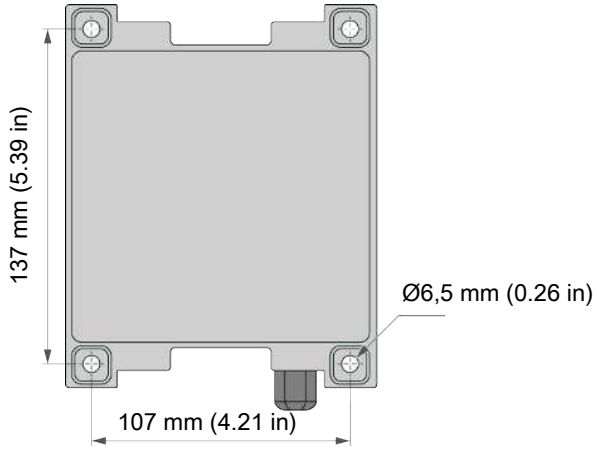


Technical Data

Technical Data	
Housing:	compact aluminium sensor housing
Dimensions:	5.12 in x 6.3 in x 3.54 in (W x H x D)
Weight:	approx. 4.4 lb
Degree of protection:	IP 33
Voltage:	100-240 V AC, 0.7 A, 50-60 Hz (optional 12 V DC, 2.1 A); prefuse min. 5 A
Ambient temperature:	-4...122 °F
Relative humidity:	0...95 %
Measuring principle:	Light-scattering measurement
Sensors:	2 x optical sensor; separate control and signal analysis
Volume flow:	2 L/min
Port:	RS485 (modbus), WLAN
Clip contacts:	max. 0.5 mm (0.02 in); Voltage supply connection: max. 2.5 mm (0.1 in)
Fan:	for forced flow
Heater:	for sample gas conditioning (maintaining the dew point difference)
Average dust contents:	up to 200 µg/m³ (with electrostatic filter 500 µg)
Detection limit:	3 µg/m³
Outlet:	4...20 mA current loop
Optional:	- Pre-separator with regulated heater (aerosols) - Electrostatic filter (for zero point control in high fine dust pollution) - Built-in pre-separator for measuring fine particles ($PM_{2.5}$)

Dimensions





Project-No.: _____

Questionnaire Filter Monitoring and Dust Measurement

BÜHLER TECHNOLOGIES

Gas Analysis

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Street		Dept.	
ZIP code, city		Phone	
Country		Email	

Person in charge

General process information

Industry
(e. g.: Metal, Chemistry, Food, Energy, etc.)

Industry sector
(e. g.: Casting, Plastics, Powdered milk , coal-fired power plant, etc.)

Process
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Filter type
(e. g.: Bag filter, Cartidge filter, Cyclone, Electrofilter, etc.)

Reason for filter monitoring
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Certificates / Approvals

Ex-Zone ☐ Yes ☐ No

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from to [m/s]

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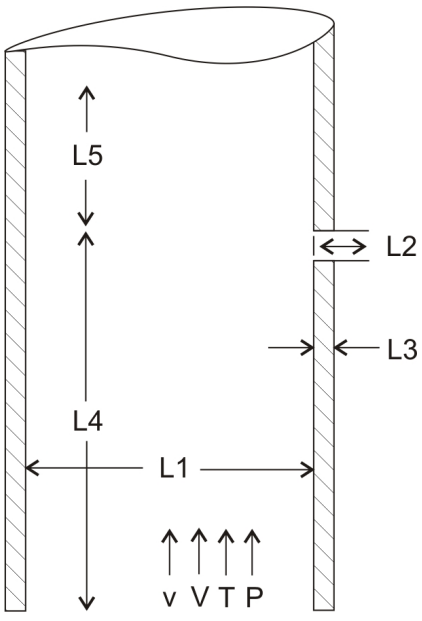
Pressure exhaust gas [P]: [mbar]

Residual dust content: [mg/Nm³]

Material of particles:

Particle size: [µm]

Relative humidity: [%]



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☐ vertical

flow direction: ↑ ↓ → ←
☐ ☐ ☐ ☐

Water drops contained? ☐ Yes ☐ No

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Which type:

Mains supply: ☐ 110-230 V ☐ 24 V DC

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analyse@buehler-technologies.com
Internet: www.buehler-technologies.com

15 Certificates

Current issue date:	14 December 2024	Original approval(s):
Expiry date:	13 December 2027	ISO 9001 - 11 December 1995
Certificate identity number:	10645169	

Certificate of Approval

This is to certify that the Management System of:

Bühler Technologies GmbH

Harkortstrasse 29, 40880 Ratingen, Germany

has been approved by LRQA to the following standards:

ISO 9001:2015

Approval number(s): ISO 9001 – 0017734

The scope of this approval is applicable to:

Design and manufacture as well as procurement of products for instrumentation, process control and for the fluid power industry.

Marta Escudero

Regional Director, Europe

Issued by: LRQA Limited

UKAS MANAGEMENT SYSTEMS 0001

1

Production Quality Assurance Notification

2 Equipment and Protective Systems intended for use in potentially explosive atmospheres
Directive 2014/34/EU
Annex IV - Module D: Conformity to type based on quality assurance of the production process
Annex VII - Module E: Conformity to type based on product quality assurance

3 Notification number: **BVS 21 ATEX ZQS/E213**

4 Product category: **Equipment and components**
equipment-group II, categories 1G, 1D, 2G, 2D:
Equipment and components for measurement and control

5 Manufacturer: **Bühler Technologies GmbH**

6 Address: **Harkortstr. 29, 40880 Ratingen, Germany**

Site(s) of manufacture: **Harkortstr. 29, 40880 Ratingen, Germany**

7 The certification body of DEKRA Testing and Certification GmbH, Notified Body No 0158 in accordance with Article 17 of the Council Directive 2014/34/EU of 26 February 2014 notifies that the manufacturer has a production quality system, which complies with Annex IV of the Directive.
This quality system in compliance with Annex IV of the Directive also meets the requirements of Annex VII.
In the updated annex all products covered by this notification and their type examination certificate numbers are listed.

8 This notification is based on audit report ZQS/E213/21 issued 2021-09-09.
Results of periodical re-assessments of the quality system are a part of this notification.

9 This notification is valid from 2021-07-22 until 2024-07-22 and can be withdrawn if the manufacturer does not satisfy the production quality assurance surveillance according to Annex IV and VII.

10 According to Article 16 (3) of the Directive 2014/34/EU the CE marking shall be followed by the identification number 0158 of DEKRA Testing and Certification GmbH as notified body involved in the production control phase.

DEKRA Testing and Certification GmbH
Bochum, 2021-09-09

Managing Director

This is a translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

DEKRA Testing and Certification GmbH, Handwerkstr. 15, 70565 Stuttgart, Germany
Certification body: Dinnendahlstr. 9, 44809 Bochum, Germany
Phone +49.234.3696-400, Fax +49.234.3696-401, e-mail DTC-Certification-body@dekra.com