ABB MEASUREMENT & ANALYTICS | OPERATING INSTRUCTION

GAA330-M

Emission monitoring system for marine applications

Measurement made easy

Contents

Preface

Content of this operating instruction

This operating instruction contains all the information necessary for the safe and compliant installation, start-up, operation and maintenance of the analyzer system.

Further information

System documentation

The system documentation includes the following material:

- Analyzer data sheet
- Operating instruction
- Certificates
- CD-ROM with
  - Drawings set (layout plan, piping plan, interface plan) and
  - Information about function block configuration if applicable
- DVD-ROM "Software tools and technical documentation"

Analyzer data sheet

The version of the delivered analyzer system is described in the "Analyzer data sheet" supplied with the analyzer system.

DVD-ROM "Software tools and technical documentation"

The DVD-ROM "Software tools and technical documentation" with the following contents is included in the scope of supply of the analyzer system:

- Software tools
- Operating instructions
- Data sheets
- Technical information
- Certificates

Internet

You will find information on ABB Analytical products and services on the Internet at "http://www.abb.com/analytical".

Service contact

If the information in this operating instruction does not cover a particular situation, ABB Service will be pleased to supply additional information as required.

Please contact your local service representative. For emergencies, please contact

ABB Service,
Telephone: +49-(0)180-5-222 580, Telefax: +49-(0)621-381 931 29031,
E-mail: automation.service@de.abb.com

Symbols and typefaces in this operating instruction

CAUTION identifies safety information to be heeded during analyzer system operation, in order to avoid risks to the user.

NOTE identifies specific information on the operation of the analyzer system as well as on the use of this operating instruction.

1, ***2***, ***3***, …	Identifies reference numbers in figures.
`Display`	Identifies a display on the screen.
`Input`	Identifies a user entry • either by pressing a soft key • or by selecting a menu item • or via the numeric keypad
p_e	Gauge pressure
p_{abs}	Absolute pressure
p_{amb}	Atmospheric pressure

Safety information

Intended application

Intended application

The analyzer system is designed for continuous measurement of concentrations of specific components in gases or vapor.

Any other use is not as specified. The specified use also includes taking note of this operating instruction.

The analyzer system must not be used to measure flammable gases or combustible gas/air or gas/oxygen mixtures. The analyzer system must not be installed in hazardous locations.

The analyzer system interior remains free of explosive atmosphere during normal operation. Therefore, the integration of explosion protection measures inside the analyzer system is not required.

Safety information

Requirements for safe operation

In order to operate in a safe and efficient manner the analyzer system should be properly handled and stored, correctly installed and set-up, properly operated and correctly maintained.

Personnel qualifications

Only persons familiar with the installation, set-up, operation and maintenance of comparable devices and certified as being capable of such work should work on the device.

Special information and precautions

These include

- The content of this operating instruction,
- The safety information affixed to the analyzer system,
- The applicable safety precautions for installing and operating electrical devices,
- Safety precautions for working with gases, acids, condensates, etc.

Safety labels affixed to the analyzer system

Observe the safety labels affixed to the analyzer system or to the individual components:

Consult documentation!

Hot surface! (Temperature > 60 °C)

Corrosive material!

Risk of electric shock!

National regulations

The regulations, standards and guidelines cited in this operating instruction are applicable in the Federal Republic of Germany. The applicable national regulations should be followed when the device is used in other countries.

Device safety and safe operation

The device is designed and tested in accordance with safety standard EN 61010 Part 1 "Safety requirements for electrical equipment for measurement, control, and laboratory use" and is shipped ready for safe operation. To maintain this condition and to assure safe operation, read and follow the safety information in this operating instruction and use the described accessories as specified in this operating instruction. Failure to do so can put persons at risk and can lead to device damage as well as damage to other systems and devices.

Working with hazardous gases

Some gas components whose concentration is measured with the analyzer system are hazardous to health. For this reason, the sample gas must under no circumstances be allowed to escape from the sample gas path in either the measurement mode or when performing maintenance. The analyzer system must be checked for leaks regularly. The diluted stack gas must be discharged outside the room where the analyzer cabinet is installed. Ensure adequate ventilation of the room in which the analyzer system is installed. The legal requirements for the maximum work place limit values of the measurement and test gases must be observed.

Protective lead connection

The protective lead (ground) should be attached to the protective lead connector before any other connection is made.

Risks of a disconnected protective lead

The device can be hazardous if the protective lead is interrupted inside or outside the device or if the protective lead is disconnected.

Correct operating voltage

Be sure the analyzer system voltage setting matches the line voltage before connecting the power supply.

Risks involved in opening the covers

Current-bearing components can be exposed when the covers or parts are removed, even if this can be done without tools. Current can be present at some connection points.

Risks involved in working with an open device

All work on a device that is open and connected to power should only be performed by trained personnel who are familiar with the risks involved.

Charged capacitors

The capacitors in the analyzer system can retain their charge even when it is disconnected from all power sources.

Use of proper fuses

Only fuses of the specified type and rated current should be used as replacements. Never use patched fuses. Do not short-circuit the fuse holder contacts.

Risks involved in opening the gas paths

Do not open any gas paths in the analyzer system or in the integrated analyzers. Doing so will damage gas path seal integrity.

If system-internal gas paths are opened, a seal integrity check must be performed with a leak detector (thermal conductivity) when the device is reassembled.

When safe operation can no longer be assured

If it is apparent that safe operation is no longer possible, the device should be taken out of operation and secured against unauthorized use.

The possibility of safe operation is excluded:

- If the device is visibly damaged,
- If the device no longer operates,
- After prolonged storage under adverse conditions,
- After severe transport stresses.

System overview

System description

Intended use

The GAA330-M analyzer system is designed for continuous measurement of exhaust gases of marine diesel engines. Measurement components are CO_2 and SO_2 which are sampled downstream of the scrubber.

Measuring principle

The analyzer system extracts the sample gas from the exhaust gas stream. The gas analyzer cannot process the sample without further treatment as e.g. an excessive dust content, temperature and dew point, excessive or insufficient pressure and interference components in the sample gas can affect the operating ability of the gas analyzer and distort the measurement result. Therefore, additional devices, such as the sampling probe, the sample gas line, the sample gas cooler, pumps and filters ensure that the sample gas entry conditions of the connected gas analyzer are met, and a proper measurement result is obtained regardless of the process and the local conditions. The sample handling system is specific for the applied measuring principle. The analyzer system uses the NDIR photometer AO2000-Uras26 for detecting SO_2 and CO_2.

System design

The GAA330-M analyzer system is a complete turn-key solution with the following components:

- Probe and filer unit for proper gas sampling
- Heated sample gas line for feeding the sample to the gas analyzer
- Sample conditioning components like sample gas cooler, filters and pump to ensure the gas conditions for reliable measurement results
- AO2020-Uras26 gas analyzer for measuring SO_2 and CO_2

The sample conditioning components and the gas analyzer are integrated into the analyzer cabinet of the analyzer system.

Available options are:

- Heated probe for measuring low temperature samples
- Filter unit (with protection box, IP54, anti-freeze heating) for installation locations at −20 °C to +45 °C
- Air conditioning unit for operation at ambient temperature +5 °C to +45 °C
- Dual sampling for simultaneous measurement at two different sampling locations
- Dual switching for measurement at two sampling locations or for uninterrupted measurement at one sample location

Measurement ranges

The AO2020-Uras26 gas analyzer is configured and calibrated for the following measurement ranges:

- Maximum measurement range for SO_2 is 0 to 500 ppm.
- Typical measurement range for SO_2 is 0 to 250 ppm.
- Typical measurement range for CO_2 is 0 to 20 %vol.

Analog signal output

The measured concentrations of CO_2 and SO_2 are available as 4 to 20 mA signals for further use in the process control system.

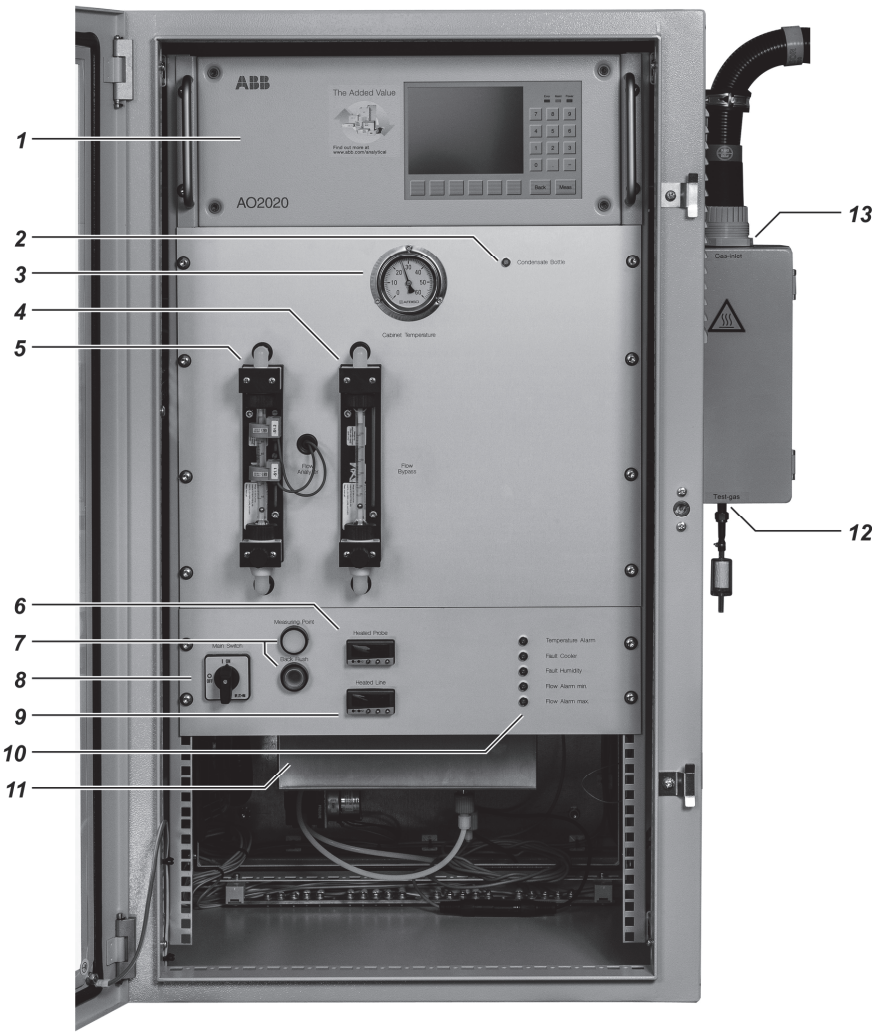
Digital signal output

The following digital signals are provided for the process control system of the ship:

- Error analyzer system
- Calibration in process
- Back-purging in process
- Auto range SO_2 0 to 250 / 0 to 500 ppm

System design

System modules



1 Gas analyzer

2 Condensate bottle status indicator

3 Cabinet temperature indicator

4 Bypass flow meter

5 Analyzer flow meter

6 Heated probe temperature controller

7 Measuring point and back-purging pushbuttons

8 Main switch

9 Heated line temperature controller

10 Status indicators for temperature alarm, fault cooler, fault humidity, flow alarm min and flow alarm max

11 Sample gas cooler

12 Test gas inlet

13 Sample gas inlet

Gas flow

The gas is extracted from the exhaust gas line after the scrubber by a heated sample probe. The heated sampling line is the connection and supplying line between sampling probe and analyzer cabinet. The probe and the sampling line are heated to avoid condensation.

To clean the filters in the sampling probe a back-purging system via the filter chamber can be integrated as an option. The filters are cleaned with pressurized air every 8 hours cyclically or automatically when the flow is below the minimum value.

At the entrance of the analyzer cabinet there is a 3/2-way solenoid valve. The gas flow goes to the gas cooler and via filter, flow meter, pump and aqua stop filter to the gas analyzer.

Sampling probe

The sampling probe is connected gas tight to the process with a flange. The probe pipe extracts the gas in the middle of the exhaust pipe. An external heated filter separates the dust from the sampling gas.

The heating of the filter is controlled with a Pt100 resistance thermometer and the power/temperature is adjusted with a temperature controller installed in the cabinet. The sinter filter is a ceramic filter. Normal temperature is 180 °C. If the temperature is 20 °C below the set value an error signal is generated.

The filter is cleaned by the back-purging system either every 8 hours cyclically or automatically when required (option) or manually controlled.

Heated sampling line

The heated sampling line is directly connected to the head of the probe. The core is a PTFE hose. The line is heated to 180 °C.

The temperature is controlled with a Pt100 resistance thermometer and the power/temperature is adjusted with a temperature controller installed in the cabinet. In case of a deviation from the set value a status signal is generated and displayed as an illuminated red lamp on the status signal board.

Temperature controllers

Temperature controllers are used to control the temperature of the sampling probe and the heated sampling line. An alarm signal is output as soon as the temperature drops below the minimum temperature limit.

Solenoid valve

A solenoid valve is installed to switch between measuring gas and ambient air during calibration.

Front panel

On top is the NDIR gas analyzer AO2020-Uras26. Below are the flow meters which control the gas flow to the analyzer and the bypass. Depending on the version of the system, there are two or four flowmeters.

Below, on the left side of the status signal board, are the main switch and lighted pushbuttons as indication of activity of measuring point (green lamp) and back-purging (orange lamp).

Next to these are the temperature controllers for sample probe and heated line. Depending on the version of the system, there are two or four temperature controllers.

The status of the system is indicated by the red LEDs on the right side of the status signal board.

Cabinet interior

The cabinet contains the sample conditioning components, pump, valves, filters and gas analyzer. It also contains the main switch, the power supply and the fuses for all components, as well as the connection terminals for analog and digital signals.

Gas cooler with condensate collecting bottle

The gas cooler defines the water content of the sample at a certain dew point (typically 3 °C). Therefore, the temperature of the sample falls from approx. 180 °C to the set point of the sample gas cooler and condensation will occur. The condensate is removed with a hose pump and collected in a separate bottle.

The cooler is controlled by the system and the following signals can be output:

- Condensate level: The level of the condensate collecting bottle is monitored and a signal will output (displayed via a red LED on the front panel) when maintenance / emptying the bottle is required.
- Fault cooler: A status signal "fault cooler" is set (red LED on the front panel) if the cooler temperature is too high. The signal is also provided as "Failure" status signal.
- Failure alarm: If a failure of the cooler is detected, the feed pump is switched off and the system is set to failure mode. The failure mode is displayed on the panel and provided as a status signal.

Universal filter, humidity control

The universal filter contains a PTFE filter element with 2 µm fineness to reliably separate solids, in particular extremely fine particles, occurring in analysis techniques in gas filtration. It uses very fine, deep-acting filter elements. At the bottom of the filter is the humidity controller, which is a conductive liquid sensor. If this sensor detects humidity, a signal is generated and displayed as an illuminated red lamp on the status signal board. Furthermore, the analyzer pump is switched off.

Sample gas pump

The sample gas pump sucks the sample from the exhaust gas and continuously feeds the gas analyzer with the sample gas. The pump is a diaphragm pump. If the pump fails a flow alarm occurs. This alarm is displayed on the front panel and provided as a failure status signal.

Pressure control valve

The pressure control valve ensures a constant sample flow to the gas analyzer. This means, the valve stabilizes the outlet pressure of the sample pump by returning some sample gas to the pump inlet. Thus, if the pressure at the pump outlet drops, the valve reduces the returned gas volume to increase the pressure at the outlet.

Flow control

The flow meters monitor the sample gas flow through the analyzer. The following parameters are considered:

- Typical flow: 60 l/h
- Minimum flow level: 40 l/h
- Maximum flow level: 80 l/h

If the flow violates a limit value an alarm is displayed on the front panel. In addition, the sample probe is automatically back-purged.

