BÜHLER TECHNOLOGIES

Gas Analysis

Oxygen Flue Gas Analyzer

BA 2000

Installation and Operation Instructions

Original instructions

BE550012
11/2018

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Read this instruction carefully prior to installation and/or use. Pay attention particularly to all advises and safety instructions to prevent injuries. Bühler Technologies can not be held responsible for misusing the product or unreliable function due to unauthorised modifications.

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Contents

1 Introduction

1.1 Intended Use

The oxygen flue gas analyzer BA 2000 is intended for 'quasi in situ' measurement of the oxygen concentration in combustion processes. The ZrO_2 sensor is installed inside a self-regulating probe which is heated to approx. 180 °C (356 °F) to prevent condensation. The injector built into the filter housing continuously supplies the ZrO_2 sensor with fresh process gas through a quick and easy to replace filter element and then returns it to the process. The potentiometric ZrO_2 sensor in the BA 2000 provides accurate, extremely fast measurements. No reference gas needed for operation.

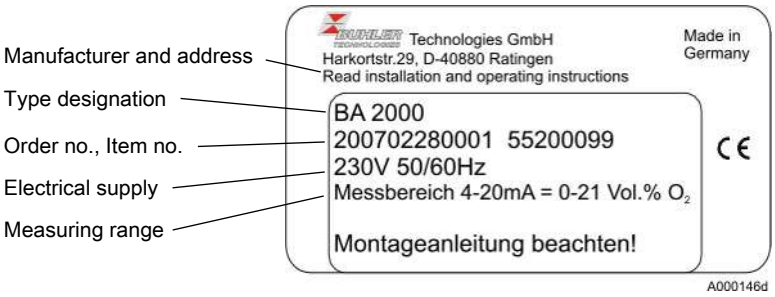
In addition to the BA 2000 base version we also offer the special versions BA 2000-MF (separate sample gas recovery) and BA 2000-SE (separated electronics up to approx. 15 m).

Please note the drawing in the appendix and check whether the technical data specified match the application parameters before installing the analyzer. Further verify all contents are complete.

Please note the specific values of the analyzer when connecting, and the correct versions when ordering spare parts.

1.2 Type Plate

Example:



1.3 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

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

1.4 Scope of delivery

– 1x oxygen flue gas analyzer
– 1x flange seal and screws
– 1x product documentation

The analyzer may come with different factory installed accessories depending on the order:

– outlet filter (required for operation!)
– sampling tube or inlet filter
– sampling tube/inlet filter extension
– adapter flange
– pump (if instrument air not available)
– digital display

This accessory, as well as separate accessories included, are listed as separate line items in the order.

2 Safety instructions

2.1 Important notices

Please particularly note the following analyser instructions:

– Always transport the equipment diligently and carefully. Strong impact and shock may damage the measuring cells in the analyser or shorten their life!

– Avoid condensation inside the equipment, as the measurement system could be damaged and become defective. If the sample gas contains condensable components, the analyser must have suitable upstream sample gas conditioning. Our customer service will gladly help you select a system.

Signal words for warnings

DANGER	Signal word for an imminent danger with high risk, resulting in severe injuries or death if not avoided.
WARNING	Signal word for a hazardous situation with medium risk, possibly resulting in severe injuries or death if not avoided.
CAUTION	Signal word for a hazardous situation with low risk, resulting in damaged to the device or the property or minor or medium injuries if not avoided.
NOTICE	Signal word for important information to the product.

Warning signs

In this manual, the following warning signs are used:


Warning against hazardous situations


Warning against electrical voltage


Warning against respiration of toxic gases


Warning against acid and corrosive substances


Warning against potentially explosive atmospheres


Warning against hot surface


General notice


Disconnect from mains


Wear respirator


Wear eye/face protection


Wear protection gloves

2.2 General hazard warnings

The equipment must be installed by a professional familiar with the safety requirements and risks.

Be sure to observe the safety regulations and generally applicable rules of technology relevant for the installation site. Prevent malfunctions and avoid personal injuries and property damage.

The operator of the system must ensure:

– Safety notices and operating instructions are available and observed,

– The respective national accident prevention regulations are observed,

– The permissible data and operational conditions are maintained,

– Safety guards are used and mandatory maintenance is performed,

– Legal regulations are observed during disposal.

Maintenance, Repair

Please note during maintenance and repairs:

- Repairs to the unit must be performed by Bühler authorised personnel.
- Only perform conversion-, maintenance or installation work described in these operating and installation instructions.
- Always use genuine spare parts.

Always observe the applicable safety and operating regulations in the respective country of use when performing any type of maintenance.

DANGER **Electric voltage**

Risk of electric shock

a) Disconnect all poles of the unit from the mains for any maintenance on electric components.

b) Secure the equipment from accidental restarting.

c) The unit may only be opened by trained, competent personnel.

d) Ensure the correct voltages supply.

DANGER **Toxic, corrosive gases**

The measuring gas led through the equipment can be hazardous when breathing or touching it.

a) Check tightness of the measuring system before putting it into operation.

b) Take care that harmful gases are exhausted to a save place.

c) Before maintenance turn off the gas supply and make sure that it cannot be turned on unintentionally.

d) Protect yourself during maintenance against toxic / corrosive gases. Use suitable protective equipment.

DANGER **Potentially explosive atmosphere**

Explosion hazard if used in hazardous areas.
The device is not suitable for operation in hazardous areas with potentially explosive atmospheres.
Do not expose the device to combustible or explosive gas mixtures.

3 Transport and storage

Transport

This device is sensitive to shock and vibration. Therefore, where possible, transport in the original packaging or large, sturdy packaging with at least 3 layers of cardboard, plastic or aluminium sheet. Line the inside of the packaging with padding at least 10 cm thick on all sides.

The device should be marked fragile for shipping.

Storage

During extended periods of non-use, protect the analyzer against moisture and heat.

The analyzer must be stored in a covered, dry location free from vibration and dust, at a temperature between –20 °C and +60 °C (-4 °F to 140 °F).

4 Installation and connection

4.1 Installation

The analyzer is intended for flange mounting. The installation location and position are determined by the specific application factors. If necessary, the connection piece should be slightly tilted toward the centre of the channel. The installation site should be protected from the weather.

In addition, adequate and safe access for installation and future maintenance work should be provided. Particularly note the uninstalled size of the sampling tube!

The outlet filter, inlet filter (optional) and the sampling tube (optional) are included in the package and must be installed prior to use.

NOTICE

The outlet filter and the O-ring for the handle must be inserted prior to first startup.
Operating without outlet filter prohibited!

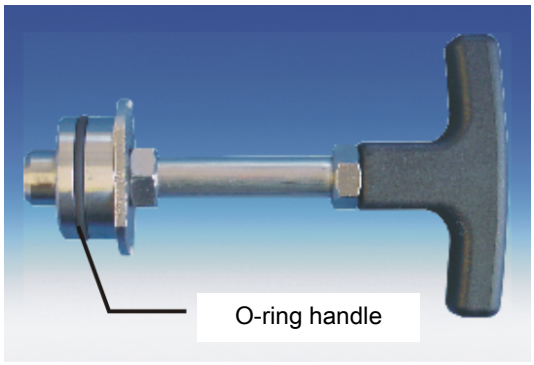


Fig. 1: O-ring handle

The sampling tube or the inlet filter (if necessary with matching extension) must be screwed in. Then attach the analyzer to the mating flange using the included seals and screws.

