SIPROCESS UV600

Gas analyzers for determining UV-absorbing gases

7MB2621

Manual

Continuous gas analysis

SIEMENS

SIEMENS

Continuous gas analysis

Gas analyzer for measuring UV-active gases SIPROCESS UV600

Operating Instructions

7MB2621

10/2013

A5E03529375-02

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction 1

1.1 Purpose of this documentation

These instructions contain all information required to commission and use the device. It is your responsibility to read the instructions carefully prior to installation and commissioning. In order to use the device correctly, first review its principle of operation.

The instructions are aimed at persons mechanically installing the device, connecting it electronically, configuring the parameters and commissioning it, as well as service and maintenance engineers.

1.2 History

Issue	Comment
01 10/2011	First edition
02 10/2013	Revision of significant functions

1.3 Checking the consignment

Check the device packaging for damage. Inform your supplier of any damage. Retain the damaged parts for clarification.

Check the scope of delivery by comparing the shipping documents with your order for correctness and completeness.

Do not take damaged or incomplete devices into operation under any circumstances.

Special conditions for storage and transportation of device listed in Section "Auto-Hotspot".

1.4 Notes on warranty

The contents of this manual shall not become part of or modify any prior or existing agreement, commitment or legal relationship. The sales contract contains all obligations on the part of Siemens as well as the complete and solely applicable warranty conditions. Any statements regarding device versions described in the manual do not create new warranties or modify the existing warranty.

The content reflects the technical status at the time of publishing. Siemens reserves the right to make technical changes in the course of further development.

Safety notes

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2.1 Precondition for use

This device left the factory in good working condition. In order to maintain this status and to ensure safe operation of the device, observe these instructions and all the specifications relevant to safety.

Observe the information and symbols on the device. Do not remove any information or symbols from the device. Always keep the information and symbols in a completely legible state.

2.2 Requirements for special applications

Due to the large number of possible applications, each detail of the described device versions for each possible scenario during commissioning, operation, maintenance or operation in systems cannot be considered in the instructions. If you need additional information not covered by these instructions, contact your local Siemens office or company representative.

Note

Operation under special ambient conditions

We highly recommend that you contact your Siemens representative or our application department before you operate the device under special ambient conditions as can be encountered in nuclear power plants or when the device is used for research and development purposes.

2.3 Proper use

The SIPROCESS UV600 gas analyzer measures the concentration of one gas or several gases in a gas mixture.

The following conditions apply when selecting the location of use of the analyzer and the condition of the supplied sample gas:

Location of use

- The SIPROCESS UV600 may only be used in closed rooms
- The SIPROCESS UV600 must not be used in potentially explosive atmospheres

Sample gas

The SIPROCESS UV600 is **not** suitable for measuring **flammable and/or explosive gases and gas mixtures**!

In addition, the sample gas must be free from:

- Substances which could attack the materials of the gas path in the analyzer
- Particles which could deposit in the gas path in the analyzer
- Gas components which could condense in the analyzer during normal operation

Additional information is available in the Auto-Hotspot . In case of doubt, we recommend that you discuss your application with our technical department.

It is also possible that components may be present in the sample gas which influence the measurement (cross-sensitivity). In such a case, the displayed value deviates from the actual measured value. In order to minimize or eliminate cross-sensitivities, we recommend that you discuss your application with our technical department

2.4 Responsibilities of the operating company

Qualified personnel

Installation, commissioning, operation, and maintenance of the SIPROCESS UV600 gas analyzer may only be carried out by qualified personnel.

Qualified personnel in the sense of the safety-related information in this Manual are persons who are

- either familiar with the safety concepts of automation equipment as system planning and design engineers
  or
- have been trained to work with automation equipment and are conversant with the contents of this Manual as operating personnel
  or
- are trained to repair such automation equipment and authorized to energize, tag, connect and ground circuits and devices/systems in accordance with established safety practices as commissioning and/or service personnel.

Correct usage

- The SIPROCESS UV600 must only be used in compliance with this Manual and further Manuals.
- The described maintenance work must be carried out, and the defined maintenance periods must be observed.
- No parts on or in the device may be removed, modified or added unless described and specified by the manufacturer.
- Gas preparation must be provided in accordance with the measuring task and the composition of the sample gas.
- All laws, directives, and technical regulations applicable at the location of use must be observed.

Responsibility when handling dangerous substances

DANGER

Danger to life with leaks in gas path

If the sample gas contains substances which are harmful to health, a leak in the gas path is an acute health hazard, or also a danger to the life of personnel at corresponding concentrations.

The following measures must be taken to avoid such situations:

- *Use appropriate safety measures to avoid leaks. Make sure that these safety measures function permanently and are observed*

WARNING

Health hazard resulting from contact with toxic gases

The analyzer is filled with potentially dangerous gases which can escape in the event of a fault or leak. These are CO, NO, NO_2, SO_2, NH_3, H_2O, hydrocarbons, freons with a maximum concentration of 1000 ppm.

- Regularly check the condition of the analyzer's gaskets
- Only open the analyzer in well ventilated areas, especially if leaking of a component is suspected.

Description

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The SIPROCESS UV600 gas analyzer is an ultraviolet measuring instrument which can simultaneously measure up to three components. As a result of its spectral range, the SIPROCESS UV600 can measure NO highly selectively as well as a number of further UV-active gases such as NO_2, SO_2, and H_2S. Furthermore, there is no cross-sensitivity with CO_2 and H_2O.

3.1 Benefits

- Very low cross-sensitivity with other gases
- All modules are temperature-controlled, and thus independent of the ambient temperature
- Simultaneous measurement of NO and NO_2 with subsequent calculation of total. Therefore neither an NO_2 converter nor a CLD analyzer is required.
- Measurement in the UV range:
  - No cross-sensitivity with H_2O and CO_2
  - Very low SO_2 and NO measuring ranges possible
- UV resonance absorption spectrometry:
  - Measurement of very low NO concentrations
  - Very low cross-sensitivity possible
- Very long service life of UV lamp (usually 2 years)
- Low drifts and high stability thanks to four-channel measuring method with double generation of quotient
- True reference measurement for low-drift, stable results
- Interface for remote monitoring in networks and linking to process control systems
- Optional calibration unit
  - Filter wheel with calibration cells which can be automatically swung into the optical path
  - Low consumption of calibration gas
  - Manual or automatic calibration possible

3.2 Field of application

- Emission measurements
  - Measurement of low NO concentrations in power plants or gas turbines
  - Monitoring of NO_x in DeNOx plants through direct measurement of NO and NO_2 and calculation of total NO_x in the analyzer
  - Efficient measurement in desulfurization plants
  - Monitoring of very small SO_2 and NO concentrations
  - Emission measurements in the paper and cellulose industries
- Process monitoring
  - Measurement of SO_2 in process gases in the paper and petrochemical industries
  - Optimization of NO_x emissions in exhaust gases in the automotive industry
  - H_2S and SO_2 measurements in the residual gas purification of sulfur recovery units (SRU)

3.3 Design

3.3.1 Device configuration

- 19" rack unit with 4 HU for installation
  - in hinged frame
  - in cabinets with or without telescopic rails
- Internal gas paths: hose made of FKM or pipe made of PTFE or stainless steel
- Gas connections for sample gas inlet and outlet: pipe diameter 6 mm

3.3.2 Display and control panel

- Large LC display for simultaneous display of measured value and device status
- Sensor buttons with context-based functions
- Display protected by glass pane
- Contrast of the LC display can be adjusted

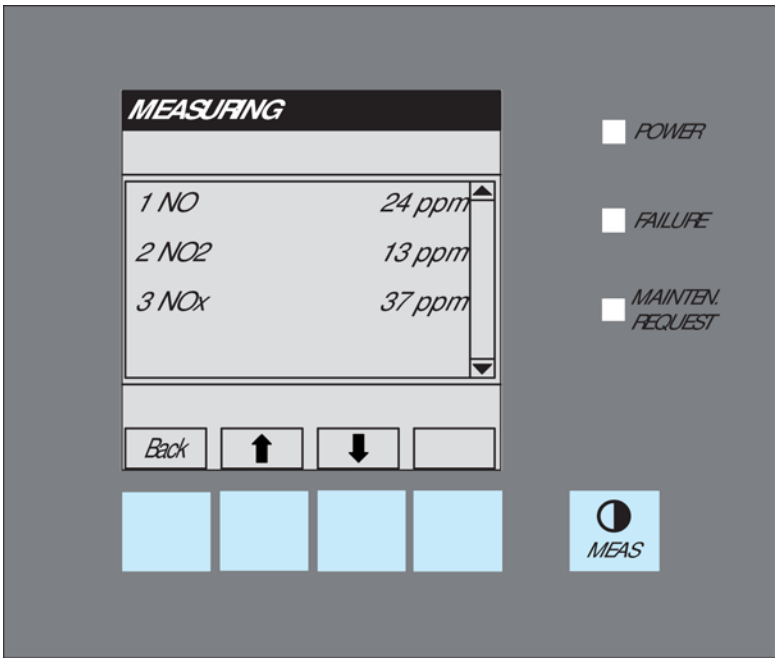


Figure 3-1 Display_and_control_panel

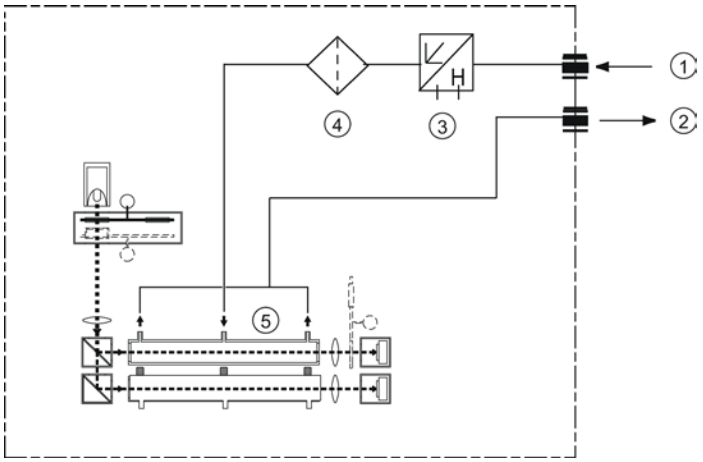
3.3.3 Input and outputs

- 2 configurable analog inputs
- 4 configurable analog outputs
- 8 digital inputs
- 8 digital outputs