Aqua stop filter

The aqua stop filter is the final protection for the analyzer. The aqua stop filter holds back any humidity. Since the aqua stop filter is used as a so called 'police filter', the 1.5 m relaxation distance does not have to be considered.

AO2020-Uras26 gas analyzer

The AO2020-Uras26 gas analyzer is integrated into the analyzer system for measuring CO_2 and SO_2. The main components are an infrared source (lamp), a sample cell, a wavelength filter, and the infrared detector. The gas is pumped into the sample cell, and the gas concentration is measured electro-optically by its absorption of a specific wavelength in the infrared wavelength range.

Installation preparation

Installing the analyzer system

Notes

- ABB recommends having the analyzer system installed by ABB personnel.
- When installing the analyzer system, in addition to this operating instruction, comply with the information contained in the drawings set.
- If there is shipping damage which points to improper handling file a damage claim with the shipper (railway, mail or freight carrier) within seven days.
- Make sure the enclosed accessories are not lost.
- Keep the packaging material for future shipping needs.

Installation – Overview

1. Prepare the gas sampling probe installation site.
2. Prepare the analyzer cabinet installation site.
3. Install the gas sampling probe and filter unit.
4. Install the sample gas line.
5. Install the back-purging unit (if applicable).
6. Install the analyzer cabinet.
7. Install the instrument air and test gas supply (if applicable).
8. Connect the gas lines to the analyzer cabinet.
9. Connect the electrical leads to the analyzer cabinet.

Analyzer system: Installation site requirements

CAUTION
The analyzer system must not be installed in hazardous locations.

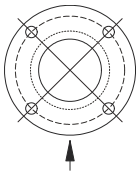
Choosing the extraction point

The extraction point must be suitable for extracting a representative specimen flow.

In case of emission monitoring of exhaust gases, the extraction point is specified in accordance with responsible technical inspection authority, e.g. classification society.

Wall tube installation

Install the wall tube with mounting flange (DN 65, PN 6, facing type A to EN 1092-1; not supplied) at the extraction point in such a way that the sampling probe tube can be easily installed and removed. The sampling probe tube must be easily accessible to allow maintenance work to be performed. Align the boreholes of the mounting flange in relation to the flow direction of the process gas.



Short gas paths

The analyzer cabinet should be installed as close as possible to the sampling site. A short sample gas line results in short T90 times.

The sample gas line length is limited to 30 meters with 230 VAC power on account of pressure drop build-up in the line and the required electrical fusing.

Protection from adverse conditions

Protect the analyzer cabinet against

- Water spray
- Contact with chemicals
- Strong sunlight and heat radiation
- Strong air currents
- Heavy dust load
- Corrosive atmospheres

Installation indoors

The analyzer system is intended for installation aboard a ship. Thereby, the installation location height is naturally limited to sea level.

The analyzer cabinet is only suitable for installation indoors. An air-conditioned room is recommended.

Protection class: IP54

Ambient temperature

Operation	with ventilation fan	+5 to +35 °C
	with cooling unit	+5 to +45 °C
Storage and transport		+2 to +60 °C
	after draining and drying parts in contact with condensate	–25 to +60 °C

Relative humidity

Year-round average max. 75%, short-term max. 95%, occasional slight condensation is permitted.

Dimensions and space requirement

Refer to the "Layout Plan" in the drawings set.

Installation site stability

The installation site floor must be plane and the wall capable of supporting the cabinets weight.

Sample gas inlet conditions (at the extraction point)

CAUTION
The analyzer system must not be used to measure flammable gases or combustible gas/air or gas/oxygen mixtures!

Temperature	Max. 500 °C
Pressure p_{abs}	850 to 1100 hPa (0.85 to 1.1 bar)
Flow	Max. 200 l/h

Power supply requirements

Operating voltage	230 VAC ± 10%, 50 to 60 Hz ± 3 Hz; L1, L2, L3 each max. 25 A	
Power consumption	Basic version (incl. AO2020-Uras26)	950 VA
	Cooling unit	+ 410 VA
	Filter unit type PFE3 or PFE2, heated	+ 250 VA
	Probe tube type 42, heated	+ 800 VA
	Sample gas line type TBL01-S	+ 90 VA/m

Provide a mains isolator or a switched socket-outlet in order to be able to disconnect all the power from the analyzer system if required.

Service socket

230 VAC, 48 to 62 Hz, max. 5 A.

The service socket is located on the right side of the cabinet; access is given from the outside.

Weight of the individual system components

Sheet steel cabinet (basic version)	Approx. 110 kg
Probe tube type 42, heated	8 kg
Filter unit, heated, with protective case	20 kg
Sample gas line type TBL01, heated	1 kg/m
Cooling unit	13 kg

Sound level

Ventilation fan	50 Hz	Approx. 59 dB(A)
	60 Hz	Approx. 61 dB(A)
Cooling unit		Max. 61 dB(A)

Safety

Test	to EN 61010-1:2010
Overvoltage category	Power supply: II
Degree of pollution	2

Electromagnetic compatibility

Interference immunity	Tested to EN 61326-1:2013. Inspection severity: Industrial area, fulfills at least the rating to Table 2 of EN 61326.
Emitted interference	Tested to EN 61326-1:2013. Limit value class B for interference field strength and interference voltage is met.

Back-purging unit: Installation site and air supply requirements

Design of the back-purging unit

The back-purging unit consists of a protective cabinet with shut-off valve, 6 bar pressure reduction valve, solenoid valves for back-purging, pressure regulator and 5 l compressed air receiver for effective pressure pulses also with lower airflow rate.

Distance to sampling probe

The distance between the back-purging unit and the sampling probe must not exceed 5 m (length of the steel-braided compressed-air hoses = 6 m).

Protection from adverse conditions

Protect the back-purging unit against

- Water spray
- Contact with chemicals
- Strong sunlight and heat radiation
- Strong air currents
- Heavy dust load
- Corrosive atmospheres
- Vibration

Compressed-air supply requirements

- Dry (dew point < 3 °C), oil- and dust-free
- max. 6 bar for back-purging
- approx. 4 bar as control air (required for 2-stage back-purging with type PFE2 filter unit)
- required flow rate approx. 100 m^3/h

CAUTION
If the compressed air is not dry and clean, this will result in damage to the sample conditioning components (valves, filters, sample gas cooler, sample gas feed unit) as well as to the gas analyzer.

Items delivered

Items delivered

Quantity	Description
	Standard equipment
1	Analyzer cabinet
1 set	System documentation
	Additional items delivered per order
1	Gas sampling probe tube type 40 (unheated) or type 42 (heated)
1	Filter unit type PFE3 or type PFE2 with heating sleeve and 2-stage back-purging unit
1	Sample gas line, heated
1	Condensate collection bottle
1	Wear parts set (optional)

Materials needed for installation (not supplied)

Gas sampling

Wall tube with mounting flange (DN 65, PN 6, facing type A to EN 1092-1)

Gas lines

Sample gas (unheated line)	PTFE pipe 4/6x1 mm
Sample gas outlet	PTFE pipe 4/6x1 mm
Test gas N_2	PTFE pipe 4/6x1 mm
Test gases 1, 2, 3	PTFE pipe 4/6x1 mm
Instrument air	Stainless steel pipe, 6 mm O.D., or compressed-air hose (plus pressure gauge and shut-off valve)
Condensate collecting bottle	PVC tube 4/6x1 mm

Cable specifications

Analyzer cabinet supply	
Input wiring	3 x 1.5 mm^2
Grounding cable	≥ 10 mm^2

Connection between analyzer cabinet and filter unit / sampling probe	
GAA330-M with filter unit PFE3 and heated probe type 42	
Probe type 42 input wiring	2 x 1.5 mm^2
Probe type 42 signal lines (Pt100)	2 x 0.75 mm^2
Filter unit PFE3 input wiring	4 x 1.5 mm^2
Filter unit PFE3 valves (back-purging)	4 x 1.5 mm^2
Filter unit PFE3 signal lines (1 x Pt100)	2 x 0.75 mm^2
GAA330-M with filter unit PFE2 and heated probe type 42 (probe type 42 is connected to PFE2 terminal box)	
Filter unit PFE2 input wiring	4 x 1.5 mm^2
Filter unit PFE2 probe and antifreeze heating	4 x 1.5 mm^2
Filter unit PFE2 valves (back-purging)	4 x 1.5 mm^2
Filter unit PFE2 signal lines (2 x Pt100)	4 x 0.75 mm^2

Connection between analyzer cabinet and ship control room

Analog signal 4 to 20 mA SO_2	2 x 1 mm^2 (shielded)
Analog signal 4 to 20 mA CO_2	2 x 1 mm^2 (shielded)
Alarm and malfunction messages	12 x 1 mm^2
1 x digital contact malfunction measurement system	
1 x digital contact calibration measurement system	
1 x digital contact back flushing probe active	
1 x digital contact measurement range changeover SO_2	
Ethernet 10/100/1000 BASE-T interfaces	
Modbus RTU RS485 or RS232 (optional)	
PROFIBUS RS485 (optional)	

Mounting

Screws and nuts to mount the analyzer cabinet on the wall

A suitable lifting device (crane, block and tackle, lifting truck, etc.) and lifting gear are required for transport and installation of the analyzer cabinet.

Installation

Type 40 probe tube and filter unit installation

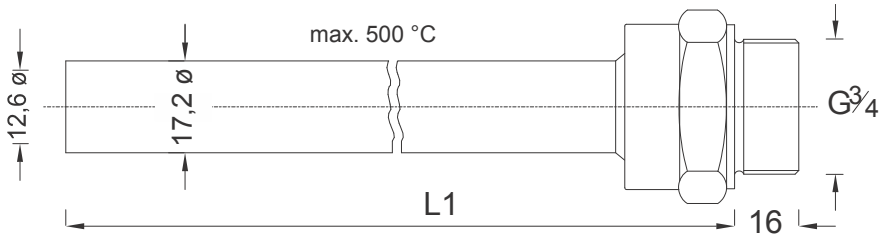
CAUTION
The weight of the probe tube with filter unit amounts to approx.
18 to 20 kg! Two persons are needed for transportation and mounting!

Before the installation

Observe the "Piping plan" in the drawings set.

Make sure that the wall tube is installed at the extraction point.

Type 40 probe tube



L1 = 500/1000/1500 mm (dimensions in mm)

Installation

1. Screw the probe tube into the internal thread of the filter unit.
2. Insert the pre-assembled probe tube with filter unit in the wall tube and screw the flange of the filter unit to the flange of the wall tube. Use the green seal from the accessories pack to seal the space between the flanges of wall tube and filter unit.
3. Mount the heating sleeve on the filter unit.
4. If applicable, install the compressed-air hoses between the filter unit and the back-purging unit.

Type 42 probe tube and filter unit installation

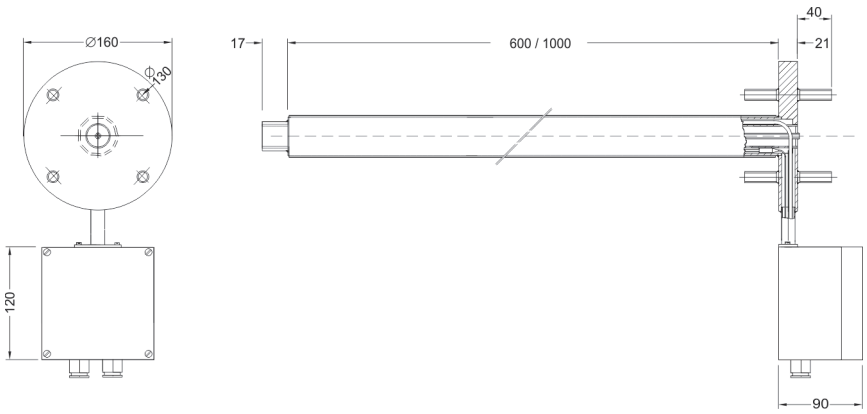
CAUTION
The weight of the probe tube with filter unit amounts to approx.
28 to 32 kg! Two persons are needed for transportation and mounting!

Before the installation

Observe the "Piping plan" in the drawings set.

Make sure that the wall tube is installed at the extraction point.

Type 42 probe tube



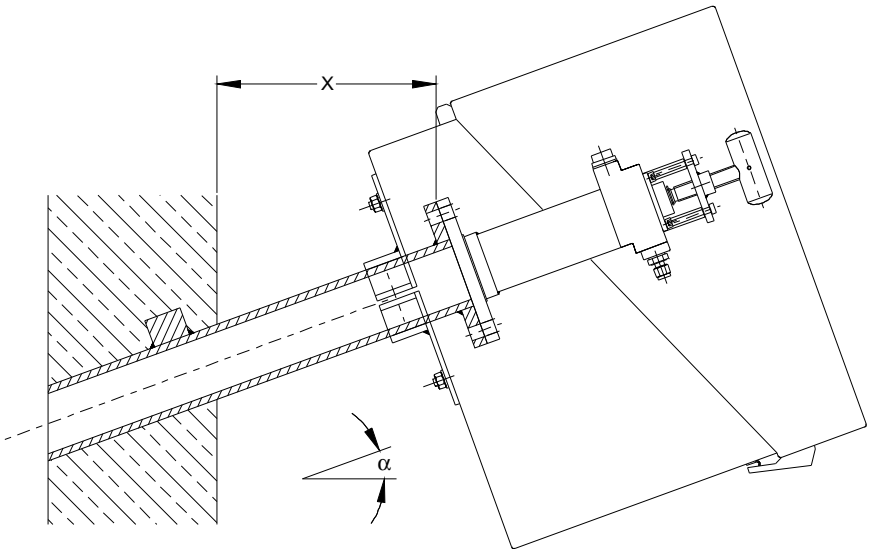
(dimensions in mm)

Installation

1. Insert the probe tube in the wall tube and screw the probe tube flange to the wall tube flange. Use the green seal from the accessories pack to seal the space between the flanges.
2. Screw the filter unit to the flange of the probe tube. Use the green seal from the accessories pack to seal the space between the flanges of probe tube and filter unit.
3. Mount the heating sleeve on the filter unit.
4. If applicable, install the compressed-air hoses between the filter unit and the back-purging unit.