The exposed flange areas and, if applicable, the connection piece must be completely insulated following assembly to prevent any thermal bridges. The insulating material must meet the application requirements and be weatherproof.

NOTICE

If the heat dissipation is very high near the analyzer due to the application, the customer must install an appropriate shield to protect the probe, sensor and electronics.

4.2 Connecting the gas lines

4.2.1 Connecting instrument air for the injector

A pipe fitting is located under the weather hood to connect a ø6 mm tube for instrument air.

Please be sure to use filtered air with a minimum rating of **PNEUROP/ISO Class 4**.

Class	Particle/m³ Particle size: (1 to 5) µm	Pressure dew point [°C]	Residual oil content [mg/m³]
4	up to 1000 (no particles ≥ 15 µm)	≤ 3	≤ 5

4.2.2 Required instrument air pressure

The response time of the analyzer varies by the pressure of the instrument air used for the injector. The attached data sheet contains diagrams which show the t_{90} times based on the volume flow and instrument air pressure.

As seen in the diagrams, as the instrument air pressure rises (or the volume flow increases, respectively) the response time t_{90} of the analyzer becomes faster.

However, there are some drawbacks to a fast response time:

– increased wear on the ZrO_2 sensor (sample gas is taken in via the sensor)

– rising operating cost due to high usage of compressed air

– risk of sample gas taken in and recovered sample gas/instrument air mixture mixing

We therefore recommend a pressure setting of max. 0.5 bar (7.25 psi) for instrument air (measured with injector running).

4.2.3 Operating the injector with a pump

When operating the injector with a pump instead of instrument air, the air taken in by the pump must meet the same requirements as instrument air.

We again recommend a pressure setting of max. 0.5 bar (7.25 psi) on the pressure end of the pump (measured with injector running).

4.2.4 Connecting test gas

At the side, next to the flange, is a pipe fitting with a sealing cap for connecting a Ø6 mm or ¼" tube for the test gas. The test gas connection must be sealed airtight during operation. This can either be achieved by using the sealing cap or - with a fixed test gas line connected - an airtight shut-off valve.

WARNING **Gas emanation**

Sample gas can be harmful to the health!
Check the lines for leaks.

4.2.5 Installing a separate sample gas recovery

The special version BA 2000-MF is ready for separate sample gas recovery. The sample gas recovery connects to a Ø12 mm or ½" tube under the weather hood, depending on the version. Ensure that both the pressure and the flow rate at both the sampling site and return are identical.

4.3 Electrical connections

CAUTION **Incorrect mains voltage**

An incorrect mains voltage can destroy the unit.
When connecting the unit, ensure the mains voltage matches that specified in the type plate.
The connection must be made by a trained professional.

WARNING **Electric voltage**

Insulation test will damage the device
Do not test the electric strength if the entire unit is under high voltage!

This analyzer is equipped with extensive EMC protection. Testing the electric strength will damage electronic filter components. The necessary tests of all assemblies requiring testing were carried out at the factory (test voltage 1 kV or 1.5 kV depending on component).

4.3.1 Probe

The probe contains self-regulating heating elements. It comes with two cubic plugs per EN 175301-803. One plug is for the power supply, the other is the alarm output. The power supply is already connected to the electronics. Connect the alarm output per the terminal diagram (see appendix). The plugs are configured so they cannot be reversed. For safety reasons this configuration must not be modified.

4.3.2 ZrO2 sensor

The sensor comes with a 5-pin M12 connector and is already connected to the electronics.

4.3.3 Power supply and outputs

Inside the electronics housing is a terminal block for connecting the mains supply, the alarm output, and the mA signal. The connection to the included terminal blocks is shown in the connection diagram in the appendix. The plugs can be removed from their sockets for this purpose and reinserted after wiring. The pin assignment is also printed onto the board.

5 Initial operation

5.1 Calibration

The ZrO_2 sensor must be running for at least 1 hour before calibrating.

5.1.1 Introduction to calibration

Changes to external factors such as the ambient temperature and atmospheric pressure as well as changes in the sample gas conditions such as flow fate, pressure and temperature can affect the measurement results. These changes in the measuring performance is called drift.

To compensate this drift the device must be calibrated regularly. A calibration checks the measuring performance of the device with test gas.

A 1-point calibration with instrument air is entirely sufficient for operation.

However, if desired a 2-point calibration with instrument air and an additional test gas may also be performed. The O_2 concentration of the test gas should ideally be the same as the sample gas.

When is a calibration necessary?

The device should be calibrated in the following cases:

– with every initial operation, after initialising
– regularly during operation (recommended: every 14 days)

5.1.2 1-point calibration

The injector of the analyzer must be running during calibration. The pressure of the instrument air for the injector must correspond with the conditions of subsequent measurements.

– Use instrument air per **PNEUROP/ISO Class 4** with a primary pressure of approx. 0.1 bar (1.45 psi) as the test gas.
– Wait at least 5 min until the end value is stable.
– In the menu, open Calibration Point 1 (**CAL1**).
– Press ↵ to confirm the value of 20.9 Vol.% O_2.
– Press **E** to close the menu. The display shows a concentration of 20.9 (Vol.% O_2). **Note Disabling 2-point calibration**: If a 2-point calibration was performed, the measurement calibration also applies to the 2nd calibration point. In this case, an "indirect" 2-point calibration must be performed. To do so, under menu item **CAL2** set the O_2 value to 0.0% and confirm. The standard parameters will be loaded, 2-point calibration is disabled.

5.1.3 2-point calibration

In addition to the steps required for 1-point calibration, this calibration uses an additional test gas with an O_2 concentration which ideally corresponds with the sample gas which will later be used.

– 1-point calibration with instrument air
– Use test gas at the known O_2 concentration with a primary pressure of approx. 0.1 bar (1.45 psi).
– Wait at least 5 min until the end value is stable. The value displayed should be about the same as the O_2 concentration of the test gas.
– Open "Calibration Point 2" (**CAL2**) from the menu.
– Set the concentration of the test gas and press ↵ to confirm. **Note**: When setting this to 0.0 Vol.% O_2, the default parameters will be used, which corresponds to 1-point calibration.
– Press **E** to close the menu. The display will show the concentration of the test gas.

6 Operation and Control

NOTICE

The device must not be operated beyond its specifications.

6.1 ZrO2 sensor function

CAUTION

Hot surface

Risk of burns
With the sensor installed, the sensor tube can be up to 650 °C (1202 °F).

The sensor electronics regulate the sensor heater to 650 °C (1202 °F). The mV sensor signal is processed by the electronics and output as a linear 4 20 mA signal (0 ... 21 Vol.% O_2 corresponds to 4 ... 20 mA).

Whilst heating up (approx. 1 h), the display alternates between “init” and the temperature of the sensor heater. Once the operating temperature is reached, the temperature display switches to oxygen display and alternates with “init”. Until the operating temperature is reached, the output signal will indicate 0 mA. Once the operating temperature is reached, the current mA value will be output. After heating up, the oxygen concentration will be continuously displayed.