3.3.4 Communication

Connection via SIPROCESS-UV600 SW tool

3.4 Gas path



1	Sample gas inlet	4	Filter (optional)
2	Sample gas outlet	5	Analyzer unit (UV module)
3	Moisture sensor (optional)		

Figure 3-2 Gas path of SIPROCESS UV600

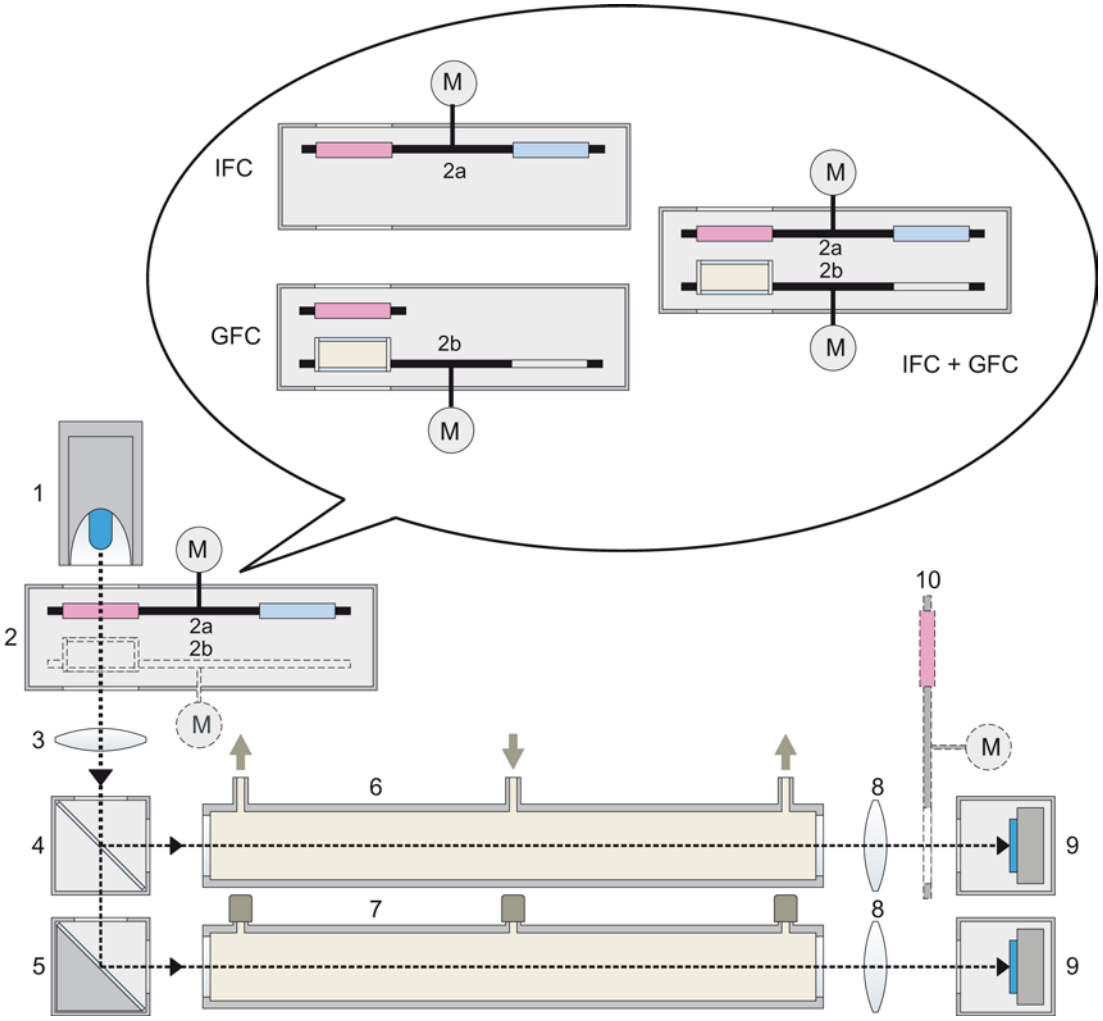
3.5 Materials wetted by sample gas

Table 3- 1

Component	Material
Analyzer unit (sample chamber):	Aluminum or stainless steel mat. no. 1.4404 [*], epoxy resin
Optical window	CaF_2 or quartz [*], epoxy resin
Gas path, gaskets	FKM (Viton™), PTFE, stainless steel mat. no. 1.4571 [*]
Chamber:	Aluminum or stainless steel [*]
Gas inlet/outlet	PVDF, stainless steel mat. no. 1.4401 [*]
Moisture sensor	Stainless steel mat. no. 1.4571, platinum, epoxy resin
Diaphragm pump Pump body Diaphragm	 PVDF FKM (Viton™), EPDM

[*] Depending on version

3.6 Operating principle



1	UV lamp	GFC	Gas filter correlation
2	Filter wheel unit	IFC	Interference filter correlation
2a	Filter wheel 1		
2b	Filter wheel 2		
3	Collimator lens	M	Motor
4	Beam divider		
5	Mirror		
6	Sample chamber		
7	Reference chamber		
8	Convex lens		
9	Detector		
10	Calibration unit		

Operating principle

The measuring principle of the SIPROCESS UV600 is based on the molecule-specific absorption of gases in the ultraviolet wavelength range. Radiation of a wavelength appropriate to the measurement is passed through the sample, and the selective absorption is determined which is proportional to the concentration of the measured component.

Measuring method

An electrodeless discharge lamp (1) emits broadband in the ultraviolet spectral range. A filter wheel unit (2) generates the ultraviolet radiation suitable for the respective measured component. Interference filter correlation (IFC) or gas filter correlation (GFC), or also a combination of the two methods, can be used for this purpose.

Interference filter correlation (IFC)

The sample and reference radiations are generated alternately in that two different interference filters are swung into the beam path (filter wheel 2a)

Gas filter correlation (GFC)

Especially for NO as the measured component, the reference radiation is generated by swinging in a gas filter which is filled with the associated gas (filter wheel 2b)

IFC + GFC

The two filter wheels are combined in order to measure NO in combination with other components.

Design of the analyzer unit

After passing through the filter unit, the beam is directed via a lens (3), a beam divider (4) and a mirror (4) into the sample chamber (6) and reference chamber (7).

The sample beam passes through the sample chamber (6), into which sample gas flows, and its intensity is weakened in line with the concentration of the measured component. The reference beam is directed via a mirror (5) into the reference chamber (7). This is filled with a neutral gas.

The detectors (9) receive the sample and reference beams in succession. These measured signals are amplified and evaluated by electronics.

The measuring system is temperature-controlled to minimize external temperature influences.

The physical state of the measuring system is recorded simultaneously through time-offset detection of the reference beam, and compensated if necessary.

A quotient is generated for each detector from the determined signal values, and the ratio of these quotients determined. This double generation of quotients means that symmetrical signal drifts are compensated in the best possible manner in addition to proportional signal drifts.

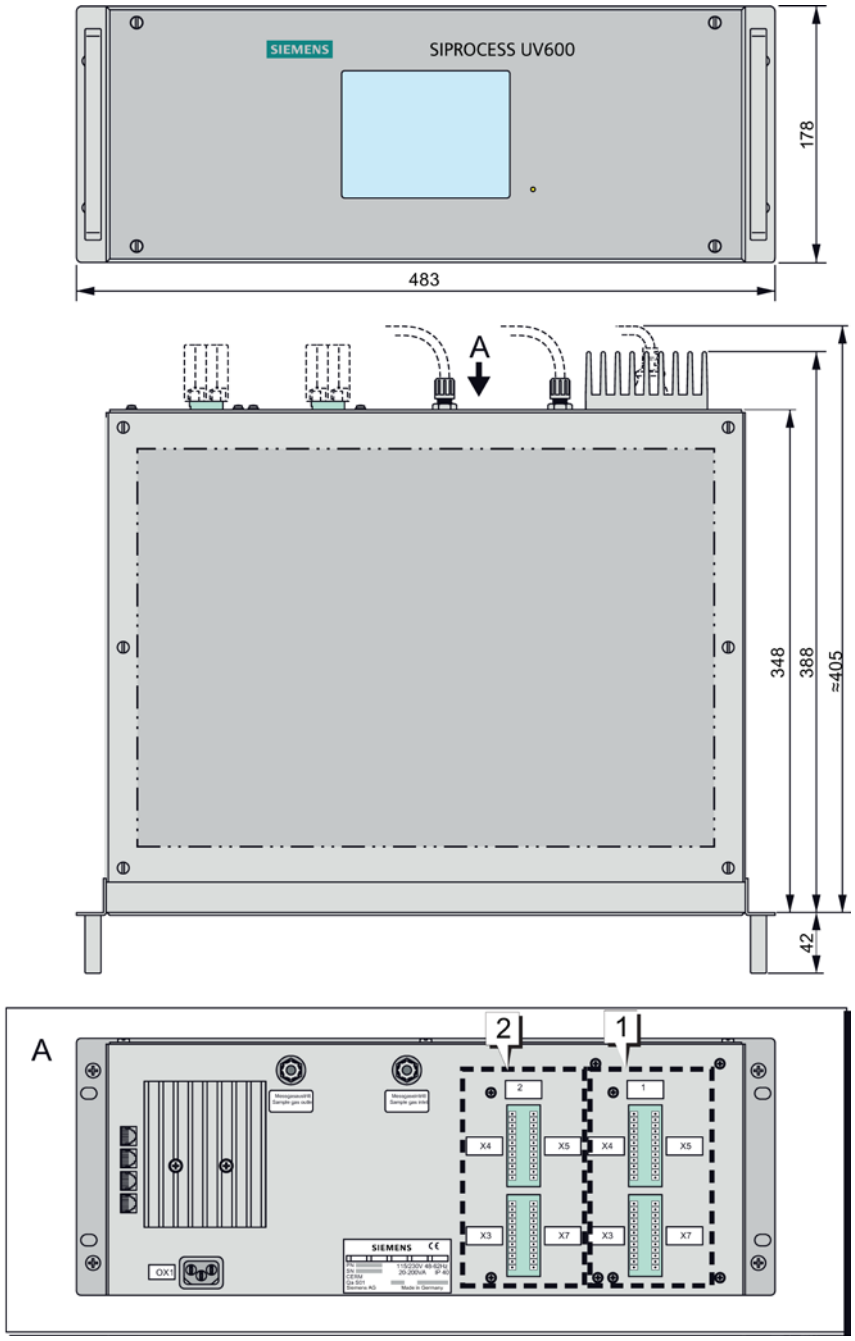
Note

The sample gases must be supplied to the device dust-free. Condensation in the sample chambers must also be prevented. Therefore, the use of gas modified for the measuring task is necessary in most application cases.

Mounting and connecting

4

4.1 Dimensions for preparing installation



1 Signal connections of internal I/O module (standard)

2 Signal connections of second, optional I/O module

Figure 4-1 Dimensions for preparing installation

4.2 Safety instructions

⚠ DANGER

Unsuitable use of the device

The SIPROCESS UV600 must not be used in potentially explosive atmospheres!

The SIPROCESS UV600 is not suitable for measuring flammable and/or explosive gases and gas mixtures!

The failure to observe this information could result in explosions with unforeseeable consequences for personnel, plants, and the environment!

⚠ DANGER

Escape of toxic gases

If the device is used to measure toxic gases, a leak in the gas path could represent a danger to life for personnel. To prevent this, the operating company must take appropriate safety measures, for example:

- Use of gas warning equipment which provides an alarm in the event of a gas leak before the gas is released
- Safe discharge of sample gas
- Purging of gas path with neutral gas prior to connection of sample gas
- A leak test for the internal gas path is obligatory **before** the sample gas is connected

NOTICE

Incorrect mounting

The device can be damaged, destroyed or its functionality impaired through improper mounting.

- Before installing ensure there is no visible damage present on the device.
- Make sure that process connectors are clean, and suitable gaskets and glands are used.
- Mount the device using suitable tools. Refer to the information in "Technical data" , for example installation torques requirements.

4.3 Installation requirements

4.3.1 Environmental conditions

Select an installation location inside a closed building which is as vibration-free as possible. Outdoor installation of the device is not permissible!