PFE2 Filter unit installation

PFE2 Filter unit: Mounting of probe protective case

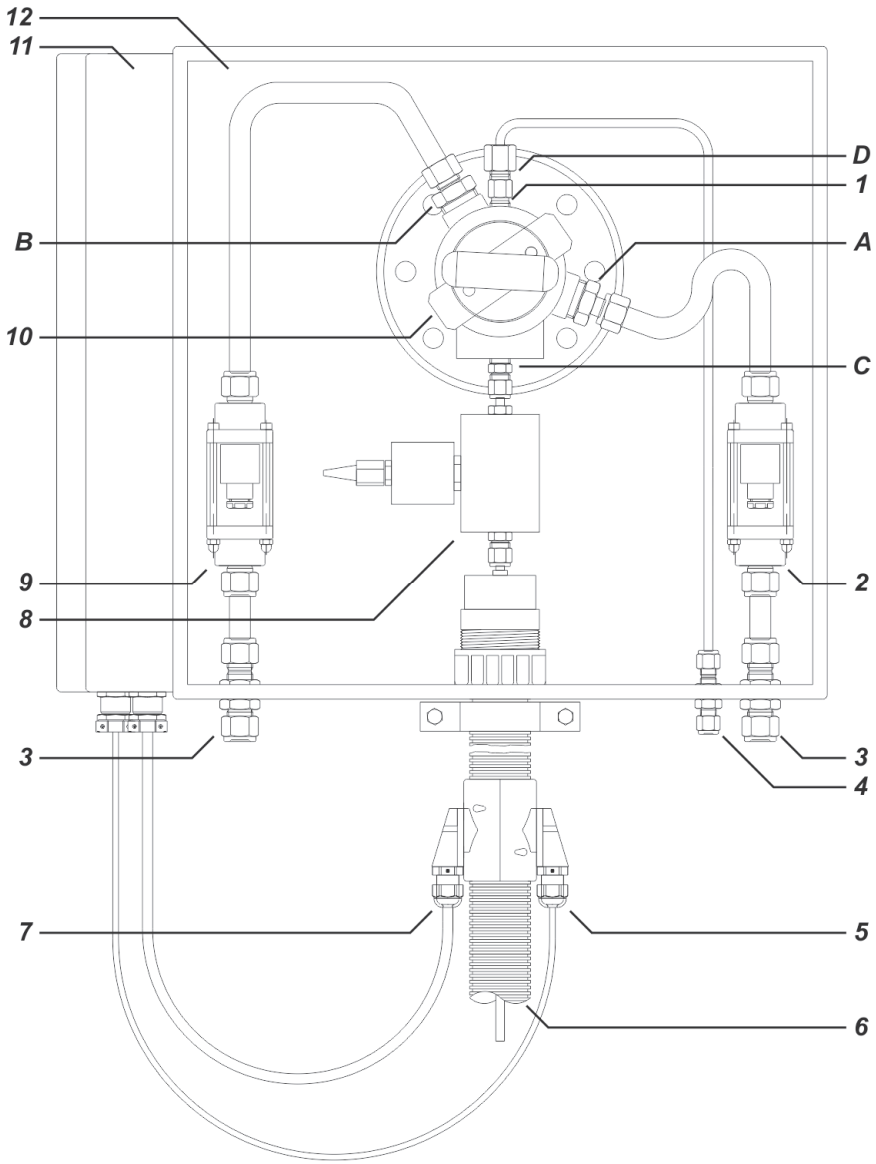


Minimum distance x_{min} of the mounting flange (wall tube flange) from the wall depending on mounting angle α:

α	10°	15°	20°	25°	30°	35°
x_{min}/mm	229	248	268	287	307	324

PFE2 Filter unit gas connection

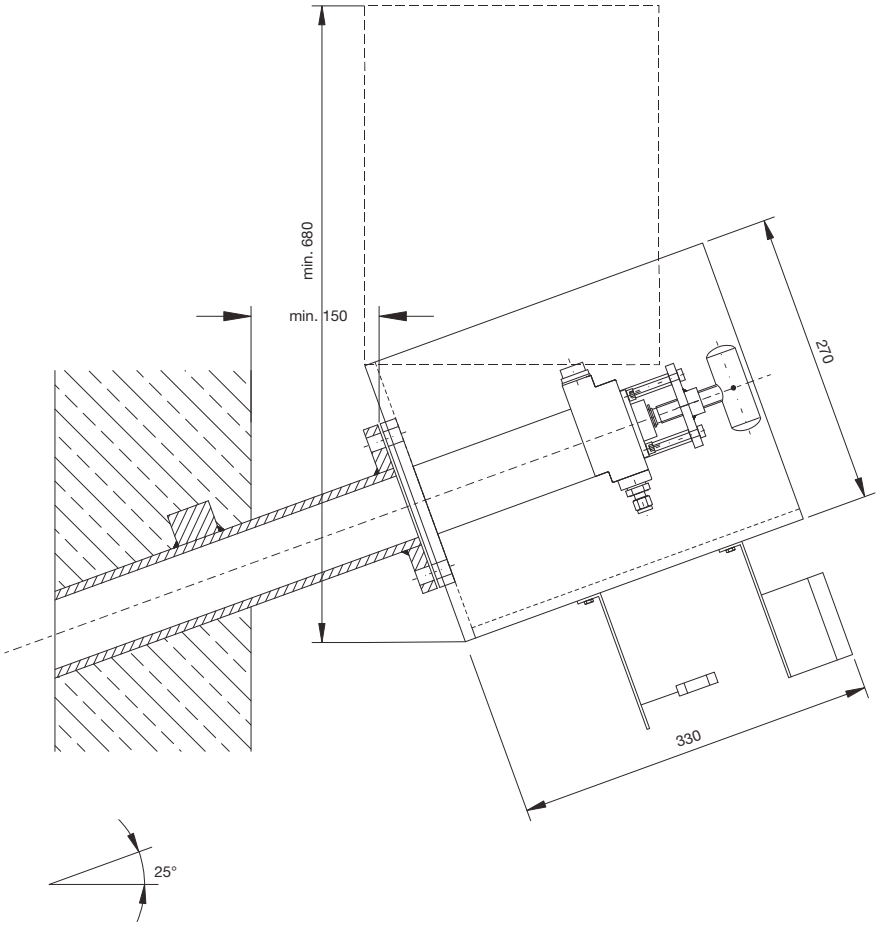
PFE2 Filter unit: Gas connections (with back-purging)



1	Check valve
2	Solenoid valve for cleaning filter -Y2
3	Connection for instrument air (max. 6 bar) bulkhead fitting 12 mm
4	Connection for test gas bulkhead fitting 6 mm
5	Connection for Pt100
6	Heated sample gas line -E2
7	Power supply
8	Heated cutoff valve -Y5 (option)
9	Solenoid valve for cleaning filter surface and probe tube -Y1
10	Filter unit
11	Terminal box
12	Protective case for the probe
A	Connection for back-purging filter G ½ in. to 12 mm pipe coupling
B	Connection for back-purging filter surface and probe tube G ½ in. to 12 mm pipe coupling
C	Sample gas outlet G ¼ in. to 6 mm pipe coupling
D	Test gas connection G ¼ in. to 6 mm pipe coupling

PFE3 Filter unit installation

PFE3 Filter unit: Mounting of probe protective case



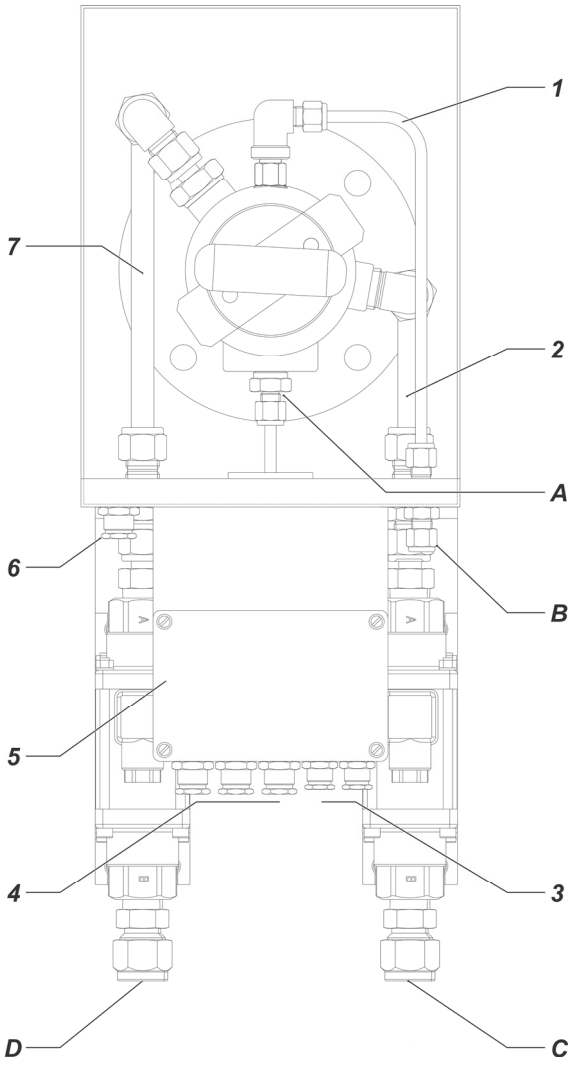
(dimensions in mm)

Minimum distance x_{min} of the mounting flange (wall tube flange) from the wall depending on mounting angle α:

α	10°	15°	20°	25°	30°	35°
x_{min}/mm	229	248	268	287	307	324

PFE3 Filter unit gas connection

PFE3 Filter unit: Gas connections (with back-purging)



1 Tube test gas, SS 1.4571, 6x1 mm

2 Tube compressed air, Cu, 12x1 mm

3 1 x M12x1.5 and 1 x M16x1.5 cable connectors

4 3 x M20x1.5 cable connectors

5 Terminal box -X1 IP66

6 1 x M20x1.5 cable connector

7 Tube compressed air, CU, 15x1 mm

A Sample gas connection, male fitting 6 mm

B Test gas connection with check valve, bulkhead fitting 6 mm

C Back-purging of filter (max. 6 bar), bulkhead fitting 18 mm

D Back-purging of filter surface/probe tube (max. 6 bar), bulkhead fitting 18 mm

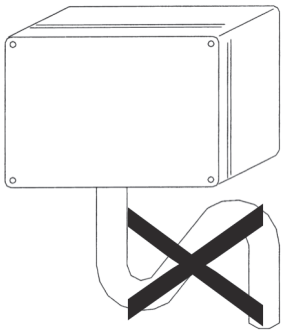
Sample gas line installation

Installing the sample gas line

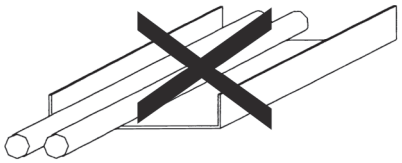
- Observe the "Piping plan" in the drawings set.
- Connect the sample gas line to the filter unit/gas sampling probe.
- Route the sample gas line through the opening provided in the right wall of the cabinet.

Fundamentals for laying the sample gas line

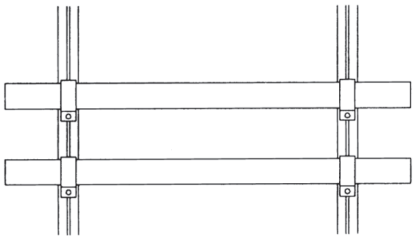
Do not lay the heated sample gas line in a thermowell.



When laying the sample gas line, avoid the formation of water locks, particularly at the sampling points.



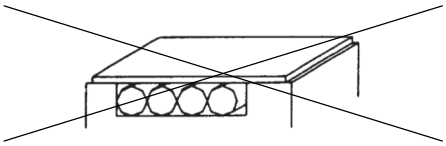
Do not lay the heated sample gas line in a cable tray together with other electrical or pneumatic lines, especially not in an enclosed cable tray.



When laying the heated sample gas lines on exposed C-profiles with BBS cable clips: Do not overtighten the cable clips, in order to prevent damage to the sample gas line through crushing.

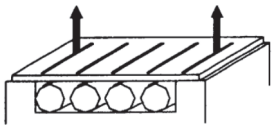
Procedures for laying the sample gas line

Incorrect

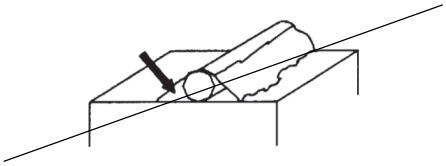


Do not lay the heated sample gas lines directly side-by-side in an enclosed duct or shaft. This results in heat accumulation.

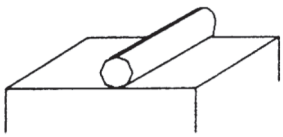
Correct



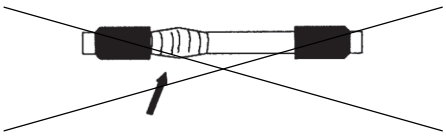
Ensure that the hoses do not touch. Maintain a distance of 25 mm. Provide adequate ventilation. Heat can be conducted away as a result.



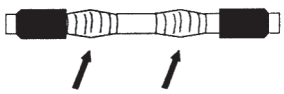
Prevent powdery substances, adhesives or other thermally insulating materials from soiling the heated sample gas line. Otherwise, over\-heating will occur at these points.



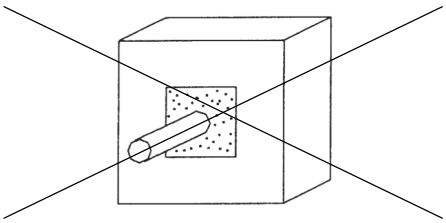
If soiling occurs, clean the materials and remedy the cause. Heat can be conducted away again as a result.



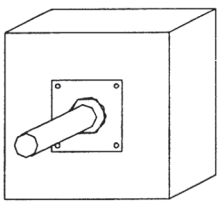
Avoid heat accumulation through wrapping the heated sample gas line with other materials, otherwise the sample gas line will overheat at these points. Do not cover the area near the temperature sensor, otherwise the rest of the sample gas line will cool down.



Do not wrap the sample gas line. Ensure that the area near the temperature sensor is exposed.
This results in error-free temperature measurement.

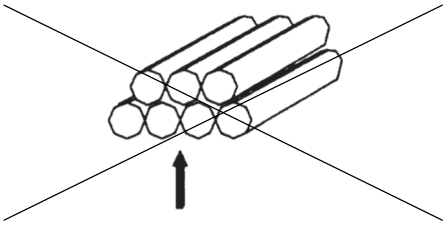


Do not lay the heated sample gas line in a wall break-through which is subsequently sealed with a sealing compound under any circumstances. The sample gas line will be destroyed by overheating in this case!



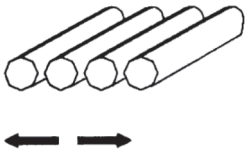
When laying the heated sample gas line through a wall break-through, use bulkhead plates with conduit thread cable glands, in order to provide adequate cooling of the sample gas line.

Incorrect

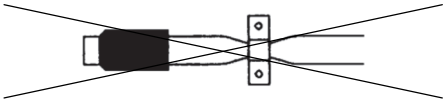


Avoid bundling or laying several heated sample gas lines, so that they touch each other. This results in overheating at the contact points.

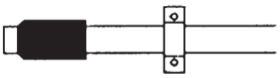
Correct



Lay several heated sample gas lines separately with a distance of at least 2.5 cm and provide adequate ventilation. Heat can be conducted away as a result.



Do not squeeze the heat insulation in mounting brackets tightly together, so that the outer braiding is pressed on to the heat conductor. If you disregard this, damage to the protective braiding and the heated sample gas line may occur.



Tighten the BBS cable clips sufficiently but not excessively, in order to prevent damage to the protective braiding and the heated sample gas line.

Permissible values for laying the sample gas line

Characteristic	Permissible value
Type	heated, Type TBL01-S, regulated heating, 200 °C, heating power approx. 100 W/m
Maximum line length	230/400 V AC: max. 30 m 120/208 V AC: max. 15 m 30 m for version with anti-frost heater
Minimum bending radius	300 mm
Maximum clip distance	1.2 m with horizontal laying 3.5 m with vertical laying
Lowest laying temperature	−10 °C
Temperature of the sheathing	max. 60 °C

Back-purging unit installation

Before the installation

Observe the "Piping plan" in the drawings set.

Installation site

The distance between the back-purging unit and the sampling probe must not exceed 5 m (length of the steel-braided compressed-air hoses = 6 m).

Connecting the compressed-air hoses to PFE2 filter unit

Connect the compressed-air hoses for purge air and control air to the respective ports at the PFE2 filter unit.

Connecting the compressed-air hoses to PFE3 filter unit

Connect the compressed-air hoses for purge air (filter and filter/probe tube) to the respective ports at the PFE3 filter unit.

Analyzer cabinet installation

Transporting the analyzer cabinet

CAUTION
The analyzer cabinet weighs approx. 110 kg. A suitable lifting device (crane, block and tackle, lifting truck, etc.) is required for transport, setting upright and installation!