The temperature is displayed to monitor the sensor temperature and appears when the temperature deviates by ± 1.5 K.

An alarm will be output when over- or underrunning the fixed set value for heating the sensor or the programmable setting of the O_2 concentration.

Status	Display	mA signal output
Heat-up phase, operating temperature not yet reached	Temperature alternating with “init”	0 mA
Heating up, operating temperature reached	O_2 concentration alternating with “init”	Current mA value
Heat-up complete, temperature within target range	Oxygen concentration	Current mA value
Heat-up complete, temperature outside the target range	Temperature flashing	0 mA
Heat-up complete, O_2 concentration outside the target range	O_2 concentration flashing	Current mA value

6.2 Using the controller

6.2.1 Use of menu functions

Overview of the operational principal:

Use this short description if you have experience with the device.

Operation is carried out by only the keys with the following functions:

Key	Function
↵	– Switch from measurement display to main menu – Selection of the display menu item – Accepting the changed value or selection
↑	– Switch to the upper menu item – Increase of the value of switching the selection – Temporary display of the alternative measurement display (if option is installed)
↓	– Switch to lower menu item – Decrease of the value of switching the selection – Temporary display of the alternative measurement display (if option is installed)

6.2.2 Detailed description of the operational principle

The detailed description will guide you through the menu step by step.

Connect the unit to the power supply and wait for the startup procedure to complete. At first the software version implemented on the unit will be displayed for a brief period. The unit will then switch directly into measured value display.

↵ Pressing the button will take you from display mode to the main menu. (The control will continue running whilst in menu mode.)

↑↓ Use these buttons to navigate the main menu.

↵ After confirming a main menu item the associated submenu will open

Here you can configure operating parameters:

↑↓ Cycle through the submenu to configure the parameters,

↵ then confirm the menu item to be changed.

↑↓ You can now set values within specific limits.

↵ After confirming the value the system will save it. This will automatically return you to the submenu.

If no button is pushed for approx. 5 s, the unit will automatically return to the submenu. Changes to values will not be saved.

The same applies to the sub- and main menu. The system will automatically return to display mode without saving the (last) value changed. Parameters which were previously changed and saved will be retained and not reset.
NOTICE! After saving values with the Enter key they will be applied to the control.

E To exit the main or submenu, select menu item E (Exit).

6.2.3 Menu navigation overview

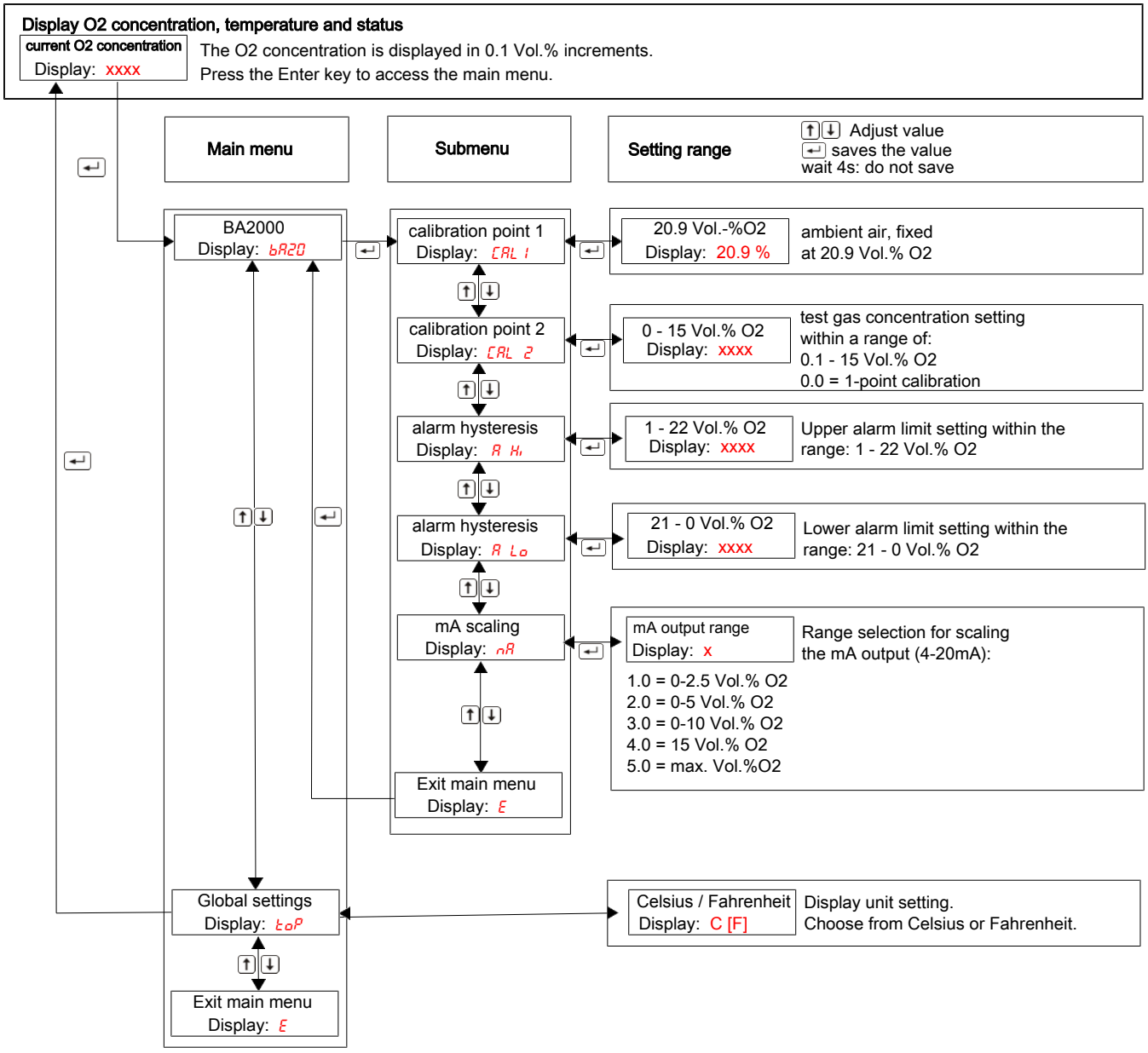


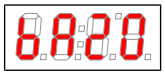
Fig. 2: Menu navigation BA 2000

6.2.4 Description of menu functions

6.2.4.1 Main menu

Analyzer BA 2000 (bA20)

Analyzer:



From here you can access all relevant analyzer settings. The related submenu allows you to select the calibration points and the alarm thresholds.

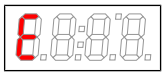
Global setting (ToP Settings)

Top Settings:

Global temperature unit setting. Choose from degrees Celsius (C) or degrees Fahrenheit (F).

Note: This main menu item has no submenu item. The temperature unit will be selected directly.

Exit Main Menu

Exit: 	Selecting this will return you to display mode.
Note:	When switching from the main menu to the display range, the sensor temperature will temporarily be displayed.