Furthermore, the location must be dry and frost-free, and the permissible relative humidity must be observed. Condensation must be avoided, both inside and outside the enclosure.

During operation, make sure that the permissible ambient temperature of 5 °C to 45 °C is maintained.

Avoid direct sunlight on the analyzer.

The air circulation at the cooling ribs of the device must not be hindered.

4.3.2 Installation conditions

The device must be installed with the base horizontal.

If the SIPROCESS UV600 is installed in a cabinet or desktop housing, it must be supported on rails. It is not sufficient to only secure the front side, since the weight of the device would load the chassis too greatly.

⚠ CAUTION

Safety hazard resulting from insufficient securing of analyzer

- When selecting mounting elements, ensure that they are suitable for the analyzer's weight.
- Before securing the analyzer, check
  - the loading capacity of the wall or
  - the specifications of the mounting cabinet.

If further devices are to be installed above or below the SIPROCESS UV600, an intermediate space of at least 1 HU must be provided.

4.4 Gas path and gas connections

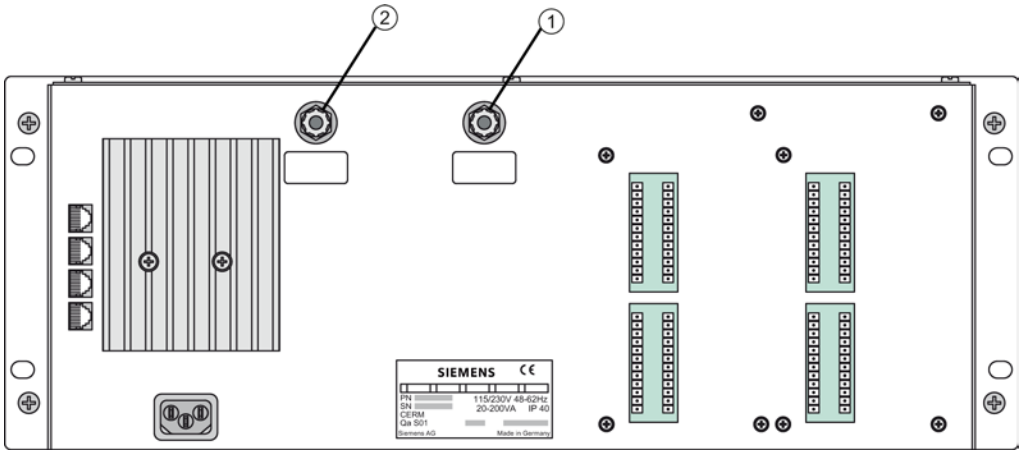
4.4.1 Gas connections

The following must be provided as gas connections:

- Sample gas inlet: Pipe socket made of PVDF or clamping ring gland for pipe diameter 6 mm or 1/4".
- Sample gas outlet: Pipe socket made of PVDF or clamping ring gland for pipe diameter 6 mm or 1/4".

A material suitable for the sample gas must be selected for the inlet and outlet pipes.

Position of the connections



1 Sample gas inlet 2 Sample gas outlet

Figure 4-2 Gas connections

Note

Material compatibility

Siemens can provide you with support concerning selection of sensor components wetted by process media. However, you are responsible for the selection of components. Siemens accepts no liability for faults or failures resulting from incompatible materials.

4.4.2 Sample gas inlet pipe

Only a carefully designed and implemented analyzer system guarantees fault-free and low-maintenance measurements with good results. The gas preparation positioned upstream of the analyzer contributes to the quality of the measurement in the same manner as the gas analyzer itself.

The sample gas is supplied to the SIPROCESS UV600 via the sample gas inlet on the enclosure (see connection ①, Figure 4-2 Gas connections (Page 26)).

The sample gas must be free from dust and aerosols prior to entry into the analyzer.. The dew point of the sample gas must be below the ambient temperature. When using a sample gas cooler, the dew point must be higher than the set cooler temperature.

In most applications, components for sample gas conditioning are required in addition to the analyzer. The following devices are usually located upstream of the sample gas inlet of the SIPROCESS UV600:

- Gas sampling unit
- Sample gas cooler
- Filter
- Sample gas pump

Additional components may also be required depending on the composition of the sample gas, for example washbottles, additional filters, pressure reducers etc.

We explicitly recommend the installation of a fine dust filter in the sample gas line which reliably filters out dust particles of >2 µm.

Corrosive components which could attack the used materials must not be connected to the SIPROCESS UV600. They must be removed from the sample gas by appropriate measures prior to entry into the analyzer.

See also

Gas connections (Page 26)

4.4.3 Sample gas outlet

⚠ WARNING

Release of dangerous gases

Toxic and corrosive gases, as well as gases which can result in explosive mixtures with air, must be discharged such that persons or equipment cannot be damaged nor the environment burdened.

Connect the sample gas outlet (connection ②, Fig. Gas connections (Page 26)) to a suitable collection point (e.g. exhaust duct or line). The following points must be observed:

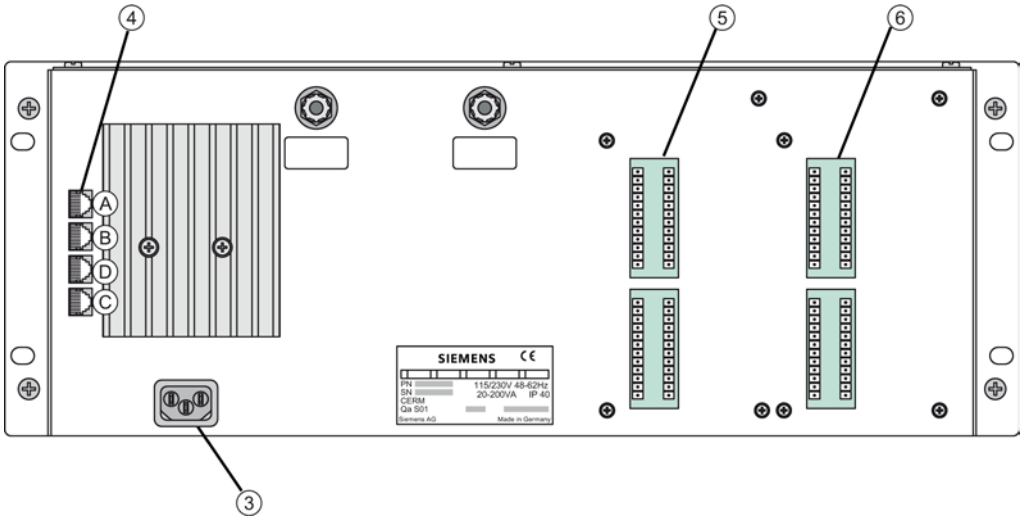
- The sample gas must not enter the inside of the enclosure.
- The sample gas outlet must not be restricted, i.e. the flow resistance in the exhaust line must be kept as small as possible by using a short line or by connection to one with a larger diameter.
- The sample gas must be able to flow freely, a significant counterpressure must not be produced.
- No high pressure variations may occur. If this cannot be guaranteed, a separate exhaust line must be provided.
- Regulation valves for setting the volume flow may only be installed **upstream of the sample gas inlet**.

4.4.4 Calibration gases

The calibration gases must be appropriate to the task. The zero gas should not result in a deflection, and the calibration gas should be close to the full-scale value.

With regard to the quality of the gases and the inlet and outlet, the same applies as described in the sections on the sample gas inlet and outlet.

4.5 Electrical connections



			Interfaces with the following function
3	Power connection	A	RS485 / external input/output
4	Interfaces assigned as shown alongside	B	RS485 / external input/output
5	Signal connections of second, internal input/output module (optional)	C	Reserved for service
6	Signal connections of internal input/output module (standard)	D	Ethernet (LAN)

Figure 4-3 Electrical connections

4.5.1 Power connection

4.5.1.1 Safety instructions for power connection

⚠ WARNING

Missing PE/ground terminal

Risk of electric shock!

Only connect the device to a power supply which has a functional ground conductor (PE, protective earth).

The PE conductor must not be interrupted inside or outside the device.

Depending on the device version, connect the power supply as follows:

- Power plug:
  Ensure that the socket used has a PE/ground conductor connection. Check that the PE/ground conductor connection of the socket and power plug match each other.
- Connecting terminals:
  Connect the terminals according to the terminal assignment table. Connect the PE/ground conductor first.

NOTICE

Faulty power supply

Device failure with faulty power supply

- Check that the existing power supply agrees with that specified on the rating plate. If this is not the case, the device must not be connected or started up.

4.5.1.2 Measures of the operating company

The safety of a system in which the analyzer is integrated is the responsibility of the operating company.

External line fuse

An external line fuse must be provided in the power supply. The recommended rating for the device is 16 A slow-blow.

Note

When switching-on, the SIPROCESS UV600 briefly requires a current larger than the rated current (approximate values: 30 A with 230 V AC or 60 A with 115 V AC power supply). Therefore fuses with slow-blow tripping characteristic must be used.

External power switch

⚠ WARNING

Endangering of electric safety resulting from live power supply

If the power supply to the analyzer or to the cables cannot be switched off using a disconnector, this could result in an electrical accident.

- Install a mains disconnection device with which the power supply to the device can be interrupted in accordance with DIN EN 61010 in the direct vicinity of the device (see rating plate for possible load). This mains disconnection device must be readily accessible at all times.
- Identify this mains disconnection device distinctly and unambiguously.
- Note that the power supply may only be switched on again following completion of connection/maintenance work by the associated personnel with observation of the applicable safety regulations.

⚠ WARNING

Endangering of electric safety resulting from power cord of incorrect rating

When using a removable power cord, an electrical accident could occur if the specifications are not correctly adhered to.

Always observe the exact specifications in the manual when using a removable power cord (see section).

4.5.1.3 Power connection

Connect the mains cable to the appliance plug (CEE-22) on the rear of the device.

4.5.2 Signal cables

When delivered, the device is equipped with one or two input/output modules (two modules as option). The device's signal connections are available to the user on these modules. You can obtain the standard configuration valid for your device from the device pass (parameter sheet).

The logical function of the signal connections can be configured individually. You can find additional information in section Setting parameters for inputs and outputs (Page 142).

See also

Operation (Page 53)

4.5.2.1 Safety instructions

NOTICE
Device failure The internal electronics can be damaged if you make the signal connections with the device switched on. • Therefore disconnect the SIPROCESS UV600 from the power supply before you make the signal connections.