Note
It is strongly recommended that the analyzer cabinet is transported by a specialist firm, transported in a horizontal position as far as possible and not set upright until immediately before the installation!

Unpacking the analyzer cabinet

- Lift out the analyzer cabinet from the shipping box.
- Do not remove the plastic sheet in which the analyzer cabinet is wrapped. Unpacking a cold analyzer cabinet can lead to condensation.
- Remove the plastic sheet only once the analyzer cabinet is at room temperature. This takes at least 24 hours.

Mounting the analyzer cabinet

- Observe the installation site requirements.
- The loading capacity of the wall must be high enough to bear the weight of the analyzer cabinet.
- Follow the "Layout plan" in the drawings set.
- Use only the vibration dampers delivered with the analyzer cabinet.

1 Mount the 4 vibration dampers to the wall using M8 bolts or studs.

2 Hang the analyzer cabinet on all 4 vibration dampers simultaneously.

3 Tighten all screws of the analyzer cabinet.

4 Ground the analyzer cabinet by means of the central grounding screw, route the grounding cable (≥ 10 mm^2/AWG 6) through the M16 cable gland.

Electrical connection

Safety information

CAUTION!
Please observe the relevant national safety regulations for the construction and operation of electrical installations as well as the following safety instructions.
Before connecting the power supply, check that the operating voltage on the rating plate is the same as the mains voltage.
The protective-conductor terminal must be connected to a protective conductor before any other connections are set up.
The device can be dangerous if the protective conductor is interrupted inside or outside the device or the protective-conductor terminal is disconnected.

CAUTION!
An easily accessible mains isolator must be installed near the analyzer cabinet in order to be able to completely disconnect the latter from the power supply. Mark the mains isolator in such a way that assignment to the device to be separated can be clearly identified.

Notes

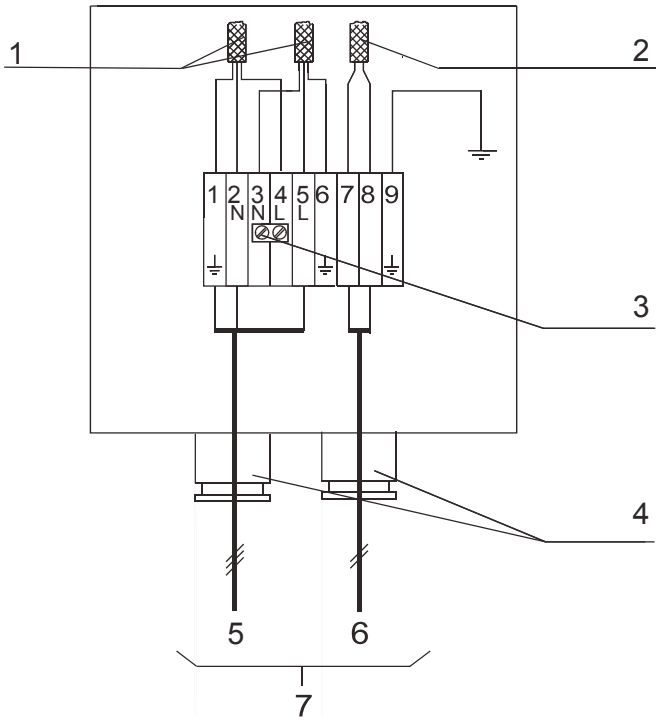
NOTE
Lay the signal lines separate from the power supply lines. Carefully plan the combination of signal lines in cables.

NOTE
The analyzer system must be hardwired!

NOTE
When installing the electrical connections, comply with the information contained in the drawings set. The connection drawings in this chapter are only examples.

Type 42 probe tube and filter unit electrical connection

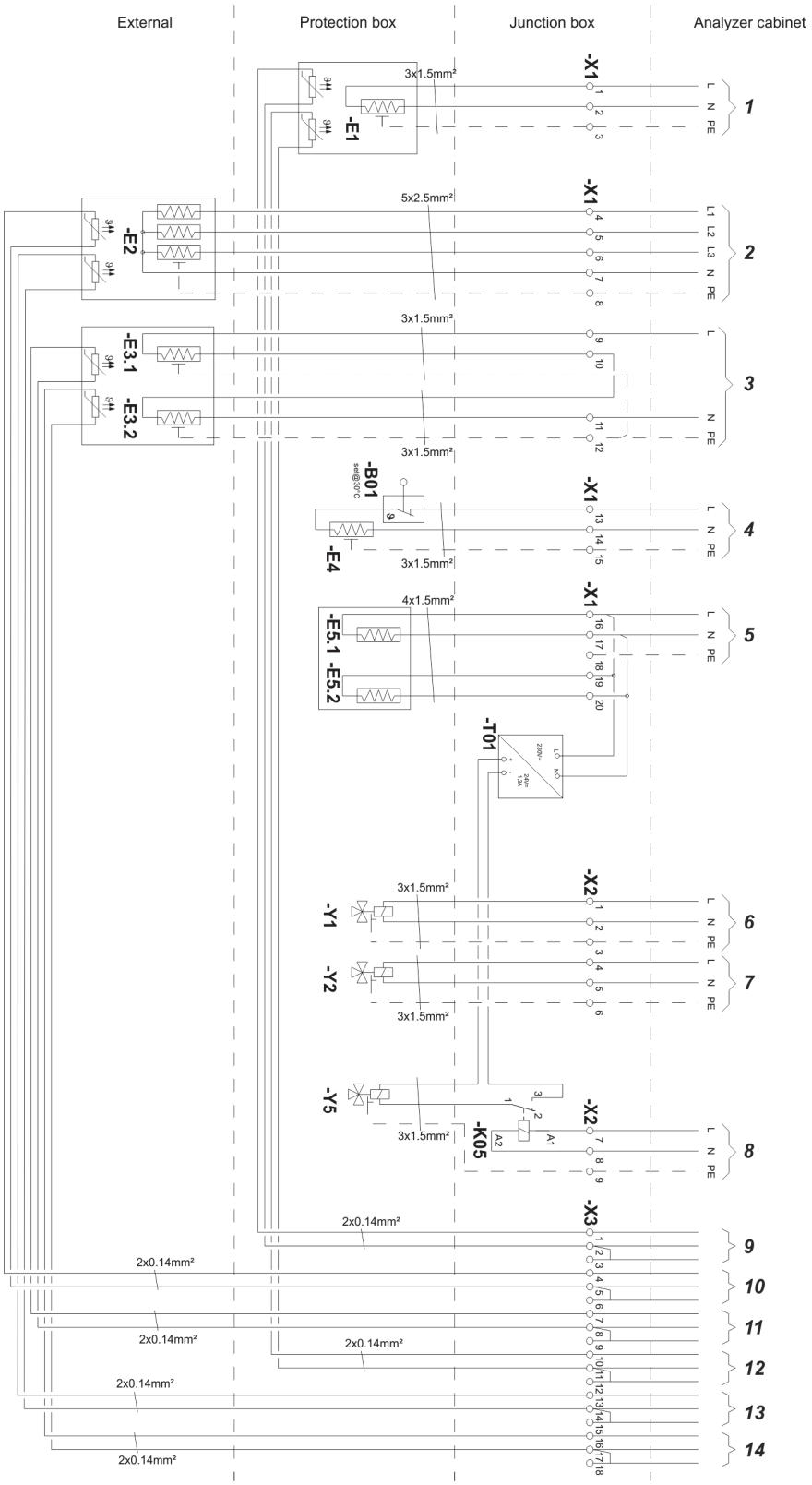
Electrical connections



1	Heating
2	Temperature sensor Pt100
3	Bridge: Power supply 230 V terminals 3 + 4 (shown in the figure) Power supply 115 V terminals 2 + 3 / 4 + 5
4	M 20
5	Mains
6	Sensor
7	Connection for temperature controller

PFE2 Filter unit electrical connection

Electrical connections



Terminal block –X1

1	Supply for heating sleeve of filter unit, 230 VAC, 50 to 60 Hz, 250 W, to be fused by the customer with 6 A, regulation required!
2	Supply for sample gas line, 230 VAC, 50 to 60 Hz, 90 W/m, max. 11 kW / 17 kW, to be fused by the customer with 16 A / 25 A, regulation required! (optional)
3	Supply for heating of the probe tube, 230 VAC, 50 to 60 Hz, max. 800 W, to be fused by the customer with 6 A, regulation required!
4	Supply for anti-frost heater, 230 VAC, 50 to 60 Hz, 300 W, to be fused by the customer with 6 A
5	Supply for PTC elements and power supply unit -G02 / heated solenoid valve in the sample gas outlet, 230 VAC, 50 to 60 Hz, 250 W, to be fused by the customer with 6 A
-B01	Temperature limiter (set at 30 °C)
-E1	Heating sleeve of filter unit
-E2	Heated sample gas line
-E3	Heated probe tube
-E4	Anti-frost heater
-E5	Heated check valve
-T01	Power supply unit

Terminal block –X2

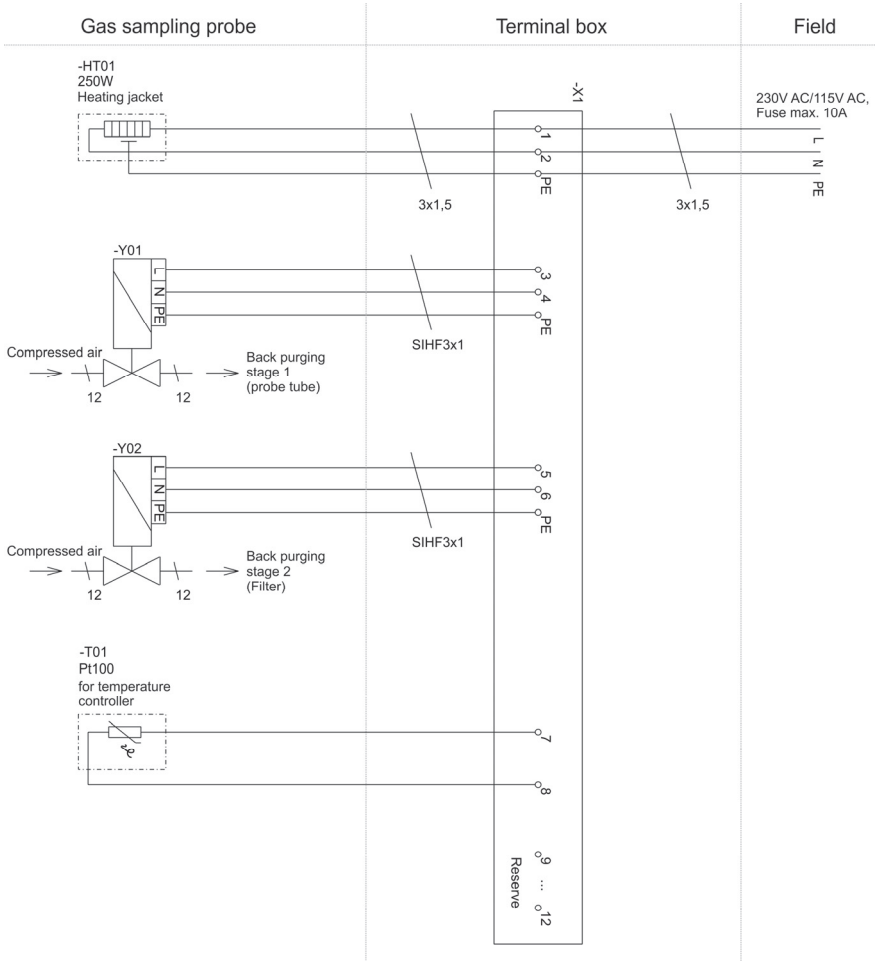
6	Supply for solenoid valve -Y1 cleaning filter surface and probe tube, 230 VAC, 50 to 60 Hz, 8 W, to be fused by the customer with 1 A
7	Supply for solenoid valve -Y2 cleaning filter, 230 VAC, 50 to 60 Hz, 8 W, to be fused by the customer with 1 A
8	Supply for relay -K05 for the activation of cutoff valve -Y5, 230 VAC, 50 to 60 Hz, to be fused by the customer with 1 A
-K05	Relay
-Y1	Solenoid valve cleaning filter surface and probe tube
-Y2	Solenoid valve cleaning filter
-Y5	Cutoff valve

Terminal block –X3

9	Resistance thermometer Pt100 for filter unit of sample gas outlet
10	Resistance thermometer Pt100 for sample gas line
11	Resistance thermometer Pt100 for probe tube
12	Resistance thermometer Pt100 for filter unit of sample gas outlet (fail-safe circuit)
13	Resistance thermometer Pt100 for sample gas line (fail-safe circuit)
14	Resistance thermometer Pt100 for probe tube (fail-safe circuit)

PFE3 Filter unit electrical connection

Electrical connections



Analyzer cabinet electrical connection

Description of the signal inputs and outputs

- Analog outputs: 4 to 20 mA, joint minus pin, electrically isolated, randomly groundable, max. DC 30 V, load max. 600 Ω, resolution 16 bit
- Digital relay outputs: Potential-free contacts (powerless status opened, fail safe), max. AC/DC 277 V, max. current AC1 5 A, max. current per group of 4 AC1 20 A
- Digital inputs: Optoelectronic coupler with internal power supply DC 24 V, switched potential-free contacts, Status 0: UL < DC 5 V, Status 1: UH > DC 11 V, I_H min / max = 2 mA / 4.5 mA
- Modbus: 9-pole sub-D plug
- Ethernet: RJ45 female connector

Connecting the electrical leads

- Observe the cable specifications.
- Observe the "Interface plan" in the drawings set.
- When routing the electrical lines, follow all applicable national safety regulations for the installation and operation of electrical devices.
- Follow all regulations and standards for electrical installations on board of ships and observe the local conditions.

Connecting the signal leads

- Route the signal leads separately from the power supply lines.
- Locate the analog and digital signal lines separately from each other.
- Carefully plan the arrangement of signal leads in the cables as well as the use of openings for cable connectors.
- Connect the signal leads to the terminal strips.
- Cable shielding should be connected according to local regulations. Differences in potential and signal interference must be taken into consideration.