6.2.4.2 Analyzer submenu (display: bA20)

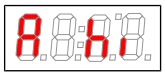
BA 2000 → calibration point 1 (CAL1)

Temperature: 	This value is fixed at 20.9 Vol.% O_2.
Note:	This value will be used for calibration.

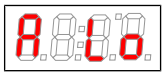
BA 2000 → calibration point 2 (CAL2)

Temperature: 	This setting defines the value of the test gas concentration. This value can be set within a range of 0.1 – 15 Vol.% O_2. A display 0.0 Vol.% O_2 corresponds to 1-point calibration.
Note:	The default value on delivery is 0.0%, i.e. the unit was not factory calibrated with CAL2, as calibration with CAL1 is entirely sufficient.

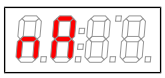
BA 2000 → upper alarm limit (Alarm high)

Alarm high: 	Here you can set the upper threshold for the visual signal and the alarm relay. The range for the alarm threshold setting is 1 – 22 Vol.% O_2.
Note:	The default value on delivery is 22 (unless otherwise agreed).

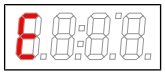
BA 2000 → lower alarm limit (Alarm low)

Alarm Low: 	Here you can set the lower threshold for the visual signal and the alarm relay. The range for the alarm threshold is 21 – 0 Vol.% O_2.
Note:	The default value on delivery is 0 (unless otherwise agreed).

mA scaling → select range (nA)

mA scaling: 	Oxygen concentration range setting, scaled to an output range of 4 to 20 mA. 1.0 = 0 – 2.5 Vol.% O_2 2.0 = 0 – 5 Vol.% O_2 3.0 = 0 – 10 Vol.% O_2 4.0 = 0 – 15 Vol.% O_2 5.0 = 0 – max. Vol.% O_2
Note:	The default value on delivery is 5.0 (unless otherwise agreed).

Exit Submenu

Exit: 	Selecting this will return you to the main menu.

7 Maintenance and repair

7.1 General warnings

- Never operate the analyzer outside the specifications.
- Observe the safety notices prior to initial operation.
- Repairs to the device must be performed by Bühler authorised personnel.
- Only perform conversion-, maintenance or installation work described in these operating and installation instructions.
- Always use genuine spare parts.
- Observe the respective safety regulations and operating specifications when performing any type of maintenance.

DANGER **Electrical voltage**

Electrocution hazard.

a) Disconnect the device from power supply.

b) Make sure that the equipment cannot be reconnected to mains unintentionally.

c) The device must be opened by trained staff only.

d) Regard correct mains voltage.

DANGER **Toxic, acidic gasses**

Sample gas can be harmful.

a) The probe must not be pressurised or energised when opened.

b) If necessary, ensure safe gas discharge

c) Protect yourself from toxic / corrosive gasses when performing maintenance, particularly when changing the filter. Wear suitable protective equipment.

d) Purge the gas line with air prior to performing maintenance.

CAUTION **Hot surface**

Risk of burns
Depending on the operating parameters, the housing temperature may reach over 100 °C during operation.
Allow the unit to cool down before performing maintenance.

CAUTION **Excess pressure**

The unit mustn't be pressurised or energised when opened.
If necessary, close the gas supply and ensure a safe pressure on the process end before opening.

7.2 Replacing the microfuse

- Disconnect the unit from the mains.
- Open the cover of the electronics housing and remove the lower section of the front panel. The fuse is located on the main board
- Remove the insulator cap from the fuse holder.
- Replace the fuse and reinstall the insulator cap. Please note the mains voltage in order to select the correct fuse.
- Install the front panel, close the cover and reconnect to power.

7.3 Maintaining the filter element

The analyzer features a particle filter which needs to be changed as it becomes dirty. When doing so, if necessary disconnect the power and switch off the process.

7.3.1 Outlet filter

- Unlock and raise the weather hood.
- Turn the handle at the back end of the probe by 90° (handle must then be horizontal), pushing in slightly, and remove.
- Remove the dirty filter element and check the sealing surfaces.
- Before installing the new filter element, replace the seal on the handle plug (seal included with the filter element).
- Then insert the handle with the new filter and turn 90° (handle must be vertical), pushing in slightly.
- With the filter removed, if necessary also need clean the inside of the sampling tube by blowing it out or using a cleaning wand.

Attention: Do not damage the rear filter seat.

NOTICE

The **ceramic filter elements** are very fragile. Therefore handle the elements with care, do not drop.
The **stainless steel filter elements** can be cleaned with an ultrasonic bath and reused several times; in this case always use new seals on the filter and handle plug.
The **weather hood** can only be closed if the handle is absolutely vertical. To do so, loosen the hood from the locking supports by lifting slightly, then flip down. Ensure that the hood lock clicks into place correctly.

7.3.2 Inlet filter

The analyzer can further be equipped with an inlet filter, which is always inside the process stream.

Process conditions may cause the filter to clog over time. In this case the inlet filter will need to be replaced.

To do so, the analyzer must be completely removed and reinstalled according to chapter 6 after changing the element.

8 Service and repair

This chapter contains information on troubleshooting and correction should an error occur during operation.

Repairs to the unit must be performed by Bühler authorised personnel.

Please contact our Service Department with any questions:

Tel.: +49-(0)2102-498955 or your agent

If the equipment is not functioning properly after correcting any malfunctions and switching on the power, it must be inspected by the manufacturer. Please send the equipment inside suitable packaging to:

Bühler Technologies GmbH

- Reparatur/Service -

Harkortstraße 29

40880 Ratingen

Germany

Please also attach the completed and signed RMA decontamination statement to the packaging. We will otherwise be unable to process your repair order.

You will find the form in the appendix of these instructions, or simply request it by e-mail:

service@buehler-technologies.com.

8.1 Troubleshooting

Problem/malfunction	Possible cause	Action
LED doesn't light up/ No controller display	No electric supply	Check mains connection
	Fuse missing	Check fuse and replace if necessary
	Controller failure	Send in unit
Sensor not heating	Temperature controller failure	Send in unit
	Heater failure	Send in unit
Probe temperature alarm	Heat-up not yet completed	Wait for heat-up to complete
	Heater failure	Send in unit
	No/incorrect power supply	Check the power supply
No heat output at probe	Heater failure	Send in unit
No mA signal from sensor	Heat-up not yet completed	Wait for heat-up to complete
	Heater failure	Send in unit
Condensation forming	Thermal bridges at the sampling point	Insulate to eliminate thermal bridges
No sample gas flowing	Gas line leak	Test tightness
	Gas line clogged	Check gas line
	Filter element clogged	Clean or replace filter element, clean sampling tube
Controller display shows Error 13 	If Temp. target value is not reached after 1 h => heater failure => heater automatically switches off.	Send in unit
Controller display shows Error 06 	Actual temperature was below 300 °C for > 5 min => heater failure => heater automatically switches off.	Send in unit

8.2 List of spare parts and consumables:

Please also specify the model and serial number when ordering parts.

Upgrade and expansion parts can be found in our catalog.