Note

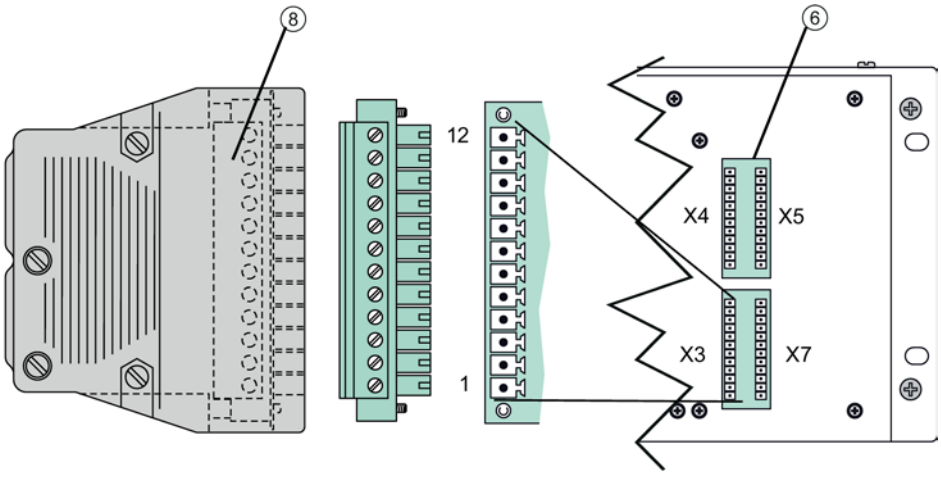
Measured-value output during calibration

The measured calibration gas values are output during the calibration, and the status "Function check" is activated.

- Check that the status message is displayed externally or has to be processed.
- Make sure that the corresponding digital output is installed.

4.5.2.2 Connection of the signal cables

The signal connections are available at terminal strips X3, X4, X5 and X7 on the 12-pin plug connectors of the input/output modules (see following Fig.). Depending on the configuration, the device has 1 or 2 input/output modules. The scope of delivery includes the corresponding counterparts with screw terminals.



6 Internal input/output module (standard) with terminal strips X3, X4, X5 and X7

8 Connection plug

Figure 4-4 Signal connections and plug connectors

The plug connections can be mechanically coded. To do this, proceed as follows:

1. Block a cut-out on a terminal of the terminal strip using a plastic insert (①, Fig. below).
2. On the connection plug, remove an element at the corresponding position (②, Fig. below)

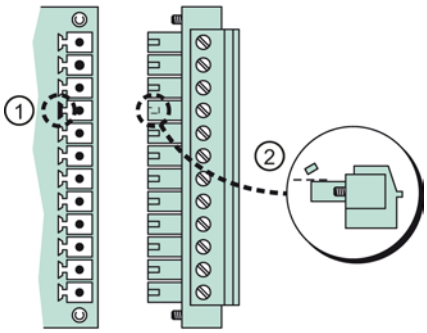


Figure 4-5 Coding of connection plugs

4.5.2.3 Signal cable

Only connect the signal cables to devices which have reliable electric isolation from their power supply. When routing the signal cables, observe the following:

- The cables must be shielded, the high-frequency impedance of the shielding must be small.
- Only connect the shielding at one end of the cable to GND/enclosure. The connection should be as short as possible and with a large area.
- Observe the shielding concept of the host system (if present).

Note

Suppressing sparking

Inductive loads (e.g. solenoid valves, relays) may only be connected to the switching outputs via spark-quenching diodes or RC elements. When using an RC element, note that this results in a drop-out delay of the inductive component. In addition, you must use a non-polarized capacitor.

4.5.2.4 Pin assignments

Plug connector X3 – digital inputs (DI)

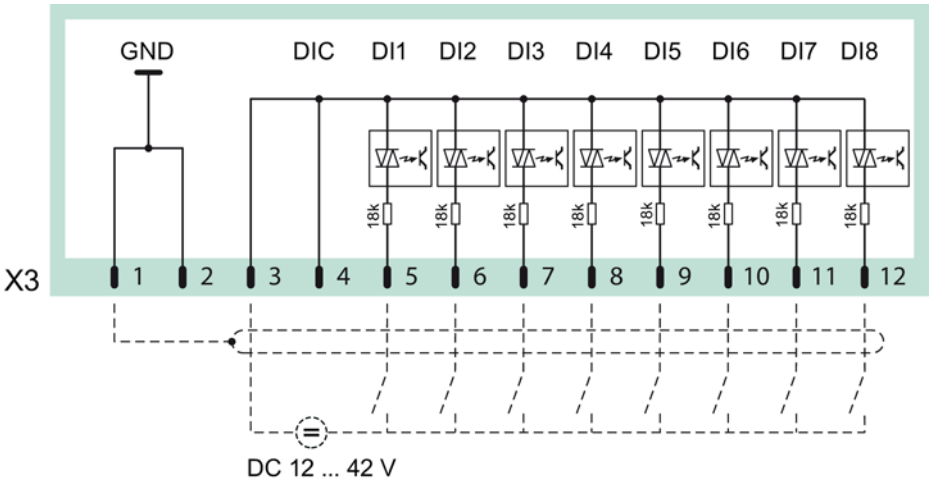


Figure 4-6 Plug connector X3 – digital inputs

Characteristic of digital inputs (see also Auto-Hotspot):

- Floating optocouplers with common reference potential (DIC)
- Switching range 14 ... 42 V (external control voltage)
- The digital inputs can be operated with a positive or negative voltage (reference potential either "-" or "+")
- With inverted switching logic, the logic function of the control input is **active** if **no** current is flowing through the control input
- Maximum voltage: ±50 V

NOTICE
Observe maximum voltage! Voltages greater than 50 V can destroy components, and safe isolation of the functional voltages is no longer guaranteed!

Plug connectors X4 and X5 – digital outputs (DO)

Plug connectors X4 and X5 – digital outputs (DO):

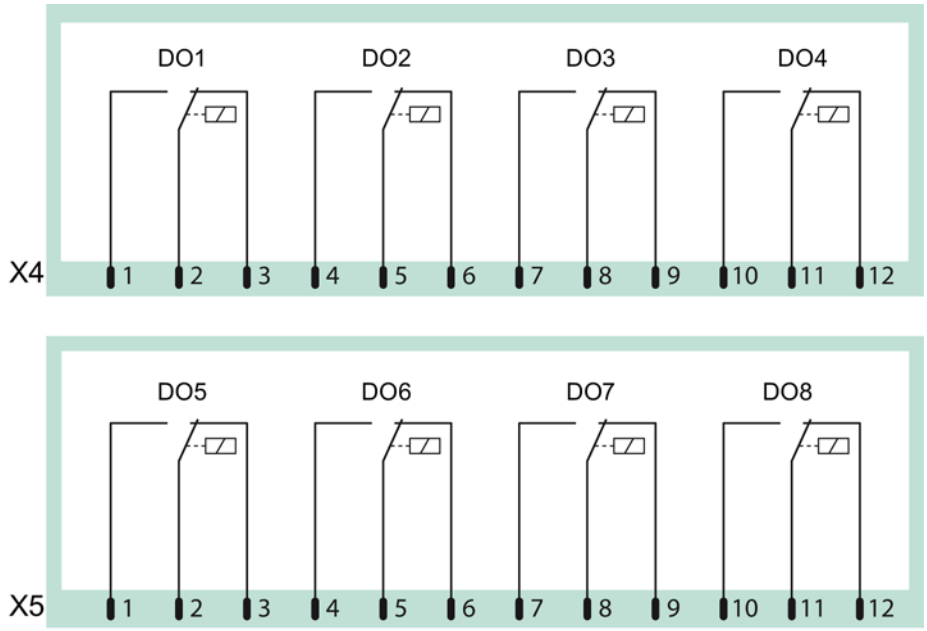


Figure 4-7 Plug connector X4/X5 - digital outputs, representation in de-energized state

Digital outputs DO1 ... DO4 are located on plug connector X4;
digital outputs DO5 .... DO8 are located on plug connector X5

Characteristic of digital outputs (see also Auto-Hotspot):

- Floating relay changeover contacts
- Single-pole changeover switch, three connections
- Maximum voltage: ±50 V
- Only connect inductive loads (e.g. relays, solenoid valves ...) via spark-quenching diodes
- Observe maximum loading capacity (see following table)

Table 4- 1 Maximum load per relay changeover contact referred to GND/enclosure

Field of application	AC voltage (rms value)	DC voltage	Current
Standard	Max. 30 V AC	Max. 48 V DC	Max. 500 mA
CSA (possible voltage/current combinations in CSA standard range)	Max. 30 V AC	Max. 48 V DC	Max. 50 mA
	Max. 15 V AC	Max. 24 V DC	Max. 200 mA
	Max. 12 V AC	Max. 18 V DC	Max. 500 mA

Switching logic

- Normal – open-circuit principle:
  The digital output is electronically active (the relay is pulled-up) if the associated switching function is logically active.
- Inverted – closed-circuit principle:
  The digital output is electronically active (the relay is pulled-up) if the logical switching function is not active. In the logically active state, the digital output is electronically deactivated (the relay is dropped-out).
  Note: This version should be particularly checked if the output is to be used for a warning signal.

Safety criteria

⚠ CAUTION

Risk for connected devices/systems

Clarify the safety consequences in the event of the following malfunctions **before** using the switching outputs:

- Power supply failure (e.g. local failure of power supply, inadvertent switch-off, blown fuse)
- Fault in input/output module (e.g. electronic fault of a switching output)
- Interruption in the electric connection

Note the switching principle:

- In the event of a power supply failure, switching outputs with normal switching logic signal signal the switching function as not active.
- In the event of a power supply failure, switching outputs with inverted switching logic immediately signal that the associated switching function is tripped.

Carefully clarify the consequences, and ensure that a dangerous situation cannot occur in the event of a fault or failure.

Plug connector X7 – analog outputs (AO) and analog inputs (AI)

Analog outputs

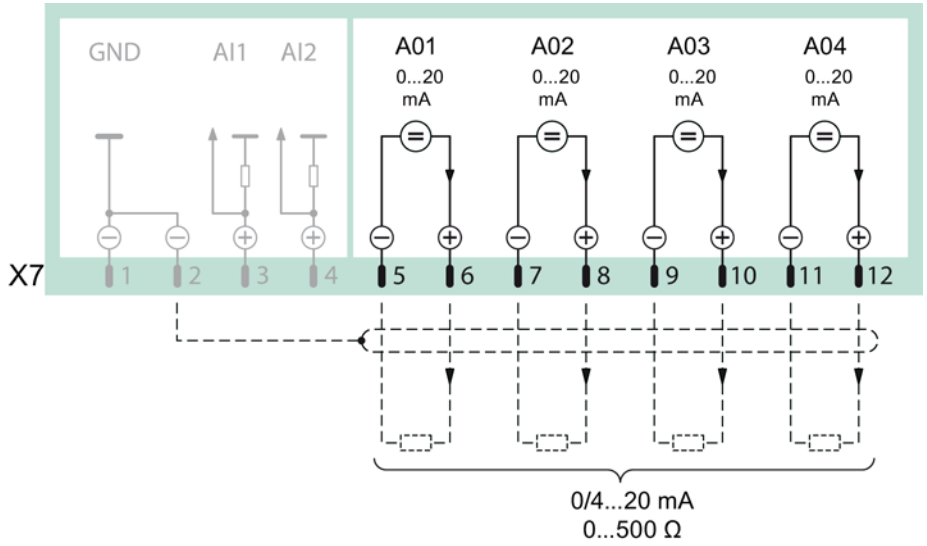


Figure 4-8 Plug connector X7 - analog outputs

Characteristic of analog outputs (see also Auto-Hotspot):

The analog outputs are floating (electrically isolated) and provide a load-independent current signal.