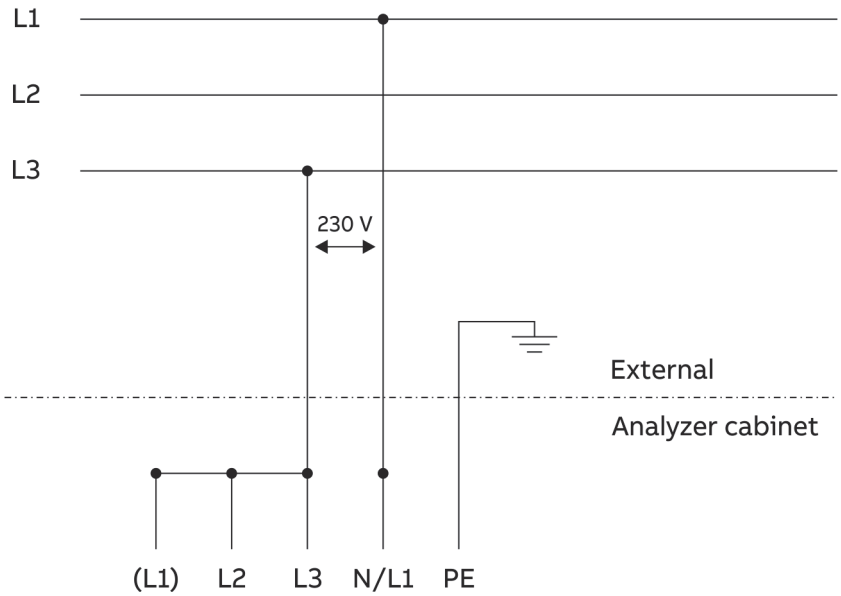
Connecting the input wiring

- Observe the power supply requirements.
- Before connecting the power supply, make sure the analyzer system operating voltage is set to match the line voltage.
- The protective lead connector and protective lead should be connected before any other connection is made. The analyzer system can be hazardous if the protective lead is interrupted inside or outside the system or if the protective lead is disconnected.
- Connect
  - the input wiring of the analyzer cabinet (see below for connection diagrams)
  - the input wiring of the heated sample components (temperature-resistant as needed)
  - the Pt100 resistance thermometer leads
  - the input wiring of the back-purging unit (solenoid valves)

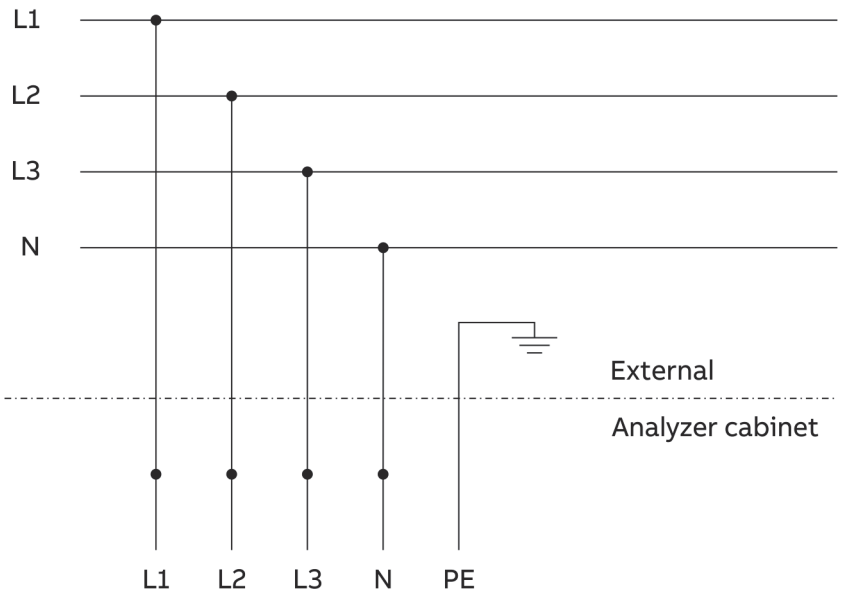
  to the terminal strips.

Connection diagrams for the input wiring of the analyzer cabinet

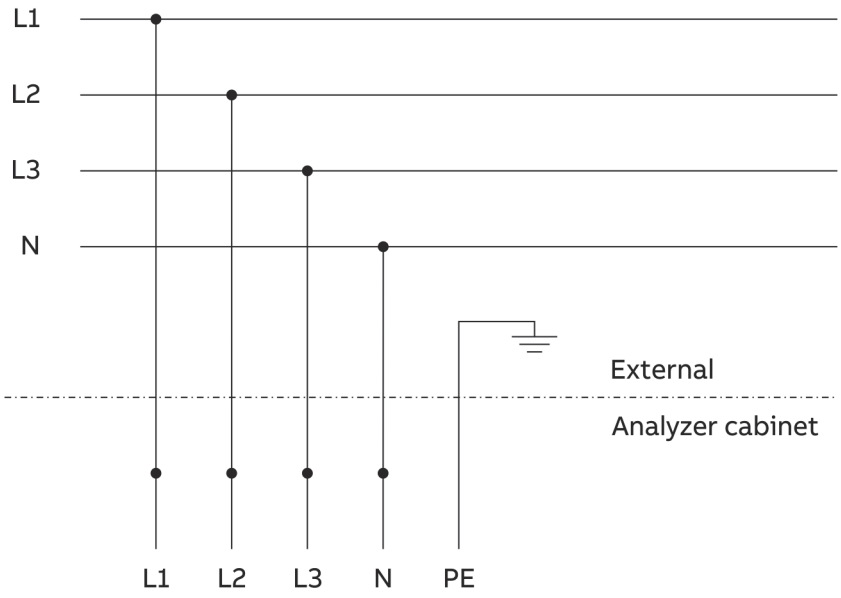
IT grid, delta connection, 3 phase 230 V system



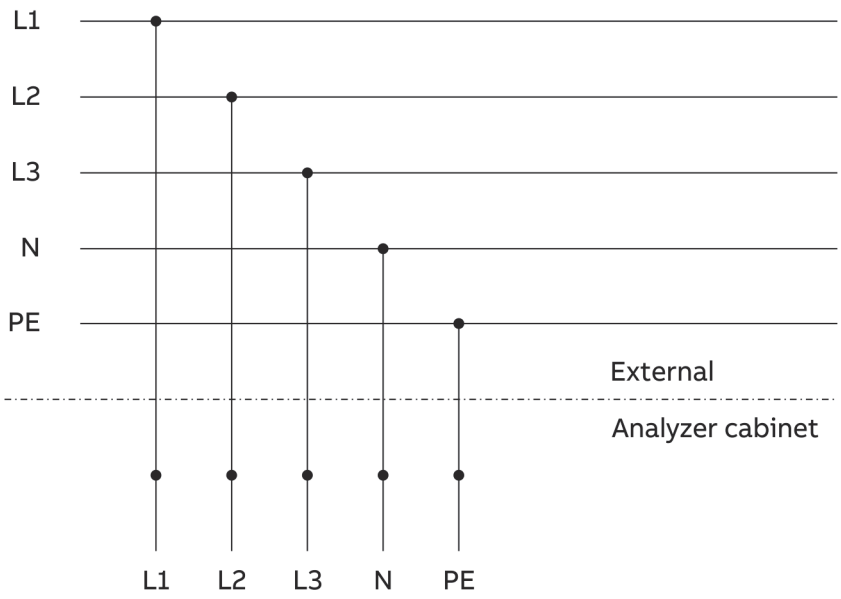
IT grid, star connection, 3 phase 230 V system + neutral



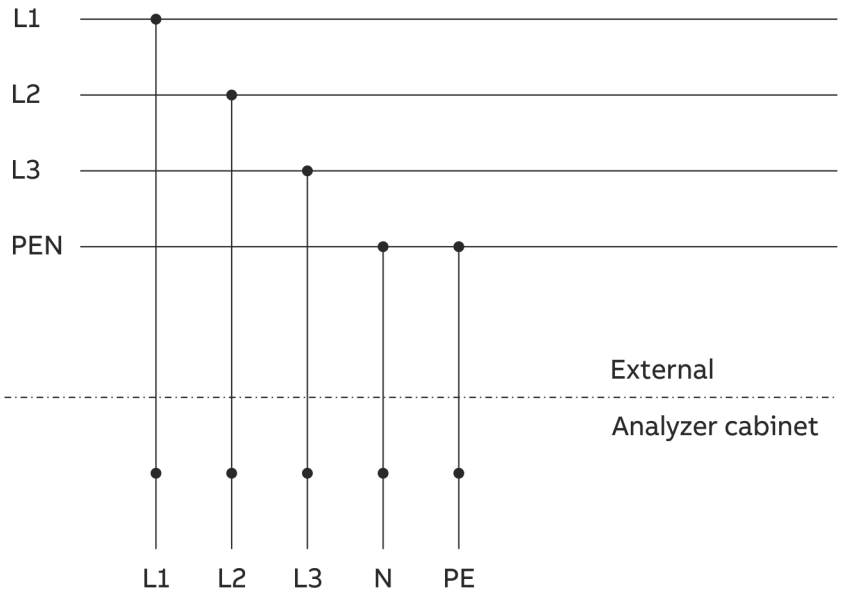
TT grid, 3 phase 230 V system



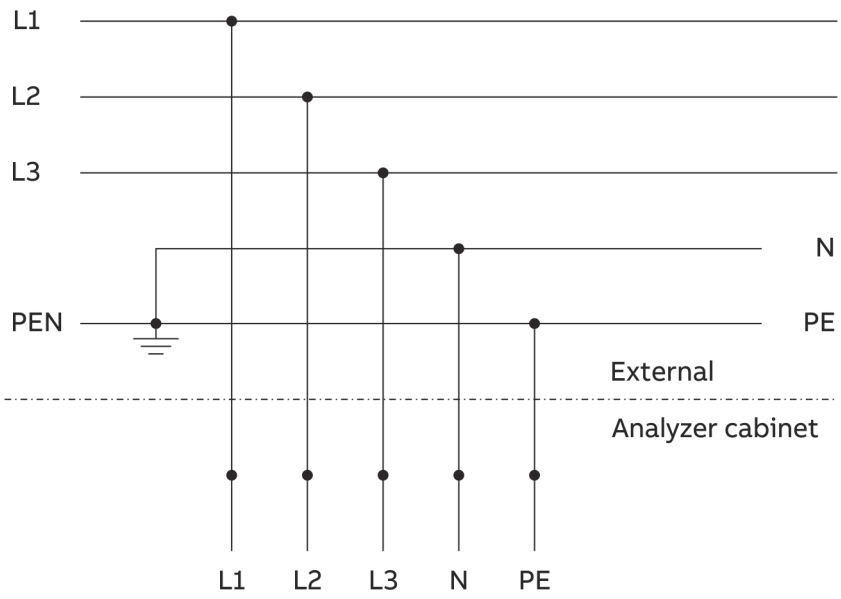
TN-S grid, 3 phase 230 V system



TN-C grid, 3 phase 230 V system



TN-C-S grid, 3 phase 230 V system



Gas sampling with automatic back-purging

In general

Filter plugging

During operation of the analyzer system the dust which is contained in the sample gas will accumulate in the probe filter of the gas sampling system. This is uncritical if dust concentration is low and only requires a cleaning of the filter periodically in longer time intervals.

But if the dust concentration is high, the dust accumulation in the filter will cause an increasing pressure loss, and the gas feed of the sample gas pump decreases and also the sample gas flow, and finally the filter is blocked in an extreme case.

Pump suction increase

At first this effect can be compensated by occasional adjustment of the sample gas flow, which increases the suction of the sample gas pump.

The pump is strong enough, but if the fouling continues, the needed suction for keeping up the required gas flow will increase to such a high value, that several unfavorable effects will emerge and can finally be accepted no longer.

Filter cleaning

If the suction exceeds a limit of about 300 mbar (accordingly the absolute pressure falls below 700 mbar), the sampling system filter has to be cleaned. The PFE2 and PFE3 filter units can be cleaned automatically by a back-purging procedure with compressed air. This procedure is controlled by the AC500.

Components for automatic back-purging procedure

Components for automatic back-purging procedure

To carry out the automatic back-purging of the filter unit, components are integrated in the analyzer system as follows:

- the PFE2 filter unit with valves combination for back-purging or
- the PFE3 filter unit and separate back-purging unit with integrated compressed-air conditioning components and
- the AC500 control program.

Control of the automatic back-purging procedure

The back-purging procedure is integrated into the AC500 control program of the analyzer system. The manual handling is carried out with the push-button "Back-Flush" on the analyzer system’s front plate.

Start of the back-purging procedure

Start of the back-purging procedure

The start of the back-purging procedure can be carried out

- Controlled by time
- Controlled by event
- Manually controlled.

Start controlled by time

After a cycle time has run down, the back-purging procedure will start automatically. A cycle time of 8 hours is factory-set.

Start controlled by event

A flow fault during normal measuring operation will start the automatic back-purging procedure. After back-purging was started by event, the procedure will run only once. If the procedure is finished (waiting time 30 s) and the starting event (flow fault) is still active, the back-purging procedure will not start again, even not controlled by time, and a status message will be generated. However, the back-purging procedure can be started manually after 30 minutes.

Manually controlled start

The manual start of back-purging procedure can be executed locally by pushing the "Back-Flush" pushbutton on the analyzer system’s front plate.

Program sequence

Program sequence

PFE2		Digital output:	-D08 DO2	-D08 DO3	-D08 DO1	-D08 DO4	-E05 MV1	Display	Status signal
		Valve:	-Y1.1	-Y2.1	-Y3.1	-Y4	-Y01	Message "Purge back active"	Maint. mode
Step	Duration	Function	Impulse compr. air	Filter back-purging	Tube back-purging	Venting	Position calibr. valve [5]		
0	8 h [1]	Measure	closed	closed	closed	open	Measure	off	off
1	10 s [6]	Back-purging probe filter	Impulse	open	closed	closed	Calibrate	on	on
2	14 s [7]	Back-purging probe tube	Impulse	closed	open	closed	Calibrate	on	on
3	6 s	Venting	closed	open	closed	open	Calibrate	on	on
4	150 s [2]	Post-purging	closed	closed	closed	open	Measure	on	on
0	8 h [1]	Measure	closed	closed	closed	open	Measure	off	off

PFE3		Digital output:		-A01 DO1	-A01 DO2	-A01 DO3	-E05 MV1	Display	Status signal
		Valve:		-Y12	-Y11	-Y07	-Y01	Message "Purge back active"	Maint. mode
Step	Duration	Function		Filter back-purging	Tube back-purging	Venting	Position calibr. valve [5]		
0	8 h [1]	Measure		closed	closed	closed	Measure	off	off
1	2 s	Switch over		closed	closed	closed	Calibrate	on	on
2	4 s [3]	Back-purging probe filter		open	closed	closed	Calibrate	on	on
3	8 s [4]	Back-purging probe tube		closed	open	closed	Calibrate	on	on
4	6 s	Venting		closed	closed	open	Calibrate	on	on
5	150 s [2]	Post-purging		closed	closed	closed	Measure	on	on
0	8 h [1]	Measure		closed	closed	closed	Measure	off	off

1) Cycle time factory-set to 8 hours
2) Post-purging time factory-set to 150 s
3) 1x pressure impulse 2 s, 1x interrupt 2 s
4) 1x pressure impulse 2 s, 1x interrupt 2 s, 1x pressure impulse 4 s
5) Calibration valve on = "Measure", calibration valve off = "Calibrate"
6) 3x interrupt 2 s, 2x pressure impulse 2 s
7) 3x interrupt 2 s, 2x pressure impulse 2 s, 1x pressure impulse 4 s

Switch over

At first the calibration valve -Y01 is switched over to position "Calibrate". This separates the sample gas conditioning system and the analyzer system from the sampling system and protects it against the back-purging pressure. At the same time the status "Maintenance mode" is activated and all analog outputs and limits are set on hold. The display reports "Purge back is active".

Back-purging probe filter

The back-purging procedure continues with the back-purging of the probe filter. To increase the cleaning effect, the compressed air is applied not continuously but by two 2 s pressure impulses alternating with a 2 s interval each.

Back-purging probe tube

After this the probe tube is purged back in the same way with two pressure impulses. A single pressure impulse of 4 s is followed, to blow out the remaining dust from the tube.

Venting and switch over

Next the pneumatic system is vented for 6 s and finally the calibration valve -Y01 is switched back from position "Calibrate" to position "Measure". This venting time removes an internal remaining pressure which might be still present in the pneumatic system and so avoids a damage of the analyzer’s measuring cell.

Post-purging period

The calibration valve switch back to position "Measure" will not finish the back-purging procedure, because first the actual sample gas must flow through the pneumatic system to purge it, and the analyzer must adjust to the new actual measuring value. A purge time of 150 s is factory-set.

End of the back-purging procedure

The back-purging procedure is not finished until the purge time has expired. Now the analog outputs and limits are set free again and they will take over the actual values. The message "Purge back active" in the display as well as the status signal "Maintenance mode" will vanish.