Available spare parts:

Spare part	Item no.
Microfuse 115 V/230 V, 800 mA	91 10 00 0001
Flange seal DN65PN6	55 200 09 90 14
Sampling tube flange seal	90 090 68
O-ring kit for filter element and probe, material: Viton	46 222 01 2
ZrO_2 sensor complete with seals	55 299 99 9
M12 connection cable for sensor	55 200 09 90 17
Ceramic filter element incl. Viton O-rings, filter fineness 3 µm	46 222 02 6
Sintered stainless steel filter element incl. Viton O-rings, filter fineness 5 µm	46 222 01 0

9 Disposal

The applicable national laws must be observed when disposing of the products. Disposal must not result in a danger to health and environment.

The crossed out wheelie bin symbol on Bühler Technologies GmbH electrical and electronic products indicates special disposal notices within the European Union (EU).

The crossed out wheelie bin symbol indicates the electric and electronic products bearing the symbol must be disposed of separate from household waste. They must be properly disposed of as waste electrical and electronic equipment.

Bühler Technologies GmbH will gladly dispose of your device bearing this mark. Please send your device to the address below for this purpose.

We are obligated by law to protect our employees from hazards posed by contaminated devices. Therefore please understand that we can only dispose of your waste equipment if the device is free from any aggressive, corrosive or other operating fluids dangerous to health or environment. **Please complete the "RMA Form and Decontamination Statement", available on our website, for every waste electrical and electronic equipment. The form must be applied to the packaging so it is visible from the outside.**

Please return waste electrical and electronic equipment to the following address:

Bühler Technologies GmbH
WEEE
Harkortstr. 29
40880 Ratingen
Germany

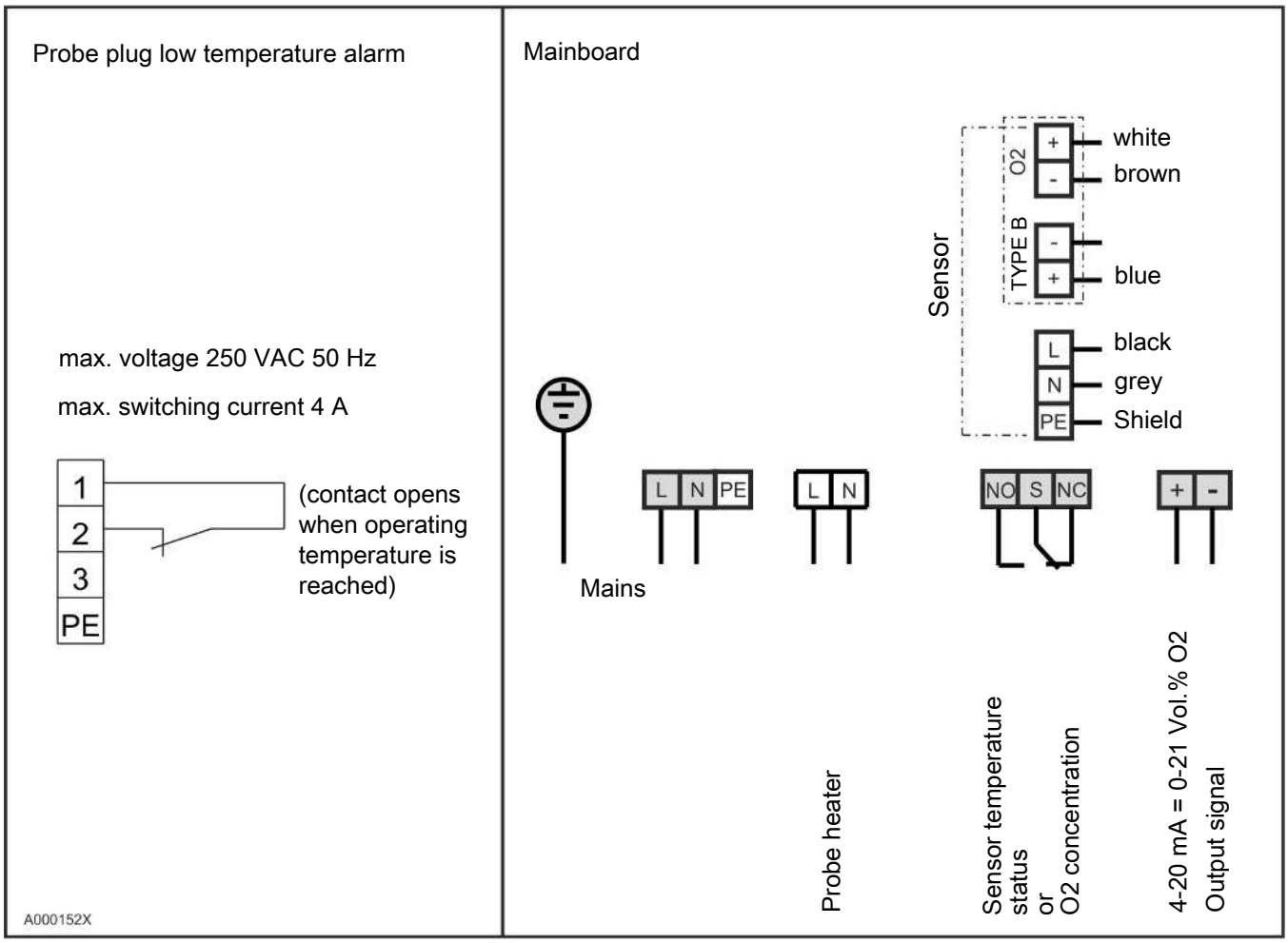
Please also observe data protection regulations and remember you are personally responsible for the returned waste equipment not bearing any personal data. Therefore please be sure to delete your personal data before returning your waste equipment.