- Signal range 0...24 mA
- Residual ripple 0.02 mA
- Resolution 0.1%
- Accuracy 0.25% of full-scale value
- Maximum load 500 Ω
- Maximum voltage ±50 V
- Adjustable start or fault state

Note

Electrical isolation

The electrical isolation is canceled if the negative poles of the analog outputs are connected to GND

Analog inputs

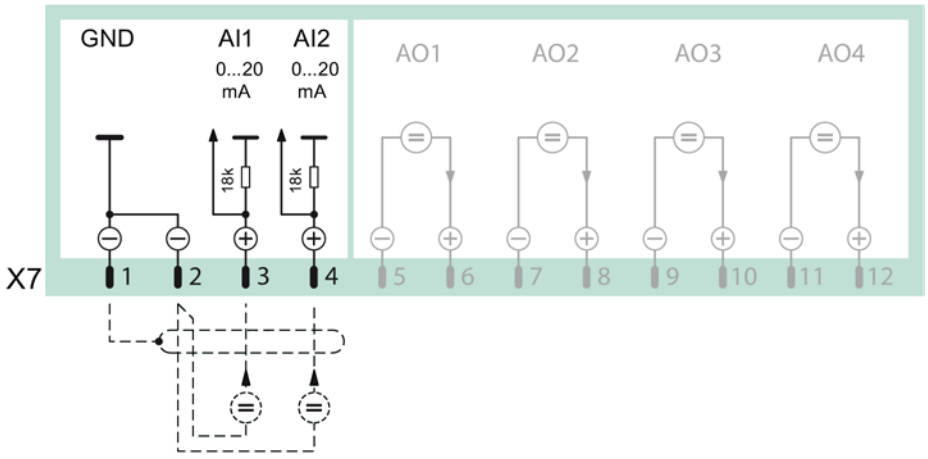


Figure 4-9 Plug connector X7 - analog inputs

Characteristic of analog inputs (see also Auto-Hotspot):

- The input signal is an analog current (standard 0 ... 20 mA, maximum 30 mA)
- The signal current must be provided by an external current source
- Load (internal resistance) of analog input: 10 Ω
- Reference potential GND (see Fig. of analog inputs)
- Overcurrent protection: ±1 000 mA
- Max. voltage: ±50 V

Function
The analog inputs (AI1, AI2) need only be connected if these inputs are configured in the analyzer. The corresponding information is supplied separately in this case.

- Therefore check the delivery to see whether information on the analog inputs has been provided.
- If this is the case, connect the specified signal sources to the analog inputs.

Startup

5

5.1 Safety instructions

⚠ DANGER

Explosion hazard

The analyzer must not be operated in potentially explosive atmospheres. Gases with flammable or explosive components must not be connected.

Explosions must be expected if this is violated, with the possibility of danger for personnel, plants, and the environment!

⚠ DANGER

Danger of poisoning

When measuring toxic or corrosive gases, leaks in the gas path can result in enrichment of the sample gas in the analyzer, and poisoning can result at corresponding concentrations.

To prevent the danger of poisoning or the damaging of analyzer components, you must carry out the following measures:

- Purge the system with inert gas (e.g. nitrogen).
- Collect the gas displaced by purging using suitable equipment, and discharge it in an environmentally-friendly manner via an exhaust line.

⚠ CAUTION

Incompatibility with liquids

If liquid enters the internal gas paths, the gas analyzer will usually become unusable. Liquid can also result from condensation.

- It is therefore essential to prevent condensation in the sample gas path of the gas analyzer
- If the sample gas contains components which condense:
  - Install an appropriate gas preparation system upstream of the gas analyzer
  - Each time you wish to shut down the internal gas path, first purge with a neutral gas which contains no components which could condense.

⚠ WARNING

Dangerous contact voltage

Danger of injury through dangerous contact voltage when the device is open or not completely closed.

The degree of protection specified on the nameplate or in Chapter "Auto-Hotspot" is no longer guaranteed if the device is open or not properly closed.

- Make sure that the device is securely closed.

5.2 Preparation for startup

5.2.1 Gas sampling and preparation

Gas connections

⚠ WARNING

Leaky gas connections

Loose or incorrectly tightened union nuts on the gas connection sockets can result in a leaky gas path.

Therefore make sure when tightening the union nuts at the gas connection sockets that you counter properly with a suitable open-ended spanner.

Gas sampling and preparation

Components for gas preparation (e.g. gas sampling devices, gas coolers, condensation traps, filters) are usually positioned upstream of the analyzer depending on the condition of the gas to be measured. These devices, and any controllers, recorders or displays which may be connected, must be fully functional prior to starting up the analyzer (refer to the associated Manuals).

To achieve perfect gas preparation, you must particularly observe the following points:

- The sample gas must be free from dust and condensation. An upstream dust filter must reliably filter out dust particles of > 2 µm. To avoid condensation in the sample gas line, the sample gas may have to be passed through a suitable gas cooler.
- Components which could interfere with the measurement must be removed by appropriate absorption filters.
- The dew point must not exceed 4 °C.

5.2.2 Leak test

Before connecting sample gas and calibration gas to the analyzer, you must check the gas connections and the internal gas path for leaks. To do this, proceed as follows:

1. Close the sample gas outlet using an appropriate dummy plug or seal.

2. Connect the sample gas inlet to an appropriate inert gas supply.

3. The supply line must contain a suitable pressure sensor (measuring range 2 000 hPa, resolution 0,1 hPa).

4. Apply a pressure of approx. 100 hPa to the sample gas path.

5. Wait for approx. 5 minutes to allow thermal equilibrium.

6. Note the pressure.

7. Wait a further 15 minutes and then note the pressure again.

8. The sample gas path is sufficiently tight if the pressure has not changed by more than 1 hPa after this time.

5.2.3 Last measures prior to startup

Check all connections

Following a successful leak test, check all gas inlet and outlet lines and electrical connections for correct seating.

Read the operating instructions

Before switching on the analyzer, make yourself acquainted with the basic operation of the analyzer (see Section Operation (Page 53)) .

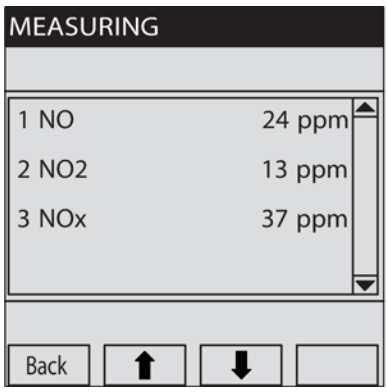
5.3 Startup

Switch on the power supply. The "POWER" LED will light up.

Wait until the measured-value display appears.
Up to the end of the warming-up phase, the LED "MAINTEN. REQUEST" is also lit.

The startup phase takes between 45 minutes and 2 hours depending on the ambient temperature. The full measuring accuracy is not achieved during this time, and calibration is not meaningful.

The display illumination may switch off automatically during this time. To reactivate it, press the right and left blue function keys simultaneously.



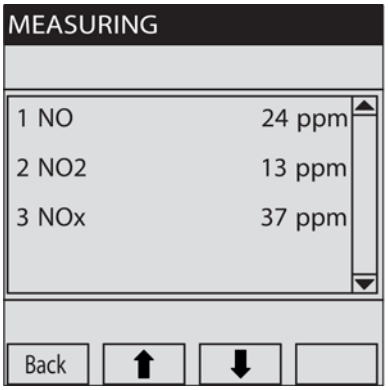
← Measuring component | current measured value

If the LED "MAINTEN. REQUEST" goes out after the startup phase, the basic setting of the device can be carried out. To do this you must be acquainted with operation as described in section Operation (Page 53).

5.4 Basic parameter assignment

5.4.1 Introduction to operation

Following switching-on and expiry of the warming-up phase, the analyzer automatically enters measuring mode. Example of the display which then appears:



← Measuring component | current measured value

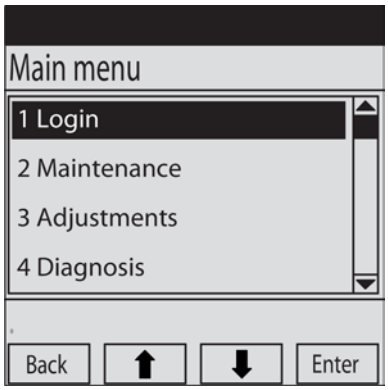
The display is automatically canceled after a certain time if a corresponding time value has been set.

You have the following options:

- Select a different measured-value display: press the "MEAS" key until the desired measured-value display appears.
- View a different component by pressing the ⬆ or ⬇ key.
- Change to the menu system: Keep pressing the Back key until a menu appears. If the left or right function key has been pressed in the last 30 minutes, the last selected menu is displayed again, otherwise the main menu appears.

Selecting the main menu

From the measured-value display by pressing the Menu or Back key, the latter several times if necessary. The following display appears:



You can now use:

- The ↑ or ↓ key to select the desired function
- Call the selected function using the Enter key
- Return to measuring mode using the Back key.

You can also return to measuring mode by pressing the 'MEAS' key on the control panel.

5.4.2 Setting the contrast

This function allows you to set the contrast of the display.

To do this, press the MEAS key for several seconds until the measured-value display disappears and the following menu appears:

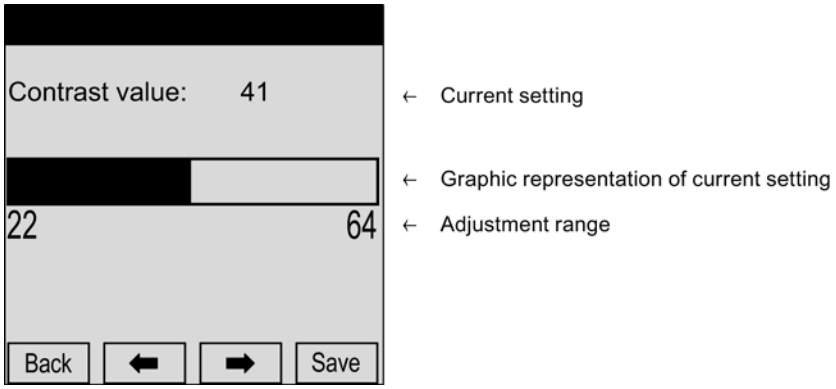


Figure 5-1 Menu for setting the contrast

By pressing the ⬅ and ➡ keys, set the desired contrast and save the setting using Save.

5.4.3 Setting the language

With this function, you can set the operating language.

To do this, use the ⬆ and ⬇ keys in the main menu to select the menu item 'Language', and activate this by pressing the Enter key.

A menu appears with selection of the operating languages.

Figure 5-2 Language menu

Use the ⬆ and ⬇ keys to select the desired language, and activate this by pressing the Save key.

5.4.4 Changing the access privileges

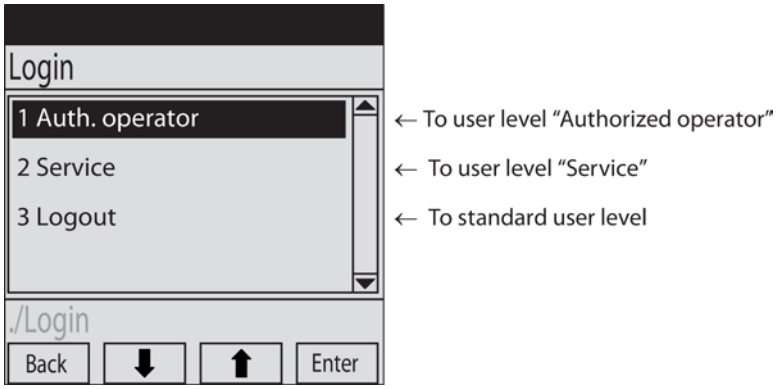
Various menu functions of the level 'Authorized user' have been assigned in the factory to the analyzer. You can use this function to change the access privileges.