Cycle time

Cycle time duration

The cycle time is given as the time interval between two automatic starts of the back-purging procedure. The higher the dust concentration in the sample gas and the higher the sample gas flow, the shorter this time interval must be set, to avoid a blocking of the gas sampling probe filter.

Cycle time factory setting

The parameter "Cycle time" is factory-set to 8 h.

The parameter "Next event time" is factory-set to 08:00 / 12:00 / 16:00 / 20:00 / 00:00 / 04:00 o'clock.

Optimum cycle time setting

The cycle time should not be adjusted shorter than needed, because during the back-purging procedure (approx.28 s) and especially during the post-purge time (factory-set to 150 s) no measurement can be made. The optimum time will have to be found out by operational experience.

Cycle time minimum value

The cycle time should not be below a lower limit. The back-purging procedure with cold compressed air causes a cooling of the heated probe filter, and the filter temperature regulation needs some time to correct this temperature decrease. As the filter heating regulation is a rather slow control loop, this time will be relatively long. Therefore, the cycle time should not fall below approx. 60 min.

Event-controlled start of the back-purging procedure by filter plugging

Should despite the time controlled back-purging a probe filter blocking occur caused by temporary larger amounts of dust, with the result of a sample gas flow decrease beneath the admissible limit, an additional back-purging procedure is started as a result, and the probe filter is purged free in between.

Adjustment of the cycle time

To adjust the cycle time the parameters of the AC500 program must be changed. Please contact ABB service.

Post-purge time

Post-purge time duration

The post-purge time at the end of the back-purging procedure must be such, that the complete pneumatic system is flushed with the actual sample gas and the analyzer gets time to take over the actual measuring value again. The needed post-purge time depends on the respective layout of the system (i.e. the length of the sample gas line) and will have to be adjusted individually. A post-purge time of 150 s is factory-set.

Guide for the post-purge time

A guide for the needed post-purge time is given in the table below. Please add the times for the pneumatic system, the analyzer and the sample gas line.

	Response time (3 x T90, approx.)
Pneumatic system without sample gas line	27 s
plus analyzer Uras26	20 s
plus for each 10 m sample gas line I.D. = 4 mm	5 s
plus PFE2/PFE3 with probe tube 40, length = 1 m	45 s

Example

For an analyzer system with filter unit PFE2/PFE3 and 15 m sample gas line at 60 l/h sample gas flow and 100 l/h bypass flow the post-purge time is calculated as follows:

Post-purge time = 27 s + 20 s + 1.5 x 5 s + 45 s = 99.5 s

Adjustment of the post-purge time

To adjust the post-purge time the parameters of the AC500 program must be changed. Please contact ABB service.

Start-up and operation

Start-up

CAUTION
The analyzer system must stand in its operating position for about 24 hours prior to start-up.
Before activating the power supply check once again that the analyzer system operating voltage is set to match the line voltage.

NOTE
Initial startup of the analyzer system should be performed by trained personnel of the manufacturer or the supplier. ABB recommends having the startup done by ABB personnel.

Prior to start-up

- Check analyzer system seal integrity.

Power supply activation

1. Make sure that all fuse switches are deactivated.
2. Turn on the analyzer system power supply with the main switch.
3. Activate the fuse switches of the individual modules one after the other.

Function check

The following events will occur after the power supply is turned on:

1. The three "Power", "Maint" and "Error" LEDs light up.
2. The different booting phases are displayed on the screen. Also, the software version is displayed.
3. After a brief time, the screen switches to measurement mode.
4. The `STATUS MESSAGE` softkey appears on the screen. This indicates the possibility of a temperature or flow problem during the warm-up phase. By pressing the soft key, the user can recall the status message summary and view status message details.

Date and time check

A correct date and time setting is required for a proper operation of functions such as automatic calibration and time / date logging of error messages.

1. Select the date / time menu item:
   `MENU` → **`Configure`** → **`System`** → **`Date / Time`**
2. Check and, if necessary, correct the date and time.

The analyzer system is factory-set to the GMT+1 time zone.

Warm-up phase

Warm-up phase

The warm-up time is approx. 2 to 4 hours.

The warm-up phase can take longer if the analyzer system was not brought to room temperature before the power supply was activated.

During the warm-up phase measurement values can be outside the ranges specified in the data sheet.

End of the warm-up phase

The warm-up phase is over when the temperature and flow status messages are gone and the measured value drift is acceptable. The latter depends on the size of the measurement range.

Readiness, sample gas supply

At the end of the warm-up phase the analyzer system is ready for operation and automatically activates the sample gas supply.

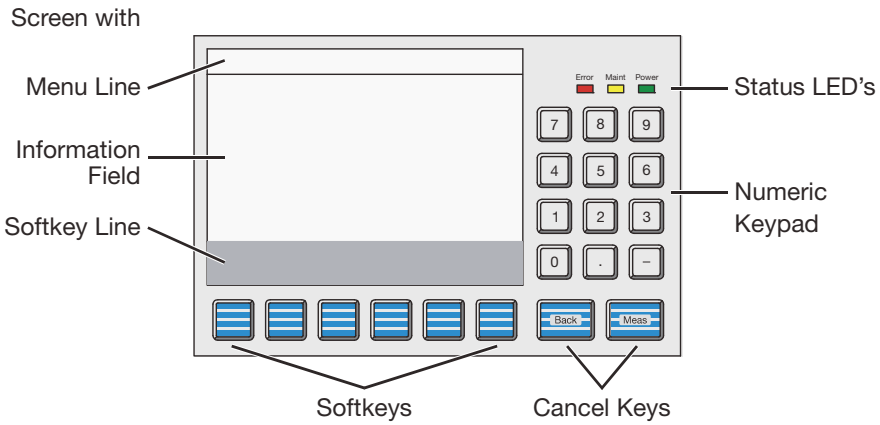
Calibration

Calibration should only be started after the warm-up phase.

Operation

Display and control unit

Overview

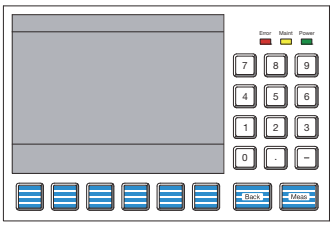


The display and control unit contains:

- The screen with
  - Menu line
  - Information field
  - Softkey line
- Status LEDs,
- Numeric keypad,
- Cancel keys and
- Softkeys.

Screen

Screen



The backlit graphics has a 320 x 240-pixel resolution.

The screen is divided into three panels

- Menu line
- Information field
- Softkey line

The menu line

The menu line appears at the upper edge of the screen. A line separates it from the information field.

It shows the current menu path and thus allows the operator to see where the system is in the menu tree. Additionally, it shows the name of the analyzer being processed.

The information field in measurement mode

In the measurement mode the information field shows the following information for each sample component in the analyzer modules installed in the gas analyzer:

- Values in numeric form and as a bar graph
- The physical unit for the measured value
- The measurement component designation
- The measurement range lower and upper limit values on the horizontal bar graph
- The analyzer type
- The analyzer name

Values from up to six sample components can be displayed simultaneously.

It is user-configurable

- which measurement values are shown on the screen and
- at which positions on the screen the measurement values are displayed.

In addition, the user can configure display elements that allow to

- enter values directly in the measurement mode or
- actuate keys.

NOTE
For further information about the screen in the measurement mode refer to the "Display" section.

The information field in menu mode

In menu mode the information field contains the menu or individual menu items or parameters with the applicable values, as well as operator prompts.

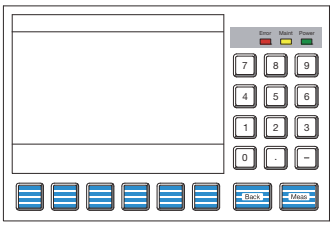
The softkey line

The softkey line appears at the lower edge of the screen. Its gray background distinguishes it from the information field.

The softkeys are further explained in the "Softkeys" section.

Status LEDs

Status LEDs



The three LEDs next to the screen show the user the gas analyzer's status.

Power

The green "Power" LED lights when the power supply is on.

Maint

The yellow "Maint" LED lights when the "Maintenance request" status signal is active.

The STATUS MESSAGE softkey appears on the screen at the same time.

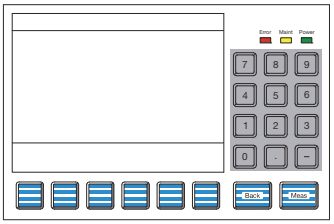
Error

The red "Error" LED lights when the "Failure" status signal or the overall status signal is active.

The STATUS MESSAGE softkey appears on the screen at the same time.

Numeric keypad

Numeric keypad



The numeric keypad is located to the right of the screen, under the status LEDs.

0 … 9, . , –

The operator can enter values directly with the:

- numeric keys "0" through "9"
- decimal point "." and
- minus sign "–".

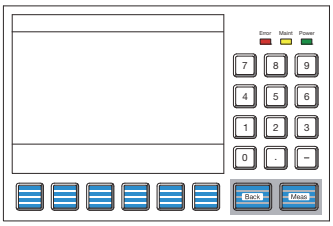
Examples:

- Test gas concentration,
- Date and time
- Air pressure
- Password

NOTE
Any digits displayed cannot be overwritten directly. They must be deleted with the BACKSPACE or CLEAR key before new digits can be entered.

Cancel keys

Cancel keys



The "Back" and "Meas" keys located under the numeric keypad are designated as cancel keys.

The "Back" key allows the operator to cancel a function or menu item and return to the previous menu level.

Only entries confirmed with the ENTER key are stored; unconfirmed items are not accepted.

The "Back" key also allows the operator to clear gas analyzer help text and messages.

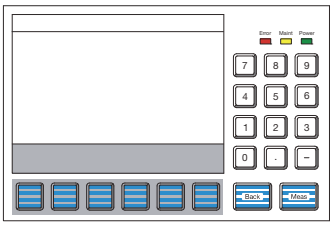
The "Meas" key allows the operator to cancel a function or menu item and to return to the measured value display in measurement mode.

Only entries confirmed with the ENTER key are stored; unconfirmed items are not accepted.

NOTE
The gas analyzer automatically reverts to the measurement mode to display values if the operator has not pressed a key in menu mode in the last five minutes ("time out").

Softkeys

Softkeys



The six keys under the screen and the softkey line at the lower edge of the screen are known as softkeys.

A softkey is the combination of the key and its designation in the softkey line.

A softkey does not have any set function but is assigned a function for a given situation as shown in the softkey line of the screen.

Pressing a softkey is the equivalent of pressing the key assigned to the function; this process is illustrated by the quasi-three-dimensional softkey representation on the screen.

Softkeys are also called keys in this operating instruction.

The softkeys in measurement mode

In the measurement mode, the softkey line contains the softkeys MENU and >>. The softkey Status message also appears if an error occurs.

The MENU key is used to call up the main menu and switch to menu mode when in measurement mode.

The >> key allows the operator to scroll to the next display "page". This key only allows forward scrolling.

The "Back" key is used for backward scrolling.

The Status message key appears in measurement mode if a "Failure" or "Maintenance request" condition arises.

This key allows the operator to call up the status message summary and view the status messages.

The user can also call up a detailed display for any message in the log.

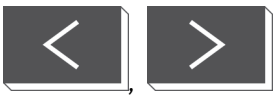
The softkeys in menu mode

In menu mode, a series of softkeys appears on the softkey line. Their descriptions and functions depend on the specific situation.

In menu mode the standard softkeys have the following functions:

The operator uses these two arrow keys to move the selection cursor up or down, e.g. in menus or lists to choose vertically arranged (menu) items.

The menu item selected is reversed, i.e. appearing as bright characters on a dark background.



The operator uses these two arrow keys to move the selection cursor left or right, e.g. into or out of a submenu or to select (menu) items arranged adjacent to each other.

The menu item selected is reversed, i.e. appearing as bright characters on a dark background.

The operator can use the BACKSPACE key to delete characters to the left of the cursor (as in a PC keyboard).

The operator can use the CLEAR key to delete all characters in a selected field.

The operator can use the ENTER key to:

- Call up menu items for processing
- Start functions
- Confirm entries, e.g. parameter settings

The ENTER key is always at the right margin of the softkey line.

The operator can use the HELP key to access context-sensitive help. The screen will then show a help message explaining the menu item selected.

The operator can use the "Back" key to clear the help message.

Password protection

Elements of password protection

Password protection consists of three elements

- Password level,
- User group,
- Password.

Password level

Each menu item is assigned a password level. Password levels are numbered with 0, 1, 2 and 3.

Menu items are assigned to different password levels in order to assure that specific menu items can only be changed by authorized users.

User group

The definition of a user group is that every user that belongs to it has access entitlement at certain password levels, i.e. can make changes to the menu items at these levels.

Some user groups are set-up at the factory.

A user group can be made up of one or more users.

Password

Every user group set-up in the system has a password.

The password consists of six digits which can be entered via the numeric keypad.

Passwords are pre-assigned for the factory-set user groups.

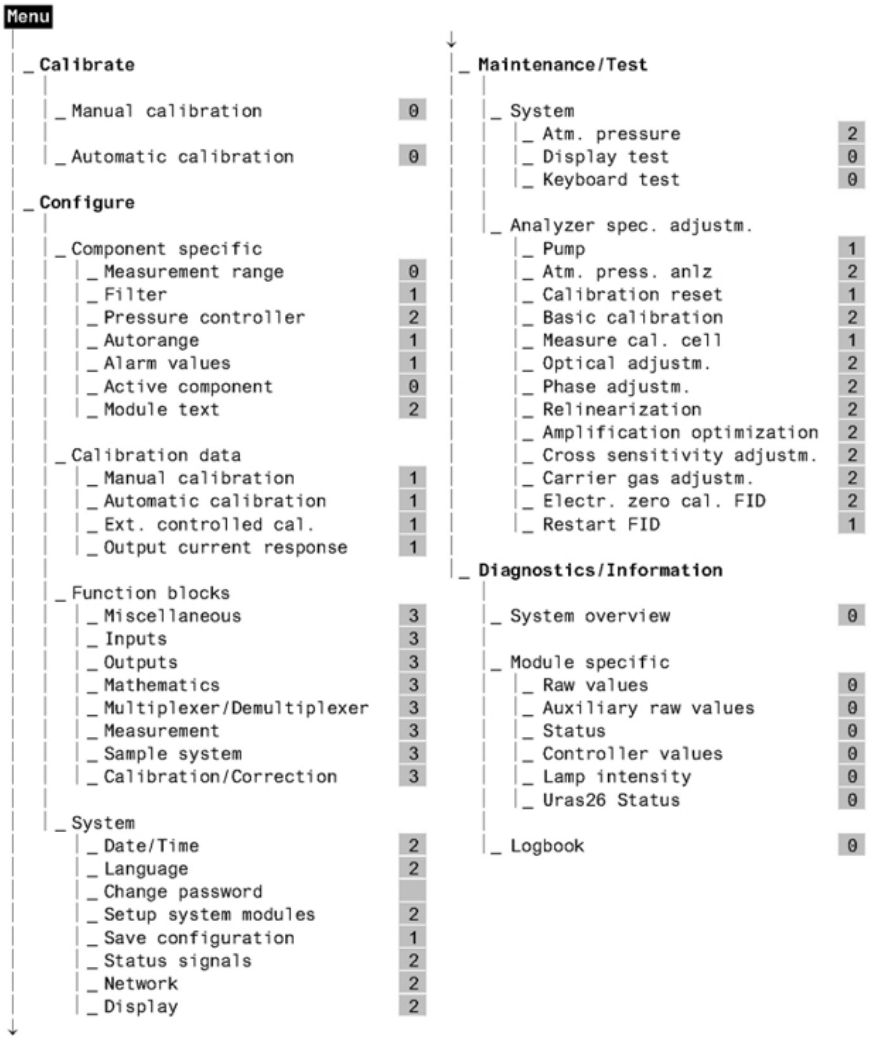
Factory setting

User group	Access to password levels	Default password
Every user	0	None
Maintenance team	0, 1	471100
Specialist team	0, 1, 2	081500
Function block specialist	0, 1, 2, 3	325465
Field service	0, 1, 2, 3, 4, S	737842

It is recommended to change the default passwords.