10 Appendix

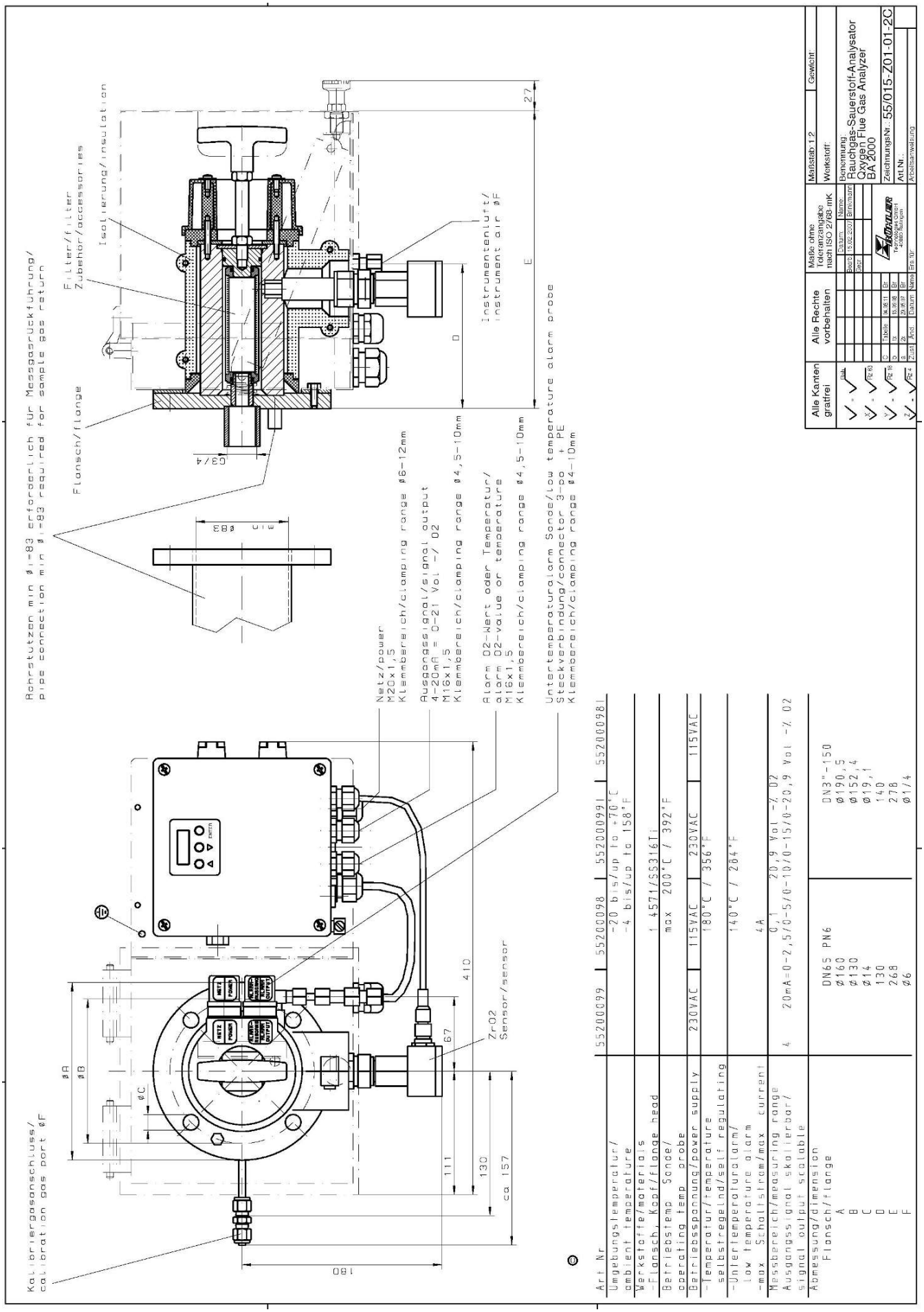
10.1 Technical Data

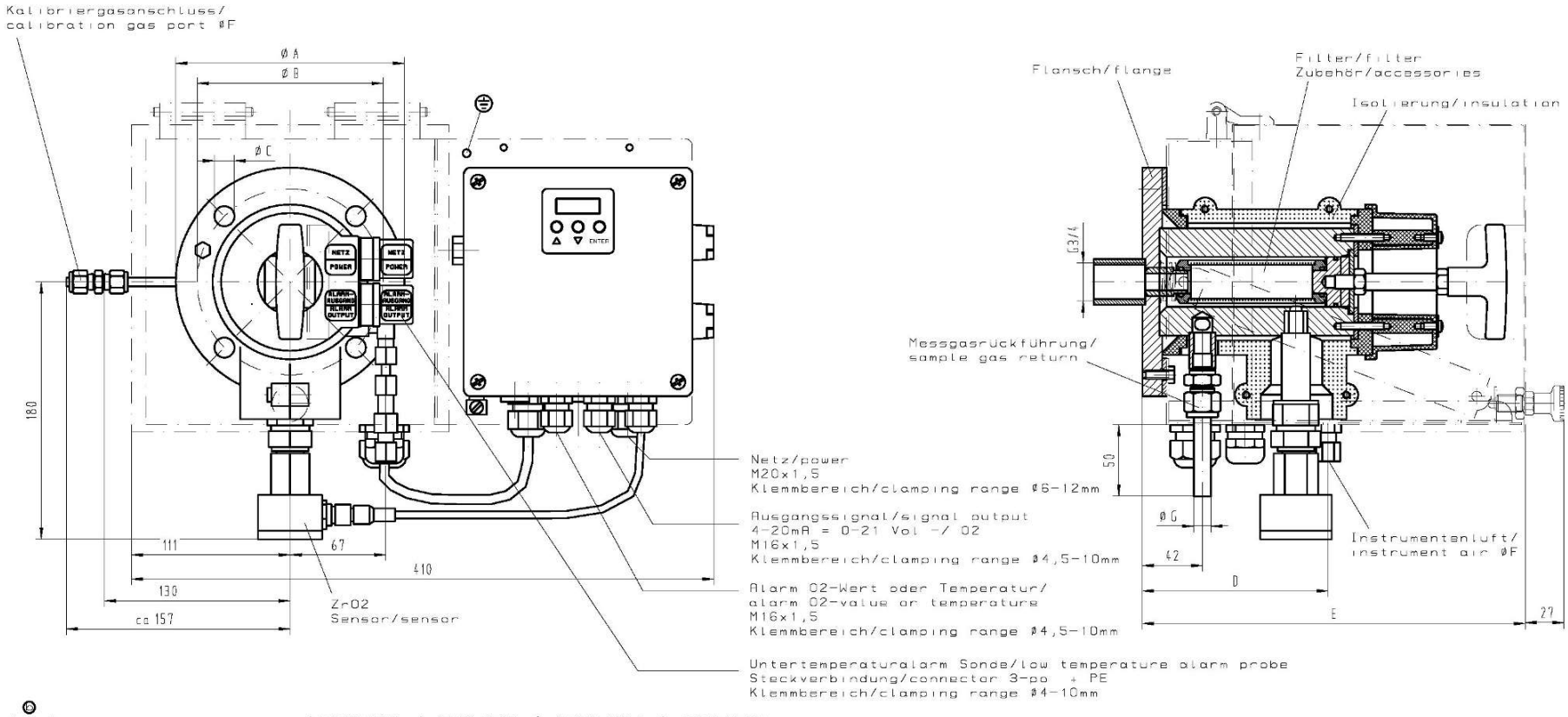
BA 2000 Technical Data	
Sampling tube length:	0.5 ... 2 m
Voltage:	115 or 230 V, 50/60 Hz
Probe heat output:	400 W
Measuring range:	0.1 to 21 Vol.-% O_2
Output signal:	4-20 mA = 0-21 Vol.-% O_2 (scalable 0-2.5/0-5/0-10/0-15)
Accuracy:	relative error < 5 %
Sensor T_{90} time:	< 15 sec
Alarm Sensor:	Upper 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
Process temperature:	up to 1600 °C, depending on sampling tube
Probe operating temperature:	max. 200 °C
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