The analyzer has the following three user levels:

- Level 0 - Standard - no limitation to access
- Level 1 - Authorized user
- Level 2 - Service - access only for service personnel

Proceed as follows to change the user level:

1. Call the main menu as described in Section Setting the language (Page 47).
2. In the main menu, use the ⬆ and ⬇ keys to select the menu item 'Login', and activate this by pressing the Enter key.
   The following menu is displayed:



3. Use the ⬆ and ⬇ keys to select the menu item 'Aut. user' and activate the user by pressing the Enter key.
   The following menu is displayed (example):

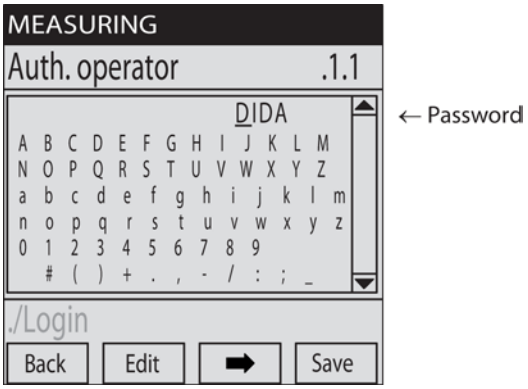


Figure 5-3 Menu 'Authorized user' for input of password.

4. Change the displayed password to "HIDE" as follows:
   - Press the ➡ key in order to set the cursor to the desired position.
   - Press the Edit key to change to edit mode for characters.
   - Press the ➡ and ⬇ keys until the correct character is displayed.
   - Press the Select key to select the character. The character then appears at the cursor position.
   - If "HIDE" is displayed as the password, press the Save key.
     The message 'Aut. user successful' is displayed.

Note

Duration of validity

User level 1 now remains active for the time set as the duration up to the next automatic log-off.

5.4.5 Displaying/adjusting the setpoints of the calibration gases

This function is used to display the setpoints (concentrations) of the calibration gases and to change them if required. Proceed as follows to call this menu:

1. Activate user level 1 as described in Changing the access privileges (Page 48)'.
2. Select the following menu sequence:
   Main menu → BCU (control unit) → Parameterization → Test gases.
   A menu is displayed with the currently set values.

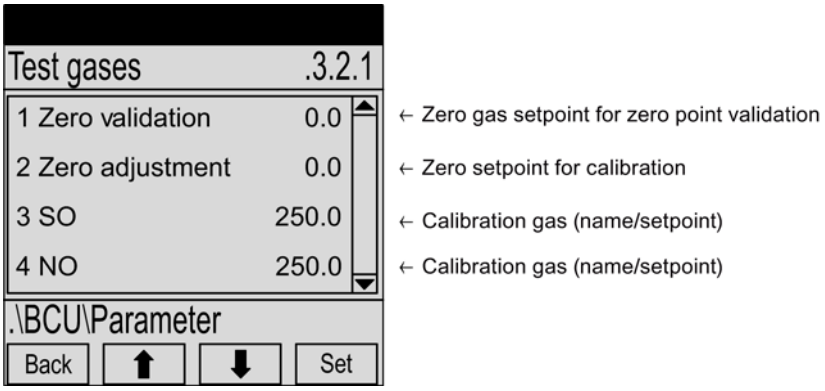


Figure 5-4 Menu 'Test gases' (example)

3. In order to change the value of a parameter, move the cursor (line displayed inverted) using the ⬆ and ⬇ keys to the desired parameter and select this by pressing the Set key.
   The following menu is displayed:

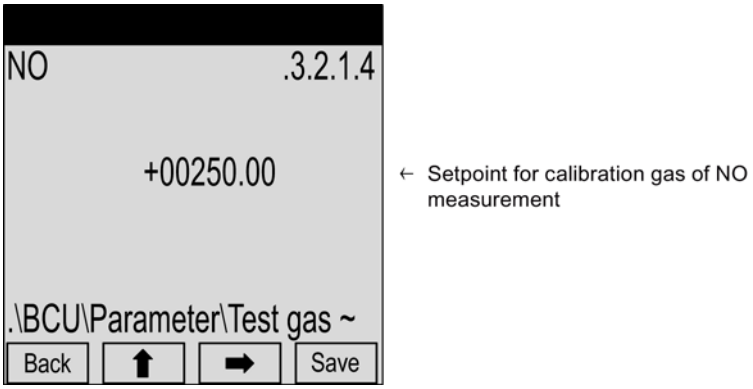


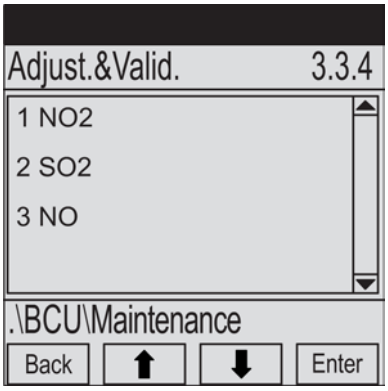
Figure 5-5 Adjustment of setpoint (example: NO)

4. Change the display parameter to the desired value as follows:
   – Press the ⬆ key until the correct value is displayed.
   – Press the ➡ key in order to move the cursor on by one position.
5. Save the desired setting using the Save key.

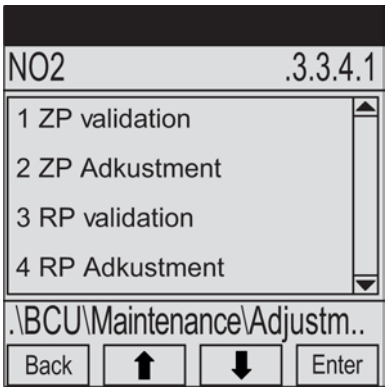
5.5 Initial calibration

In order to allow measurements, the analyzer must be calibrated. To do this, proceed as follows:

1. Check as described in Section 'Displaying/adjusting the setpoints of the calibration gases (Page 50)' whether the parameterized (displayed) setpoints agree with the concentration of the calibration gases, and adjust if this is not the case.
2. Select the menu sequence: Main menu → BCU (control unit) → Maintenance → Calib.&Valid.
   A menu is displayed with the existing measured components.



3. Use the ⬆ and ⬇ keys to select the desired measured component, and activate this by pressing the Enter key.
4. The following menu is displayed (example):



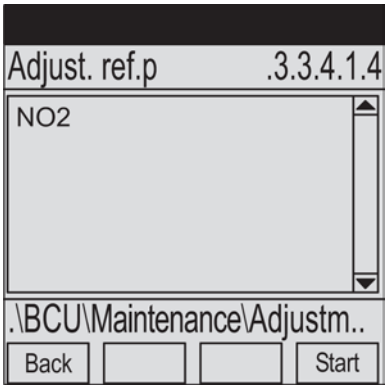
Note

Calibration sequence

Always calibrate the zero point first and then the full-scale value (reference point), otherwise the calibration of the full-scale value (reference point) will be inexact!

5. Use the ⬆ and ⬇ keys to select the desired calibration or validation function, and activate this by pressing the Enter key.

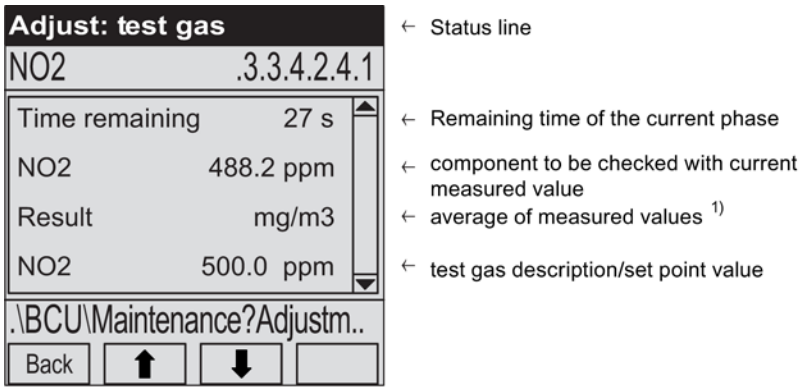
A menu is displayed with the selected calibration or validation function, in this case the calibration of the full-scale value (reference point).



6. Select Start to start with the calibration.

Table 5- 1 Sequence of a calibration/validation

Manual calibration	Automatic calibration
➞ Wait until the status line displays "Calibration: Calibration gas" or "Validation: Calibration gas". ➞ Pass the envisaged calibration gas through the sample gas inlet of the SIPROCESS UV600. ➞ Wait until the status line displays "Calibration: Sample gas" or "Validation: Sample gas". ➞ Connect the sample gas to the sample gas inlet again.	➞ The automatic procedure starts up. The currently executed part of the procedure is displayed in the status line.



1) This value appears following the evaluation; the analyzer evaluates and stores the exact average (current value for adjustment)

1. Wait until 'Stop' is displayed in the status line.
   This signals the end of the calibration or validation procedure.
2. To exit the calibration or validation, press the Back key.

Operation

6

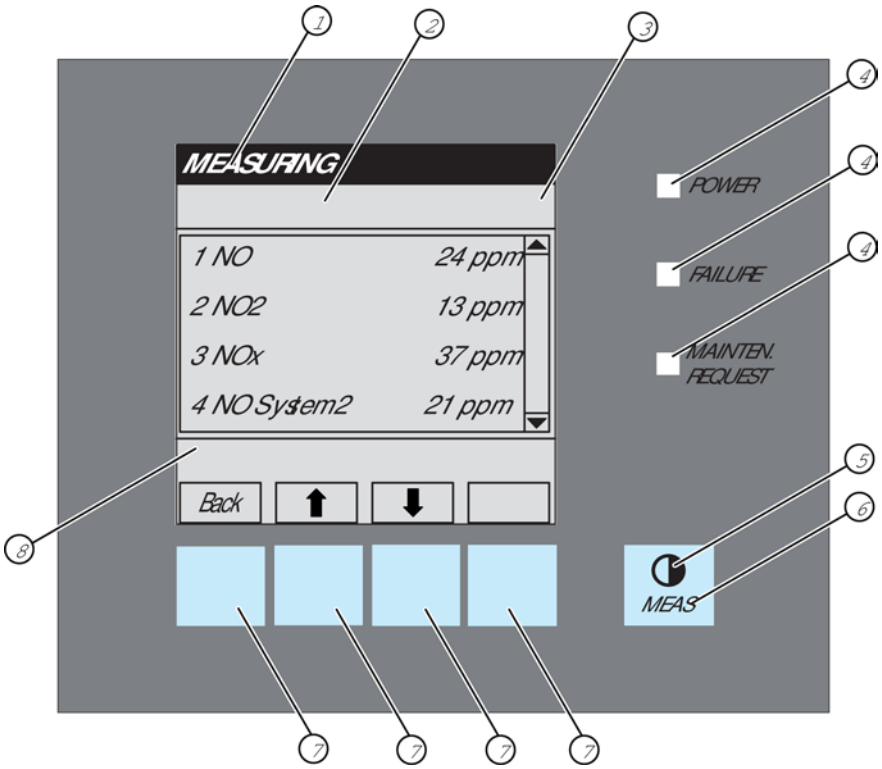
The SIPROCESS UV600 can be operated either directly using the analyzer's control elements or computer-based from a PC with the SOPAS ET operating software or via the Modbus communication interface.

