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

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

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.

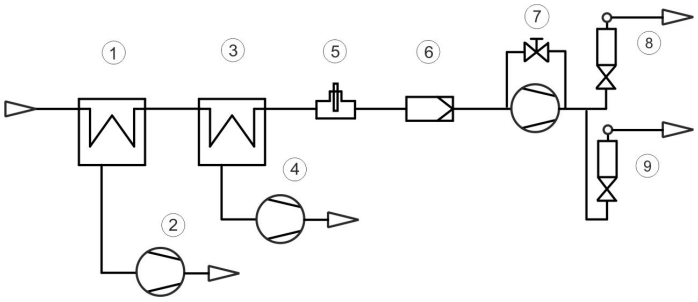
A heated line can be connected directly. An unregulated or regulated sample gas line can be connected. The PCS.smart will also control the temperature. The Smartline is specially coordinated and as a heated line with panel filter can simultaneously also be used as a portable probe. We offer a variety 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

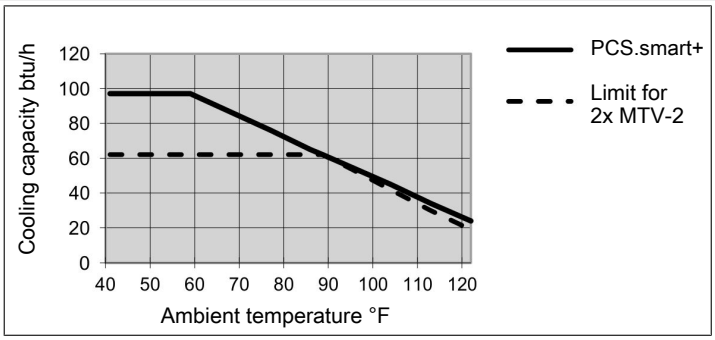
Technical Data Sample Gas Pump P1	
Inlet:	7 ... 19 psi abs.
Outlet:	Back-pressure max. 15 psi rel.
Nominal output:	4.7 lpm (at p = 15 psi abs.)

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