10.2 Connection Diagram



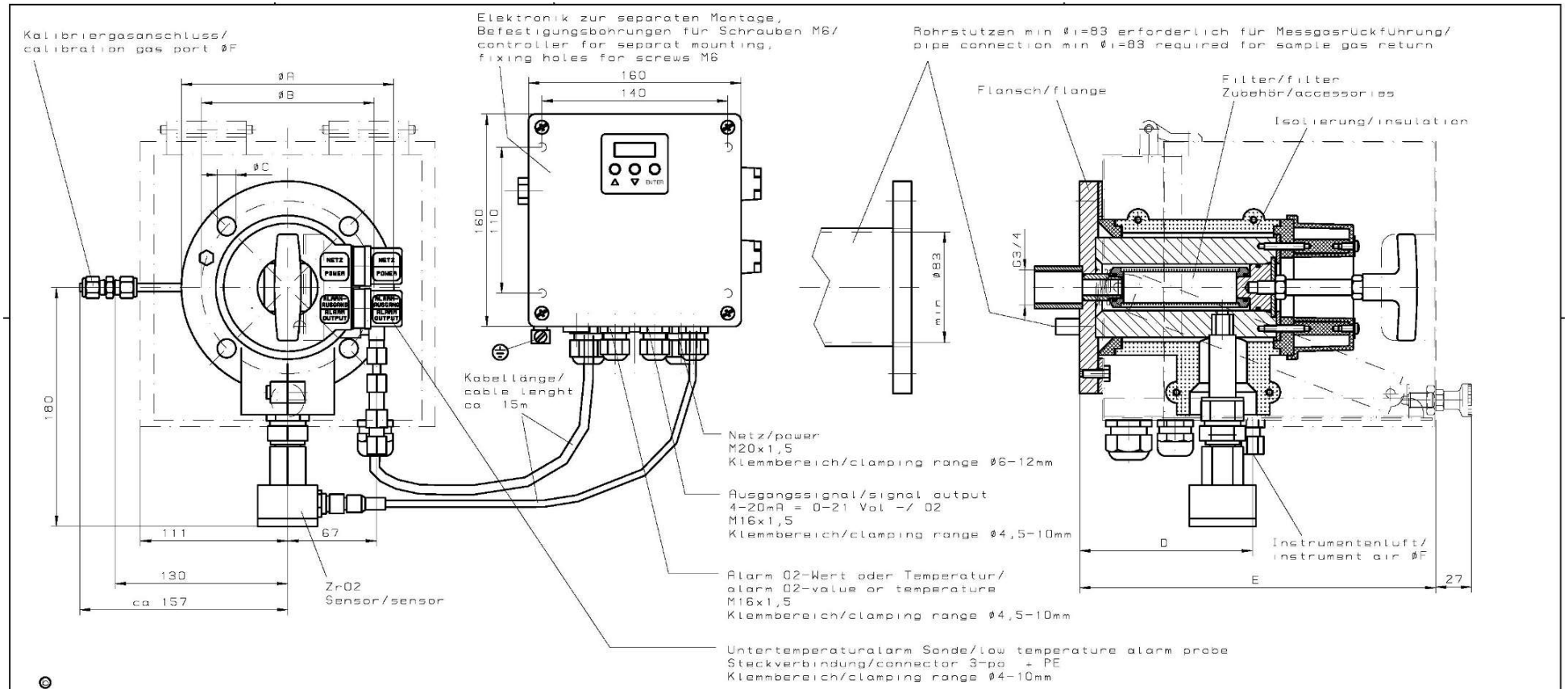
10.3 Drawings





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:
						Datum:	Name:	Werkstoff:	
Rdn.					Bearb.	15.09.2008	Brinkmann	Benennung: Rauchgas-Sauerstoff-Analysator Qxygen Flue Gas Analyzer BA 2000-MF	
RZ 63					Gepr.				
RZ 16					BÜHLER Technologies GmbH 40550 Ratingen			ZeichnungsNr.: 55/015-Z09-01-2B	
RZ 4	b	Tabelle	05.02.11	Br				Art.Nr.:	
	a	2x	26.11.08	Br					
	Zust.	Änd.	Datum	Name	Ers. für:			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	

Alle Kanten gratfrei	Alle Rechte vorbehalten				Maße ohne Toleranzangabe nach ISO 2768-mK			Maßstab: 1:2	Gewicht:
						Datum	Name	Werkstoff:	
Rdh.					Bearb.	04.05.2009	Brinkmann	Benennung: Rauchgas-Sauerstoff-Analysator Qxygen Flue Gas Analyzer BA 2000-SE	
Rz 63					Gepr.				
Rz 16					BÜHLER Technologies GmbH 40880 Ratingen			ZeichnungsNr.: 55/015-Z11-01-2B	
Rz 4	Ib	Tabelle	08.08.11	Br				Art.Nr.:	
	Ia	2x	11.10.10	Br					
	Zust.	Änd.	Datum	Name	Ers. für:			Arbeitsanweisung:	

11 Attached documents

– Declaration of Conformity KX550010
– RMA - Decontamination Statement

EU-Konformitätserklärung
EU-declaration of conformity

Hiermit erklärt Bühler Technologies GmbH, dass die nachfolgenden Produkte den wesentlichen Anforderungen der Richtlinie

Herewith declares Bühler Technologies GmbH that the following products correspond to the essential requirements of Directive

2014/35/EU
(Niederspannungsrichtlinie / *low voltage directive*)

in ihrer aktuellen Fassung entsprechen.

in its actual version.

Folgende Richtlinie wurde berücksichtigt:

The following directive was regarded:

2014/30/EU (EMV/EMC)

Produkt / products: Rauchgas Sauerstoffanalysator / Oxygen flue gas analyser
Typ / type: BA 2000

Das Betriebsmittel dient zur Messung der Sauerstoffkonzentration in Verbrennungsprozessen.
The equipment is designed for measuring oxygen concentration in combustion processes.

Das oben beschriebene Produkt der Erklärung erfüllt die einschlägigen Harmonisierungsrechtsvorschriften der Union:
The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

EN 61010-1:2010/A1:2019/AC:2019-04

EN 61326-1:2013

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller.
This declaration of conformity is issued under the sole responsibility of the manufacturer.

Dokumentationsverantwortlicher für diese Konformitätserklärung ist Herr Stefan Eschweiler mit Anschrift am Firmensitz.
The person authorized to compile the technical file is Mr. Stefan Eschweiler located at the company's address.

Ratingen, den 17.02.2023

Stefan Eschweiler
Geschäftsführer – *Managing Director*

Frank Pospiech
Geschäftsführer – *Managing Director*

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen,
Tel. +49 (0) 21 02 / 49 89-0, Fax. +49 (0) 21 02 / 49 89-20
Internet: www.buehler-technologies.com

UK Declaration of Conformity

The manufacturer Bühler Technologies GmbH declares, under the sole responsibility, that the product complies with the requirements of the following UK legislation:

Electrical Equipment Safety Regulations 2016

The following legislation were regarded:

Electromagnetic Compatibility Regulations 2016

Product: Oxygen flue gas analyser
Type: BA 2000

The equipment is designed for measuring oxygen concentration in combustion processes.

The object of the declaration described above is in conformity with the relevant designated standards:

EN 61010-1:2010/A1:2019/AC:2019-04

EN 61326-1:2013

Ratingen in Germany, 17.02.2023

Stefan Eschweiler
Managing Director

Frank Pospiech
Managing Director

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen,
Tel. +49 (0) 21 02 / 49 89-0, Fax. +49 (0) 21 02 / 49 89-20
Internet: www.buehler-technologies.com

RMA-Formular und Erklärung über Dekontaminierung
RMA-Form and explanation for decontamination

RMA-Nr./ RMA-No.