Please note that operation using SOPAS ET allows an increased number of functions, and more complex functions, than direct access on the analyzer.

This section only describes the basic functions for retaining operational readiness of the analyzer.

6.1 Control panel, display and control elements

6.1.1 Control panel



1	Status line	5	Contrast symbol
2	Current input menu	6	"MEAS" key
3	Number of the input menu	7	Function keys
4	LEDs for operational readiness (POWER), failure (FAILURE) and maintenance request (MAINTEN. REQUEST)	8	Current menu branch

Figure 6-1 Control panel with display (example)

Note

Display illumination

The display backlighting switches off automatically after a certain time. It can be reactivated by clicking on the right or left function key ⑦.

6.1.2 LEDs

Three LEDs ④ with the following meaning are positioned on the right side of the control panel:

- POWER: The device is switched on, the power supply is present.
- FAILURE: An error message is present, the F (failure) status is set.
- MAINTEN. REQUEST: At least one of the status flags M (maintenance), C (check) or U (uncertain) is set (Status (Page 71)) or the "Maintenance" state has been activated manually.

6.1.3 Control keys

MEAS key

The MEAS ⑥ key has the following functions:

- Short tipping of the MEAS key calls the measured-value display
- Long pressing of the key calls the contrast setting (see Setting the contrast (Page 46))

Function keys

Each of the four function keys ⑦ can assume different functions depending on the menu/submenu. The current assignment of the function keys is displayed in the bottom line of the respective menu. The following functions are available: In order to activate a key, it is sufficient just to touch it.

Table 6- 1 Assignment of function keys

Display	Function
Back	Return to previous menu. Inputs/modifications which have not been saved are rejected.
Diag	Call current device status (see Setting the contrast (Page 46))
Enter	Call/start the selected menu function
Edit	Change to edit mode
Menu	Call main menu (see Menu system (Page 59)
Save	Save and terminate an input
Set	Save settings
Select	Select a function or a character
Start	Start procedure
⬆	• In a selection list: Move input cursor up • During an input: Jump to next character
⬇	Move input cursor down
⬅	Move input cursor to left
➡	Move input cursor to right

See also

Maintenance status on/off (Page 121)

6.1.4 Messages in the status line

Various status messages can be displayed in the status line of the SIPROCESS UV600, as listed in the following table:

Table 6- 2 Messages in the status line

Message	Description	Possible measures
Warm-up	The analyzer has not yet reached its operating temperature	⇒ Wait until "Measuring" is displayed. ☹ The measured values of the analyzer could not yet be used. ☹ Do not carry out calibrations ☺ Other operating functions can be carried out.
Measuring	The analyzer module is in the normal operating state	Only appears if the menu branch of an analyzer module is called.
Purging	A purging time is active, measuring mode is interrupted	
Cal/Val […]	A calibration procedure or validation measurement is currently running [current phase]	⇒ *If a calibration procedure or manual validation is being carried out:* Continue the procedure in accordance with the instructions (see Auto-Hotspot). ⇒ *If a fully automatic calibration or validation is being carried out:* Wait until the automatic procedure is finished.
See logbook	A status or function message has occurred	⇒ *If the reason is unknown: Check the logbook (see).*

6.1.5 Checking the operating state

Characteristics of a safe operating state

Characteristic	Explanation
LED 'Power' lit	
LED 'Failure' not lit	
Display	Display of current measured value(s). The measured values are displayed permanently (not flashing)

Note

The display backlighting may switch off automatically after a certain time.

Characteristics of an unsafe operating state

Characteristic	Remedy
LED 'Power' not lit	Check that the power supply is connected (external power switch, fuses)
LED 'Failure' lit	Check internal messages
Measured values flash	
LED 'Maintenance request' lit	A maintenance request is present, resulting possibly in interruption in measuring mode
Measured values implausible	1. Check whether the measurements can reach these values in the current situation 2. Check the sample gas supply (e.g. gas preparation, valves, filters) 3. Carry out a calibration.

6.1.6 Menu system

The SIPROCESS UV600 has a modular design. In addition to the power supply and the motherboard, the hardware consists of the following modules:

- Control unit (BCU)
- Analyzer module (UV module)
- Input/output module (I/O module)

This design is also reflected in the menu structure. A distinction is made in the menu system between functions of the BCU and functions of the UV module. In addition, there are menu branches for general adaptation of operating functions (e.g. language, display, restart ...).

The functions of the input/output module are an exception and are present in the BCU menu branch.

Since many functions are freely-selectable, the contents of a menu branch depend on the implemented functions of the respective module.

The first menu (main menu) is the starting point in operator control mode. It is called by pressing the right function key (menu) (see Control panel (Page 54), ⑦)

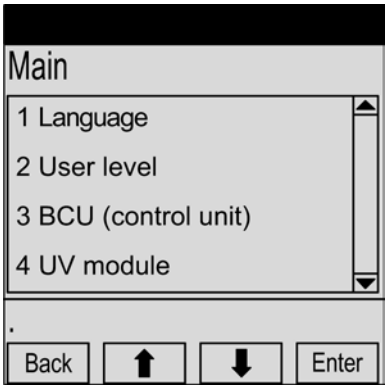


Figure 6-2 Main menu of SIPROCESS UV600

Use the ⬆ and ⬇ keys to select the desired submenu, and activate this by pressing the Enter key.

6.1.7 User levels

Individual functions are protected by different user levels. To activate these functions you may have to enter certain access codes (see Section Changing the access privileges (Page 48)). The analyzer recognizes the following three user levels:

- General level / operator not coded
- Authorized user HIDE (see also Section Changing the access privileges (Page 48))
- Service exclusively for trained and authorized specialists

Note

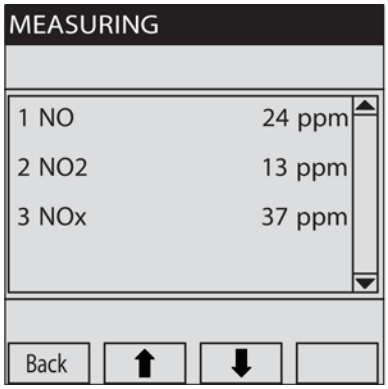
Functions protected by an access code are only displayed if the corresponding user level has previously been enabled. The corresponding code is entered using

MEAS (main menu) → 2. User level → 1. Authorized user (or 2. Service) - see also Changing the access privileges (Page 48)

6.2 Initial operating steps

6.2.1 Introduction to operation

Following switching-on and expiry of the warming-up phase, the analyzer automatically enters measuring mode. Example of the display which then appears:



← Measuring component | current measured value

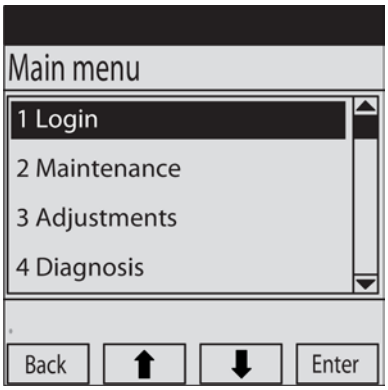
The display is automatically canceled after a certain time if a corresponding time value has been set.

You have the following options:

- Select a different measured-value display: press the "MEAS" key until the desired measured-value display appears.
- View a different component by pressing the ⬆ or ⬇ key.
- Change to the menu system: Keep pressing the Back key until a menu appears. If the left or right function key has been pressed in the last 30 minutes, the last selected menu is displayed again, otherwise the main menu appears.

Selecting the main menu

From the measured-value display by pressing the Menu or Back key, the latter several times if necessary. The following display appears:



You can now use:

- The ⬆ or ⬇ key to select the desired function
- Call the selected function using the Enter key
- Return to measuring mode using the Back key.

You can also return to measuring mode by pressing the 'MEAS' key on the control panel.

6.2.2 Changing the access privileges

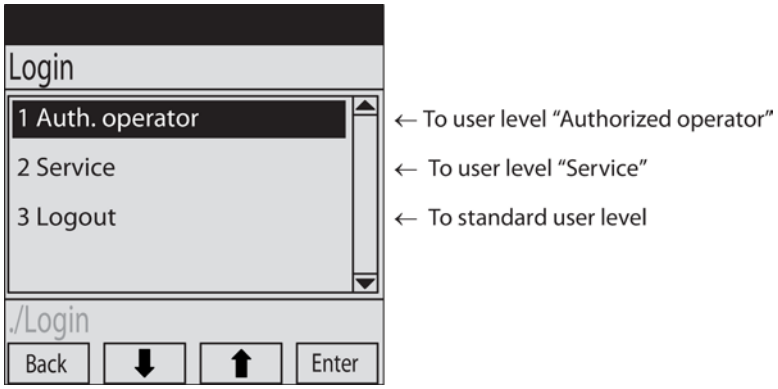
Various menu functions of the level 'Authorized user' have been assigned in the factory to the analyzer. You can use this function to change the access privileges.

The analyzer has the following three user levels:

- Level 0 - Standard - no limitation to access
- Level 1 - Authorized user
- Level 2 - Service - access only for service personnel

Proceed as follows to change the user level:

1. Call the main menu as described in Section Auto-Hotspot.
2. In the main menu, use the ⬆ and ⬇ keys to select the menu item 'Login', and activate this by pressing the Enter key.
   The following menu is displayed:



3. Use the ⬆ and ⬇ keys to select the menu item 'Aut. user' and activate the user by pressing the Enter key.

The following menu is displayed (example):

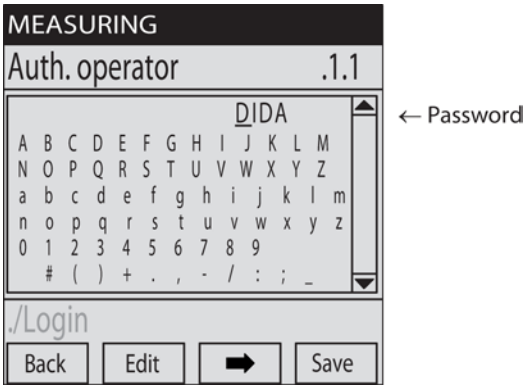


Figure 6-3 Menu 'Authorized user' for input of password.

4. Change the displayed password to "HIDE" as follows:
   - Press the ➡ key in order to set the cursor to the desired position.
   - Press the Edit key to change to edit mode for characters.
   - Press the ➡ and ⬇ keys until the correct character is displayed.
   - Press the Select key to select the character. The character then appears at the cursor position.
   - If "HIDE" is displayed as the password, press the Save key.
     The message 'Aut. user successful' is displayed.

Note

Duration of validity

User level 1 now remains active for the time set as the duration up to the next automatic log-off.