Menu tree

Menu tree



For reasons of brevity only the top-level parameters and functions are shown; the menu branches more extensively at most menu items, e.g. into the various measurement components or into the selection and adjustment of values.

Password levels

For each menu item its password level (0, 1, 2, 3) is shown in the table.

For some menu items, individual sub-menu items are on a higher password level. These apply especially to those sub-menu items which allow access to function block applications.

Note: The "Change password" menu item is not assigned to a specific password level.

Setting the time zone, date and time

Menu path

MENU → **Configure** → **System** → **Date/Time**

Procedure

Parameter	Explanation
Time Zone	The time zone can be selected either from the GMT (Greenwich Mean Time) values or from the continent/country/city list.
Date	Date must be entered in month/day/year format. Enter year with 4 digits.
Time	Time must be entered in hour: minute:second format. Enter seconds, too.

Definitions

GMT = Greenwich Mean Time
CET = Central European Time = GMT + 1 hour
CEST = Central European Daylight-saving Time = GMT + 2 hours

Daylight-saving time

The analyzer system is automatically set to daylight-saving time.

Note: This applies only when the time zone has been selected from the continent/country/city list and not from the GMT values list.

Condition as delivered

The analyzer system is factory-set to the GMT+1 time zone.

Accept the time settings

Press the softkey SET TIME to accept the modified time settings.

Selecting user interface language

Menu path

MENU → **Configure** → **System** → **Language**

Language selection

Two user interface languages are factory-configured (per order) in the analyzer system. In the menu item Language, the user can switch between these two languages.

Other languages

Other user interface languages can be loaded into the analyzer system using the SMT Software Migration Tool. SMT can be found on the DVD-ROM "Software tools and technical documentation" which is delivered with the analyzer system.

These language pairs are available:

- English – German
- English – French
- English – Italian
- English – Dutch
- English – Spanish
- English – Brazilian
- English – Polish
- German – Dutch

Maintenance

Safety information

CAUTION
Only persons familiar with the maintenance of comparable analyzer systems and certified as being capable of such work should work on the system.

Safety labels affixed to the analyzer system

CAUTION
Observe the safety labels affixed to the analyzer system or to the individual components:

Consult documentation!

Hot surface! (Temperature > 60 °C)

Corrosive material!

Risk of electric shock!

Harmful substances

CAUTION

When working with corrosive reagents note the hazard information and safety precautions contained in the applicable material safety data sheets.

Condensates are often acidic. Neutralize condensates and follow the prescribed measures for disposal.

Harmful gases

CAUTION

Some of the gases measured with the analyzer system are harmful to health.

Therefore, the sample gas must not escape from the gas path during normal operation and maintenance works.

A seal integrity check of the analyzer system has to be performed at regular intervals.

The diluted exhaust gas must be drained out of the installation room of the analyzer cabinet.

Regular maintenance tasks

NOTE
Prior to performing any maintenance works on the analyzer system be sure to activate the "Maintenance Mode" on the "Control Panel" screen thus setting the "Maintenance Mode" status signal.
Be sure to reset this setting after finishing the maintenance work.

Daily

- Visual inspection of the analyzer cabinet
- Check of flow meter for constant flow
- Check status of LEDs for error signals

Weekly

- Automatic calibration: Zero-point calibration with ambient air and end-point calibration with calibration cells (is predefined in the system and will be executed automatically once a week)
- Cleaning of ceramic filter from the sampling probe, if required use compressed air carefully
- If required: emptying of condensate collecting flask, universal filter and acid filter

CAUTION
Condensate is corrosive, handle accordingly!

Every 6 months

As weekly, additionally:

- Change of the filter element in the universal filter
- Change of the acid filter
- Change of the filter element in the cabinet fan
- Cleaning of ceramic filter from the sampling probe

Every 12 months

As every 6 months, additionally:

- Change of hose at the hose pump from gas cooler
- Change of water trap
- Seal integrity check
- Adjustment of calibration cells with test gas

Spare parts

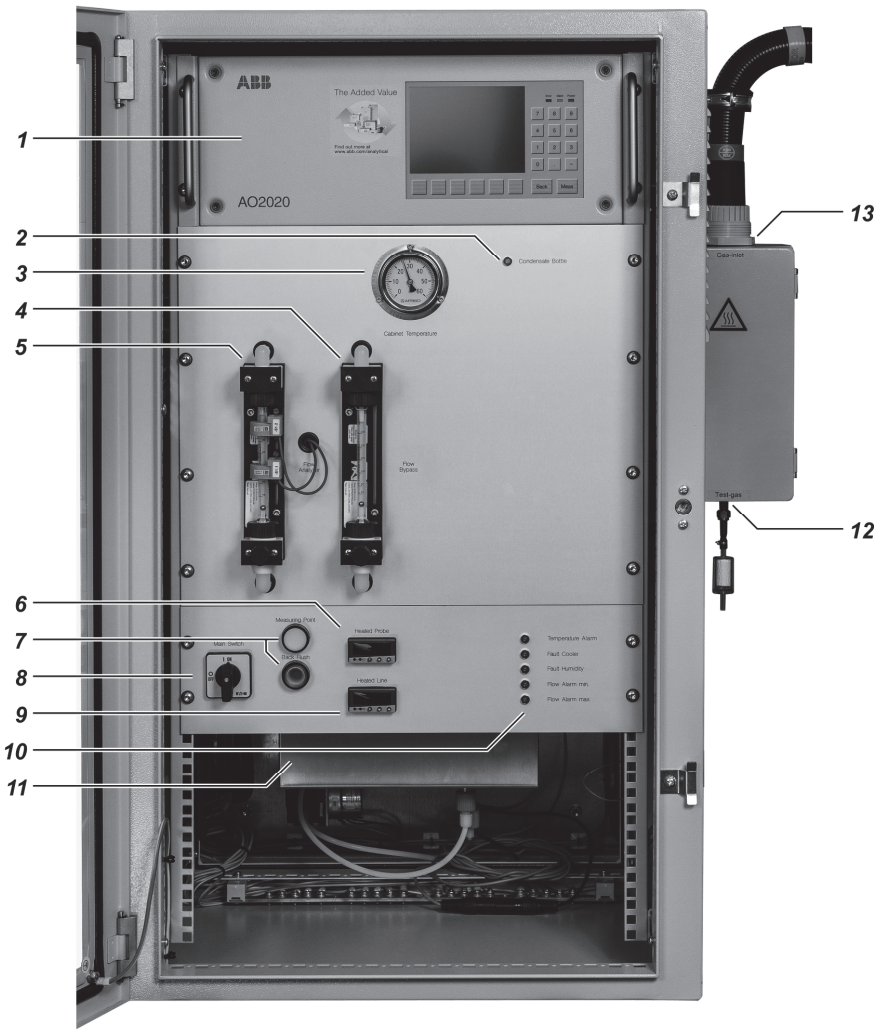
Description	Demand for one year
Filter (ceramic) sampling probe	2x
Filter (PTFE) inside cabinet	2x
Test gas filter	2x
Aquastop (upstream the analyzer)	2x
Hose for condensate pump	2x
Condensate pump	1x
Filter material for cabinet fan	1x
Solenoid valve (inside the cabinet)	2x
Temperature controller	4x
Zero gas filter	1x

Spare parts information

Spare parts information can be found on the Internet using the address https://online.abb.com/.

Analyzer cabinet: Visual inspection

View of the analyzer system



Visual inspection

	Device, module	Nominal condition
1	Gas analyzer display: Measured values, status messages	Green LED "Power" ON
2	Condensate bottle status indicator	LED OFF
3	Cabinet temperature indicator	< 45 °C
4	Bypass flow meter	120 l/h
5	Analyzer flow meter	40 to 80 l/h
6	Heated probe temperature controller	180 °C
7	Measuring point and back-purging pushbuttons	Measuring point pushbutton ON, Back-purging pushbutton OFF (can be pushed during visual inspection)
8	Main switch	ON
9	Heated line temperature controller	180 °C
10	Status indicators: Temperature alarm, Fault cooler, Fault humidity, Flow alarm min, Flow alarm max	All LEDs OFF
11	Sample gas cooler temperature	5 °C
	Cooling unit	Typical set point: 35 °C

Cleaning hints

- Never use water or any solvents to clean parts inside the analyzer cabinet.
- Always operate the analyzer system with cabinet door closed. Remove dust inside the analyzer cabinet using a broom and a vacuum cleaner.
- Clean the outside of the analyzer cabinet with a wet towel and mild cleaning agents. Pay attention that no droplets invade the cabinet.

Calibrating the analyzer system

CAUTION
Only persons familiar with the calibration of comparable analyzer systems are certified as being capable of such work and should work on the system.

NOTE
Calibration of the analyzer system has to be performed on board every 6 to 12 months with test gas, in accordance to agreement with class.

Conversion of concentration values

Care has to be taken, that the certified test gas used has to be specified in % by volume. In case it is specified in volume by mole there has to be a conversion as following:

$$Vol_C = \frac{\frac{X_C * m_C}{\rho_C}}{\frac{X_C * m_C}{\rho_C} + \frac{X_T * m_T}{\rho_T}}$$

Vol_C volume fraction of the component
X_C mole fraction
m_C molar mass of the component
ρ_C density of the component in the reference state
X_T mole fraction of the component in the reference state
ρ_T density of the carrier gas in the reference state
m_T molar mass of the carrier gas

Basics

The purpose of the calibration (adjustment) is to scale the analyzer with a reference normal. This reference normal can be a (certified) test gas or a built-in calibration cell.

When calibrating SO_2 with infrared analyzers, some characteristics have to be considered. Firstly, SO_2 is a water-soluble gas, which means that parts of the gas may be solved in water. On the other hand, SO_2 is overlaid by the water signal in the infrared range. Therefore, it is important that the water content in the measured gas is constant. This is achieved by the gas cooler, which stabilizes the output to a constant dew point of 3 °C below the entrance dew point. The error caused by the overlay of the constant water signal is compensated in the analyzer by shifting the zero point.

In continuous operation you will also get a lossless operation, as long as the gas concentration and the inlet humidity do not vary significantly.

Preconditions

- Ambient air temperature: +5 °C to +40 °C
- Flow from test gas bottle has to be as similar to the flow via the membrane pump as possible. The flow of the test gas bottle can be regulated via the pressure valve on top of the bottle.

Adjustment with calibration cell and ambient air

The dew point of the inlet air should be similar to the measured gas, for not changing the conditions in the cooler.

1. Start calibration process.
2. The solenoid valve switches to ambient air.
3. A defined purging time of 90 seconds starts to guarantee that all remains of measuring gas are replaced.
4. The zero point is set.
5. The calibration cell is driven into the gas path.
6. The end point is set.
7. The calibration cell is driven out of the gas path.
8. The solenoid valve is switched back to measuring gas.
9. A defined purging time of 90 seconds starts to guarantee that all remains of zero gas are replaced.
10. The measuring operation is restarted.

Adjustment with test gases

Test gases are dry gases, without any amount of water content. The resulting zero-point shift switches the complete sensitivity line parallel and adjusts the calibration to the operating conditions.

1. Start calibration process.
2. The zero gas is supplied through the gas cooler.
3. A defined purging time of 90 seconds starts to guarantee that all remains of measuring gas are replaced.
4. The zero point is set.
5. The end-point gas is supplied.
6. A defined purging time of 90 seconds starts to guarantee that all remains of zero gas are replaced.
7. The end point is set.
8. The solenoid valve is switched back to measuring gas.
9. A defined purging time of 90 seconds starts to guarantee that all remains of end-point gas are replaced.
10. The measuring operation is restarted.

Adjustment of the calibration cells with test gas

The calibration cells have to be checked in regular intervals with certified test gas. First the analyzer has to be adjusted with test gas. Then the analyzer has to be purged with zero gas and the calibration cell has to be driven into the gas path. When there is a difference between the measuring signal resulting from the calibration cell and the nominal value from the test gas, the current value has to be set and stored as new nominal value.

1. Start calibration process.
2. The zero gas is supplied through the gas cooler.
3. A defined purging time of 90 seconds starts to guarantee that all remains of measuring gas are replaced.
4. The zero point is set.
5. The end-point gas is supplied.
6. A defined purging time of 90 seconds starts to guarantee that all remains of zero gas are replaced.
7. The end point is set.
8. The calibration cell is driven into the gas path.
9. The measured value has to be compared to the nominal value of the calibration cell and corrected if necessary.
10. The calibration cell is driven out of the gas path.
11. The solenoid valve is switched back to measuring gas.
12. A defined purging time of 90 seconds starts to guarantee that all remains of end-point gas are replaced.
13. The measuring operation is restarted.

Checking the seal integrity

When is the seal integrity check needed?

Complete seal integrity check of the analyzer system is reserved for certified service personnel.

It should be carried out regularly at least every 12 months.

It must be performed after gas paths within the analyzer system have been opened and following a restart from cold.

The seal integrity check should be performed according to the pressure-drop method using a U-tube manometer.

Procedure

1. Interrupt the sample gas supply.
2. Close the sample gas outlet.
3. Disconnect the sample gas line from the sample gas inlet and connect a tee fitted with a shut-off valve.
4. Connect the U-tube manometer half filled with water to the free end of the tee.
5. Blow air or nitrogen through the shut-off valve to a gauge pressure of approx. 100 hPa (= 1000 mm water column).
6. Close the shut-off valve. The pressure should not chance measurably in 1 minute (pressure drop ≤ 1 hPa). A sharp pressure drop is a sign of a leak.

Replacing the filter element in the filter unit

CAUTION
Prior to performing any maintenance works on the analyzer system be sure to activate the “Maintenance Mode” on the “Control Panel” screen thus setting the “Maintenance Mode” status signal. Be sure to reset this setting after finishing the maintenance work.

Part numbers

Filter insert: 0730683
Filter stone: 0730682 (0,3 mm)

Cleaning the filter element

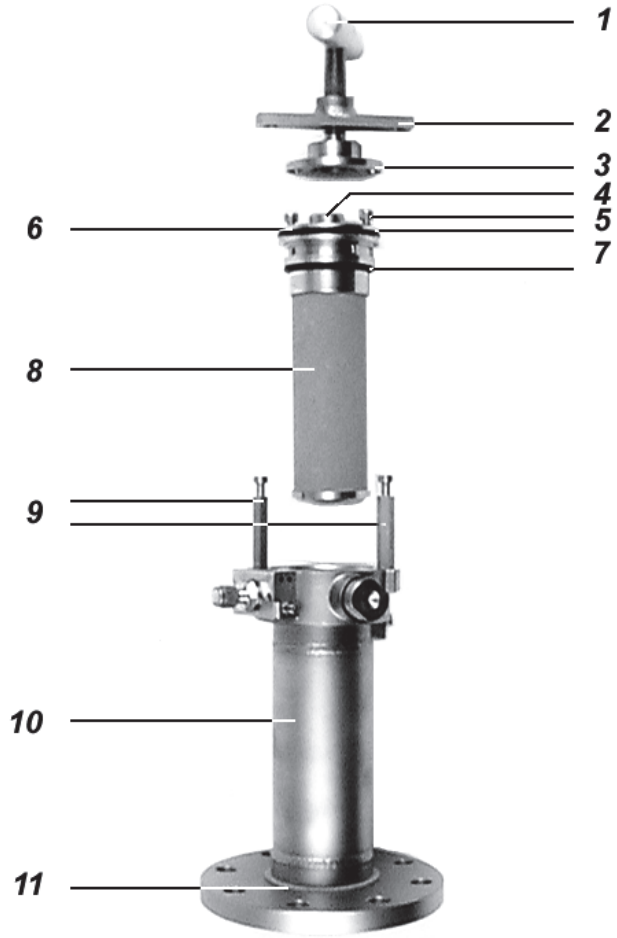
If the filter element is not permeable enough anymore, remove it so that you can remove the contamination mechanically.