Die RMA-Nr. bekommen Sie von Ihrem Ansprechpartner im Vertrieb oder Service. Bei Rücksendung eines Altgeräts zur Entsorgung tragen Sie bitte in das Feld der RMA-Nr. "WEEE" ein./ You may obtain the RMA number from your sales or service representative. When returning an old appliance for disposal, please enter "WEEE" in the RMA number box.

Zu diesem Rücksendeschein gehört eine Dekontaminierungserklärung. Die gesetzlichen Vorschriften schreiben vor, dass Sie uns diese Dekontaminierungserklärung ausgefüllt und unterschrieben zurücksenden müssen. Bitte füllen Sie auch diese im Sinne der Gesundheit unserer Mitarbeiter vollständig aus./ This return form includes a decontamination statement. The law requires you to submit this completed and signed decontamination statement to us. Please complete the entire form, also in the interest of our employee health.

Firma/ Company

Firma/ Company	
Straße/ Street	
PLZ, Ort/ Zip, City	
Land/ Country	

Ansprechpartner/ Person in charge

Name/ Name	
Abt./ Dept.	
Tel./ Phone	
E-Mail	

Gerät/ Device	
Anzahl/ Quantity	
Auftragsnr./ Order No.	

Serien-Nr./ Serial No.	
Artikel-Nr./ Item No.	

Grund der Rücksendung/ Reason for return

- ☐ Kalibrierung/ Calibration
- ☐ Modifikation/ Modification
- ☐ Reklamation/ Claim
- ☐ Reparatur/ Repair
- ☐ Elektroaltgerät/ Waste Electrical & Electronic Equipment (WEEE)
- ☐ andere/ other

bitte spezifizieren/ please specify

Ist das Gerät möglicherweise kontaminiert?/ Could the equipment be contaminated?

☐ Nein, da das Gerät nicht mit gesundheitsgefährdenden Stoffen betrieben wurde./ No, because the device was not operated with hazardous substances.

☐ Nein, da das Gerät ordnungsgemäß gereinigt und dekontaminiert wurde./ No, because the device has been properly cleaned and decontaminated.

☐ Ja, kontaminiert mit:/ Yes, contaminated with:

☐ explosiv/ explosive	☐ entzündlich/ flammable	☐ brandfördernd/ oxidizing	☐ komprimierte Gase/ compressed gases	☐ ätzend/ caustic	☐ giftig, Lebensgefahr/ poisonous, risk of death	☐ gesundheitsgefährdend/ harmful to health	☐ gesundheitsschädlich/ health hazard	☐ umweltgefährdend/ environmental hazard

Bitte Sicherheitsdatenblatt beilegen!/ Please enclose safety data sheet!

Das Gerät wurde gespült mit:/ The equipment was purged with:

Diese Erklärung wurde korrekt und vollständig ausgefüllt und von einer dazu befugten Person unterschrieben. Der Versand der (dekontaminierten) Geräte und Komponenten erfolgt gemäß den gesetzlichen Bestimmungen.

This declaration has been filled out correctly and completely, and signed by an authorized person. The dispatch of the (decontaminated) devices and components takes place according to the legal regulations.

Falls die Ware nicht gereinigt, also kontaminiert bei uns eintrifft, muss die Firma Bühler sich vorbehalten, diese durch einen externen Dienstleister reinigen zu lassen und Ihnen dies in Rechnung zu stellen.

Should the goods not arrive clean, but contaminated, Bühler reserves the right, to comission an external service provider to clean the goods and invoice it to your account.

Firmenstempel/ Company Sign

Datum/ Date

rechtsverbindliche Unterschrift/ Legally binding signature

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen
Tel. +49 (0) 21 02 / 49 89-0, Fax: +49 (0) 21 02 / 49 89-20
E-Mail: service@buehler-technologies.com
Internet: www.buehler-technologies.com

Vermeiden von Veränderung und Beschädigung der einzusendenden Baugruppe

Die Analyse defekter Baugruppen ist ein wesentlicher Bestandteil der Qualitätssicherung der Firma Bühler Technologies GmbH. Um eine aussagekräftige Analyse zu gewährleisten muss die Ware möglichst unverändert untersucht werden. Es dürfen keine Veränderungen oder weitere Beschädigungen auftreten, die Ursachen verdecken oder eine Analyse unmöglich machen.

Umgang mit elektrostatisch sensiblen Baugruppen

Bei elektronischen Baugruppen kann es sich um elektrostatisch sensible Baugruppen handeln. Es ist darauf zu achten, diese Baugruppen ESD-gerecht zu behandeln. Nach Möglichkeit sollten die Baugruppen an einem ESD-gerechten Arbeitsplatz getauscht werden. Ist dies nicht möglich sollten ESD-gerechte Maßnahmen beim Austausch getroffen werden. Der Transport darf nur in ESD-gerechten Behältnissen durchgeführt werden. Die Verpackung der Baugruppen muss ESD-konform sein. Verwenden Sie nach Möglichkeit die Verpackung des Ersatzteils oder wählen Sie selber eine ESD-gerechte Verpackung.

Einbau von Ersatzteilen

Beachten Sie beim Einbau des Ersatzteils die gleichen Vorgaben wie oben beschrieben. Achten Sie auf die ordnungsgemäße Montage des Bauteils und aller Komponenten. Versetzen Sie vor der Inbetriebnahme die Verkabelung wieder in den ursprünglichen Zustand. Fragen Sie im Zweifel beim Hersteller nach weiteren Informationen.

Einsenden von Elektroaltgeräten zur Entsorgung

Wollen Sie ein von Bühler Technologies GmbH stammendes Elektroprodukt zur fachgerechten Entsorgung einsenden, dann tragen Sie bitte in das Feld der RMA-Nr. „WEEE“ ein. Legen Sie dem Altgerät die vollständig ausgefüllte Dekontaminierungserklärung für den Transport von außen sichtbar bei. Weitere Informationen zur Entsorgung von Elektroaltgeräten finden Sie auf der Webseite unseres Unternehmens.

Avoiding alterations and damage to the components to be returned

Analysing defective assemblies is an essential part of quality assurance at Bühler Technologies GmbH. To ensure conclusive analysis the goods must be inspected unaltered, if possible. Modifications or other damages which may hide the cause or render it impossible to analyse are prohibited.

Handling electrostatically conductive components

Electronic assemblies may be sensitive to static electricity. Be sure to handle these assemblies in an ESD-safe manner. Where possible, the assembles should be replaced in an ESD-safe location. If unable to do so, take ESD-safe precautions when replacing these. Must be transported in ESD-safe containers. The packaging of the assemblies must be ESD-safe. If possible, use the packaging of the spare part or use ESD-safe packaging.

Fitting of spare parts

Observe the above specifications when installing the spare part. Ensure the part and all components are properly installed. Return the cables to the original state before putting into service. When in doubt, contact the manufacturer for additional information.

Returning old electrical appliances for disposal

If you wish to return an electrical product from Bühler Technologies GmbH for proper disposal, please enter "WEEE" in the RMA number box. Please attach the fully completed decontamination declaration form for transport to the old appliance so that it is visible from the outside. You can find more information on the disposal of old electrical appliances on our company’s website.

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen
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