Replacing the filter stone

If the filter stone is obviously damaged, replace it with a new one.

NOTE
To avoid a prolonged down time of the analyzer system the complete filter insert should be changed. The disassembling, cleaning and assembling of the used filter stone and O-rings should be done separately.

Filter element



1 T-handle

2 Bridge

3 Detaching disk

4 Locking screw

5 Removal screws

6 Flange

7 O-ring seals

8 Filter element

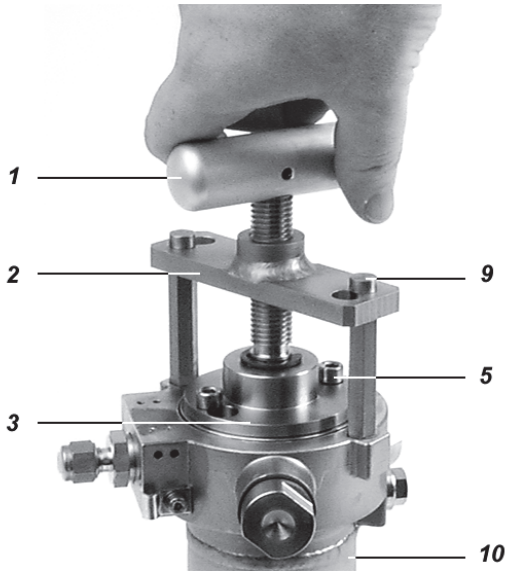
9 Bridge holding device

10 Casing

11 Casing inner seal (green)

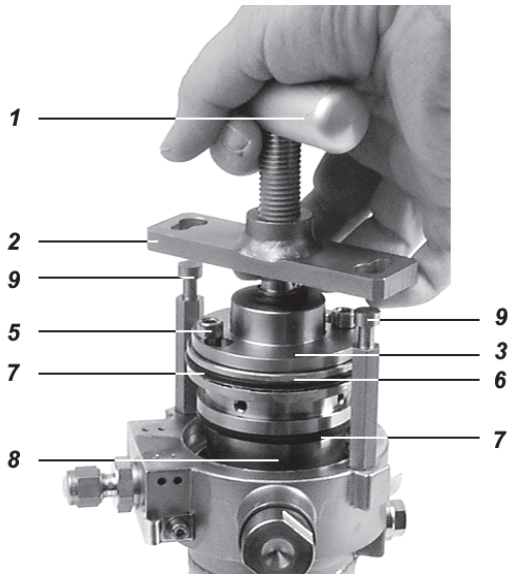
Replacing the filter element

1 Turn the T-handle ***1*** of the filter removal device ***1-3*** in counter-clockwise direction.
This pulls the filter element ***8*** via the detaching disk ***3*** out of the casing ***10***.

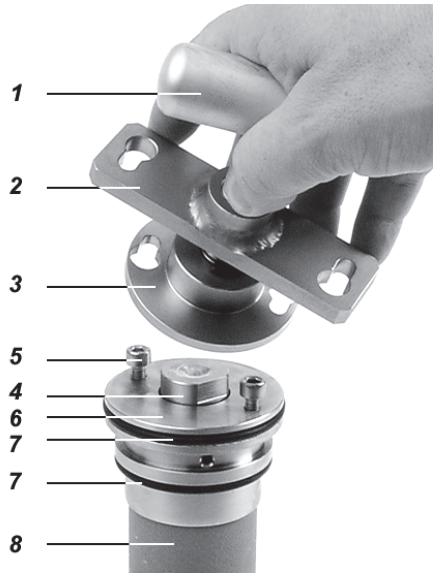


2 Turn bridge ***2*** until it can be pulled off from the bridge holding device ***9*** through the elongated holes.

3 Pull out filter element ***8*** with bridge ***2*** and detaching disk ***3***.



4 Turn detaching disk ***3*** until it can be pulled off from the hexagon screws ***5*** via the elongated holes.
Never loosen or tighten the hexagon screws ***5***. They have been adjusted at the factory so that the detaching disk ***3*** can be easily moved.



Either

5 Clean the filter element ***8***.

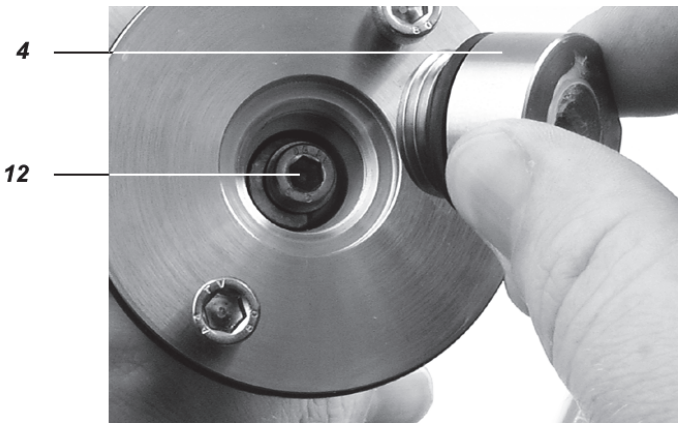
6 Replace seals ***7*** (O-rings from the accessory set).
Re-lubrication is not necessary even after replacing O-rings ***7***.
It is not necessary to replace the green casing inner seal ***11*** between flange ***6*** and casing ***10***.

7 Re-install the filter element ***8***: Steps 1 to 4 in reverse order.

Or

8 Screw off locking screw ***4*** with open-end spanner NW 22.

9 Screw out the hexagon socket screw ***12*** underneath locking screw ***4***.



10 Take out the filter stone.

11 Insert a new filter stone (with new O-rings from the accessory set).

12 Replace seals ***7*** (O-rings from the accessory set).
Re-lubrication is not necessary even after replacing O-rings ***7***.
It is not necessary to replace the green casing inner seal ***11*** between flange ***6*** and casing ***10***.

13 Re-install the filter element ***8***: Steps 1 to 4 in reverse order.

Replacing the cooling unit / fan outlet filter mesh

When is filter mesh replacement needed?

The cooling capacity of the cooling unit or the ventilation fan depends upon the cleanness of the filter mesh. It should be replaced if it begins to turn dark.

Replacing the filter mesh

1. Remove the grid which holds the filter mesh in place.
2. Change the filter mesh.
3. Re-assemble the grid.

Replacing the suction filter in the diaphragm pump

CAUTION
Residues of the gas that the pump has been feeding may be found on the diaphragm and valve plates. There materials can flow out when the diaphragm pump is opened. Take appropriate measures where needed to collect such residues.

When does the suction filter need to be replaced?

The suction filter in the pump must be replaced when the pump is no longer feeding gas efficiently enough.

Emptying the condensate collection bottle

CAUTION
When working with corrosive reagents note the hazard information and safety precautions contained in the applicable material safety data sheets.
Condensate is often acidic. Neutralize condensate and follow the prescribed measures for disposal.

Emptying the condensate collection bottle

Empty the condensate collection bottle when the applicable status message is displayed.

Troubleshooting

CAUTION
The tasks described in this chapter require special training and under some circumstances involve working with the analyzer system open and powered up. Therefore, they should only be performed by qualified and specially trained personnel.

Dynamic QR code

Application

Dynamic QR Code is a unique feature to display dynamically generated QR codes on the gas analyzer screen.

The QR code contains static information for device identification as well as dynamically generated information on system configuration and gas analyzer health status.

Static data for device identification are among other data:

- Production number
- Production date
- Software version
- Serial numbers of built-in analyzer modules and components

Dynamic data for error diagnosis are among other data:

- Status messages
- Measured values
- Temperature, pressure and flow values
- Drift values
- Analyzer-specific values

In combination with mobile devices (smartphone, tablet, etc.) Dynamic QR Code represents an innovative way of customer’s communication which allows, for instance, improved case-specific support by ABB resulting in an increased availability of analyzer assets.

Dynamic QR Code is compatible with the ABB application "my Installed Base" as well as with standard QR code scanner applications.

Handling

The QR code is selected in the gas analyzer's diagnosis menu and displayed on the gas analyzer's screen.

There is a direct link from the status messages overview to the diagnosis menu. In addition, the QR code can be selected in Remote HMI and scanned from the computer screen.

The displayed QR code is scanned using the QR code scanner application installed in the mobile device. The resulting text information displayed on the mobile device's screen is then sent by e-mail or a suitable messenger service to the local service representative defined in the "Measurement Care" agreement.

As an alternative, a photo of the displayed QR code can be sent to the service representative.

Select QR code

Menu path

`Menu` → `Diagnosis/Info.` → `QR Code Display`

Procedure

1 Select system overview or specific analyzer module.

2 Select QR code with **ENTER**.

3 Scan QR code.

4 Return to selection with **Back**.

The diagnosis menu can be selected directly from the status messages overview.

The QR code can also be selected in Remote HMI and scanned from the computer screen.

Recommended QR code scanner applications

ABB recommends the use of the following QR code scanner applications (available free of charge for iOS and Android):

"my Installed Base" by ABB

Download from App Store:

Download from Google Play:

"QR Scanner" by Kaspersky

Download from App Store:

Download from Google Play:

Status messages

Information displayed on the ship control system

- Calibration analyzer
- Back-flush active
- Collective error
- Measuring range selection SO_2
  - MR1 0 to 250 ppm
  - MR2 0 to 500 ppm

Information displayed on the analyzer system

- Temperature alarm
- Fault cooler
- Fault humidity
- Flow alarm min.
- Flow alarm max.
- Condensate level

Sample gas cooler problems

Problem	Cause	Solution
No display	No power	Check power supply
	Fuse blown	Check fuse and change it if necessary
Cooler not running	High temperature at the compressor casing	Wait until cooled off and care for enough ventilation
Status-LED blinks with high temperature	Operational temperature not yet reached	Wait for 20 minutes maximum
	Cooling capacity to low, even though cooler is running	Make sure that air can circulate free and that ventilation louvers are not obstructed
	Gas flow / dew point / gas temperature too high	Check application parameters, install pre-separator
	Fan broken	Check fan, replace if necessary
Status-LED blinks with low temperature	Control defect	Send cooler for inspection
Condensate in gas outlet	Condensate flask full	Drain flask
	Stuck valve in automatic condensate drain	Flush both directions
	Cooler overloaded	Check limiting parameters
Reduced gas flow	Clogged gas path	Check / flush heat exchanger
	Condensate outlet clogged by ice	Send cooler for inspection
Display toggles between temperature and error message Error 1	Broken wire	Temperature sensor defect. Send cooler for repair
Display toggles between temperature and error message Error 2	Short circuit	Temperature sensor defect. Send cooler for repair

Gas analyzer problems

Problem	Cause	Solution
Blinking measurement value readout	Measured signal violates measurement range limits	Note: Measurement value > +130 % MRS or measurement value < -100% MRS. Additionally, status messages 344 or 345 are generated.
Blinking ––E–– in measurement value readout	Problem in measured signal processing	View status messages Identify cause and repair
Blinking ––E–– in mA value readout	Problem in output current circuit	Identify cause (e.g. line break) and repair
Flow problem	External gas lines or filters dirty, plugged or leaking	Disconnect the gas analyzer from the gas preparation system Blow out the gas lines with compressed air or clear them mechanically Change the filter elements and packing Check gas line seal integrity
	Gas analyzer gas paths crimped or leaking	Disconnect the gas analyzer from the gas preparation system Check the analyzer module gas lines and the gas module lines for crimping or loose connections Check the integrity of the analyzer module gas paths and (if applicable) of the lines to the gas module
Temperature problem	Gas analyzer still in warm-up phase	Approx. 30 minutes without thermostat Approx. 2 hours with thermostat
	Excessive air movement	Reduce the flow of air around the gas analyzer Install shielding against draft
	Ambient temperature outside of permissible range	Protect the gas analyzer from cold and heat sources such as the sun and vats Maintain the permissible ambient temperature range

Gas pump problems

Problem	Cause	Solution
Low pump output or none at all	Pump is not connected to mains	Check the mains connection and the voltage
	Suction side (suction filter) is blocked	Replace the suction filter
	Discharge side, connection hose blocked	Clean or replace the hose
	Hoses are defective, bent or have come off	Replace the hoses or reconnect them
	Electrical defect	Return the pump to the manufacturer for repair
Loud noise	Internal parts of the pump are worn out or are out of alignment	Return the pump to the manufacturer for repair

Analyzer cabinet problems

Problem	Cause	Solution
Flow to analyzer not constant / too low	Solenoid valve plugged	Untie sampling line on both ends of the solenoid valve and carefully clean the valve from both sides with compressed air
End piece of sampling probe black / plugged	Accumulation of hydrocarbons	Untie sampling line from solenoid valve before cleaning the complete line with compressed air from the top of the stack to the black / plugged end
Humidity in one of the filter elements	Gas cooler malfunctioning	Check function of the gas cooler. If not working, see above "Sample gas cooler problems"
Gas flow to analyzer disrupted	Water trap closed after contact with condensate	Replace the water trap
"Temperature Alarm" in status signal board blinking red	Heating in sampling probe or sampling line damaged	Pt100 broken, needs to be replaced by service personnel
	Temperature controller defective	Temperature controller needs to be replaced by service personnel

Notify service

Who should you contact for further help?

Please contact your local service representative. For emergencies, please contact

ABB Service,
Telephone: +49-(0)180-5-222 580, Telefax: +49-(0)621-381 931 29031,
E-mail: automation.service@de.abb.com

Before you notify service ...

Before you notify service because of a malfunction or a status message, please check whether there actually is an error and whether the gas analyzer is actually operating out of specifications.

When you notify service ...

Select the QR code (see page 76) in the Diagnosis/Info menu, scan the QR code and send the displayed text information to the local service representative defined in the "Measurement Care" agreement.

When you notify service because of a malfunction or a status message, have the following information available:

- The production number (F-No.) of the analyzer system. It is found on the identification plate as well as in the Analyzer Data Sheet.
- The system controller and system module software versions are found in the menu item
  `MENU → Diagnosis/Info. → System overview.`
- An exact description of the problem or status as well as the status message text or number.

This information will enable the service personnel to help you quickly.

Have the Analyzer Data Sheet ready – it contains important information that will help the service personnel to find the cause of the malfunction.

Disposal

Notes for disposal

Products that are marked with the adjacent symbol may not be disposed of as unsorted municipal waste (domestic waste). They should be disposed of through separate collection of electric and electronic devices.

This product and its packaging are manufactured from materials that can be recycled by specialist recycling companies.

Bear the following in mind when disposing of this product and its packaging:

- This product is under the open scope of the WEEE Directive 2012/19/EU and relevant national laws.
- The product must be supplied to a specialist recycling company. Do not use municipal waste collection points. These may be used for privately used products only in accordance with WEEE Directive 2012/19/EU.
- If there is no possibility to dispose of the old equipment properly, ABB service can take care of its pick-up and disposal for a fee. To find your local ABB service contact visit abb.com/contacts or call +49 180 5 222 580.

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Notes

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3KXG141004R4201

OI/GAA330-M-EN Rev. C 02.2019