See also

Introduction to operation (Page 60)

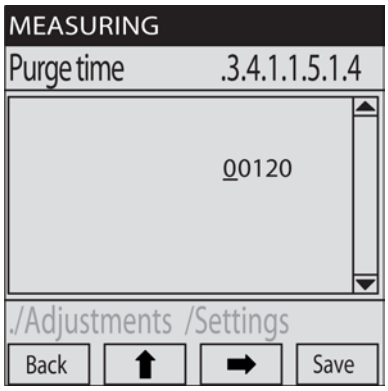
6.2.3 Character input

Prerequisite: You are an authorized user in edit mode following input of password.

You can now enter values or change displayed values.

Input of numbers

The previously set number is displayed in the menu, with the cursor at the position to be changed.



You can now use:

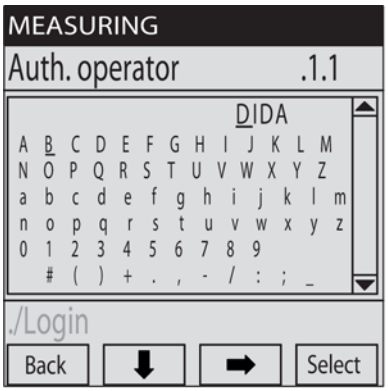
- the ➡ key to select the digit to be changed
- the ⬆ key to change the selected digit
- the Save key to import the displayed value
- the Back key to complete the input and return to the previous menu.

Input of characters

The previously set value is displayed in the menu, with the cursor at the position to be changed.

You can now use:

- the ➡ key to select the position to be changed
- the Edit key to change to the character set The meanings of the displayed function keys change.



You can now use:

- the ➡ and ⬇ keys to select the desired character
- the Select key to import the selected character into the input block.
- the Back key to complete the input and return to the previous menu.

Important functions (selection) 7

7.1 Setting the language

With this function, you can set the operating language.

To do this, use the ⬆ and ⬇ keys in the main menu to select the menu item 'Language', and activate this by pressing the Enter key.

A menu appears with selection of the operating languages.

Figure 7-1 Language menu

Use the ⬆ and ⬇ keys to select the desired language, and activate this by pressing the Save key.

7.2 Diagnostics functions

7.2.1 Menu tree for diagnostics functions

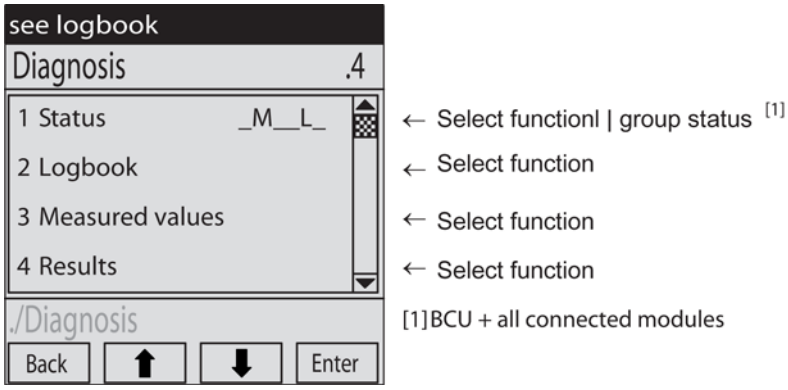
You can access the menu branch of the control unit (BCU) as follows: MEAS (main menu) → 3 BCU. The following table provides an overview of all diagnostics functions (display functions) of the menu branch BCU and the associated access privileges (user level).

User level	O Operator (standard)	A Authorized user
Access privileges	□ View	✓ Adjust/start

Menu No.	Menu tree	O	A	Explanation
1	**Logon**		✓	
1.1	Aut. Users		✓	
1.1	Service		✓	
4	**Diagnostics**	□	□	
4.1	**Status**	□	□	See section Status (Page 71)
4.1.1	Measured values	□	□	
4.1.1.1	Auxiliary values	□	□	
4.1.2	Modules	□	□	
4.1.2.x	Module	□	□	
4.1.3	Limits	□	□	
4.1.3.x	Measured component	□	□	
4.1.3.x	Auxiliary values	□	□	
4.1.3.x.y	Auxiliary value	□	□	
4.2	**Logbooks**	□	□	See section Display logbook (Page 74)
4.2.1	Logbook compl.	□	□	
4.2.x	Logbook category	□	□	
4.3	**Measured values**	□	□	See section Display measured values (Page 75)
4.3.1	List	□	□	
4.3.2	Bargraph	□	□	
4.3.3	Y-T trend 6 min.	□	□	
4.3.4	Y-T trend 120 min.	□	□	
4.3.5	Current outputs	□	□	
4.3.5.x	Measured component	□	□	
4.3.6	Auxiliary values	□	□	

4.4	**Results**	☐	☐	See section Results of calibrations and validations (Page 79)
4.4.1	Calibration results	☐	☐	
4.4.1.x	Measured component	☐	☐	
4.4.1.x.1	Zero point	☐	☐	
4.4.1.x.2	End point	☐	☐	
4.4.2	Validation results	☐	☐	
4.4.2.x	Measured component	☐	☐	
4.4.2.x.1	Zero point	☐	☐	
4.4.2.x.2	End point	☐	☐	
4.5	**Inputs, outputs**	☐	☐	See section Inputs and outputs (Page 81)
4.5.1	Analog output (AOn)	☐	☐	
4.5.1.n	AOn	☐	☐	
4.5.2	Digital output (DOn)	☐	☐	
4.5.2.n	DOn	☐	☐	
4.5.3	Analog input (AIn)	☐	☐	
4.5.3.n	AIn	☐	☐	
4.5.4	Digital input (DIn)	☐	☐	
4.5.4.n	DIn	☐	☐	
4.6	**System overview**	☐	☐	See section System overview (Page 85)
4.7	**I/O overview**	☐	☐	See section IO overview (Page 86)
4.8	**Product information**	☐	☐	See section Product information (Page 86)
4.8.1	System	☐	☐	
4.8.2	BCU	☐	☐	
4.8.3	Modules	☐	☐	
4.8.3.x	Module	☐	☐	
4.9	**Operating hours**	☐	☐	See section Operating hours (Page 88)
4.9.x	Module	☐	☐	
4.10	**Service Information**		✓	See section Service information (Page 89)
6	**Language**		✓	See section Setting the language (Page 67)

7.2.2 Overview



The following diagnostics functions are possible:

- Status
- Logbook
- Measured values
- Results
- Inputs and outputs
- System overview
- Overview of inputs and outputs
- Product information
- Operating hours
- Service/maintenance

7.2.3 Status

Overview of the status messages

Every module and every measured value can assume further statuses in addition to the 'MEASURE' status. Status flags are used to identify the corresponding status:

Status (flag)	Description	Possible cause
F	Fault	Internal fault/malfunction (unsafe operating state)
M	Maintenance	Maintenance request/maintenance status [1]
C	Check	An internal function is currently running, e.g. a calibration. Measuring function is interrupted [1]
U	Uncertain	Unsafe operating state or measured value [1]
L	Limit	Limit [2]
T	Timeout	Internal timeout of measured signals, e.g. during a calibration procedure [2]
E	Extended	Internal message [2]

Status flags

[1] Corresponds to specification in accordance with NAMUR

[2] Without NAMUR significance

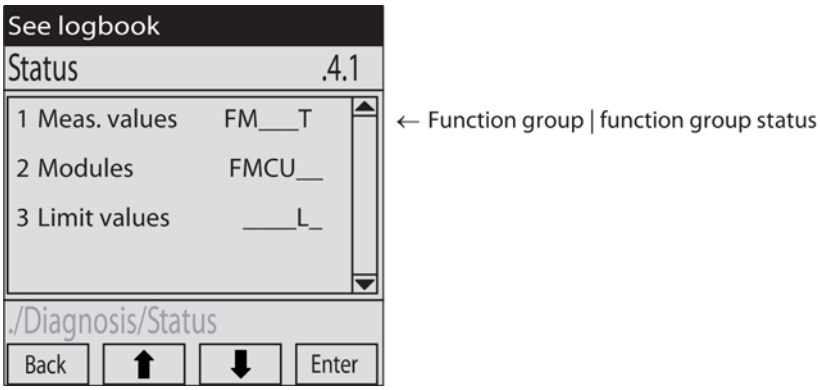
The status flags are displayed in the "Status" menu.

The status flags are displayed in the sequence F - M - C - U - L - T - E. A non-active flag is displayed by an underscore (_), i.e. the display "_ _ _ _" means that no flags are active.

Check status

Menu call:
Main menu → Diagnostics → Status.

The following menu of the function groups with their group status is then displayed (example):

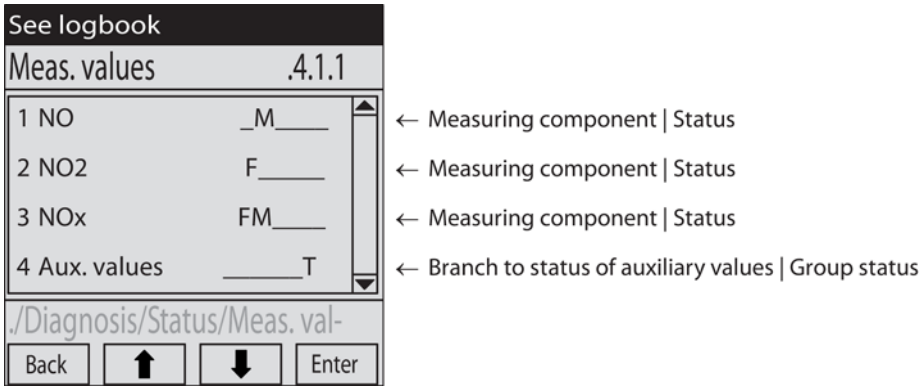


Select the desired function group in order to check the individual status.

Measured value status

Menu call:
Main menu → Diagnostics → Status → Measured values.

The following menu with the status of the individual measured values is then displayed (example):



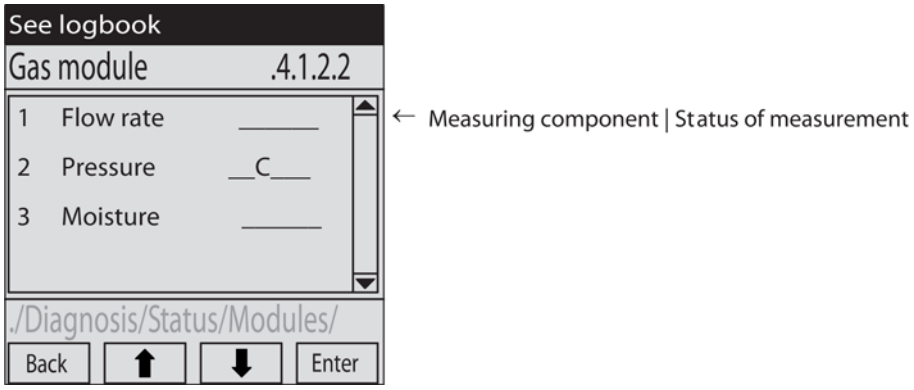
With real components (in the example: NO, NO2), the displayed status represents the signal which is sent by the hardware which internally provides the measured signal for the component (e.g. an analyzer module).

For virtual components (in the example: NOx), the status is a group status of all signal sources from which the virtual component is calculated.

Module status

Menu call:
Main menu → Diagnostics → Status → Modules.

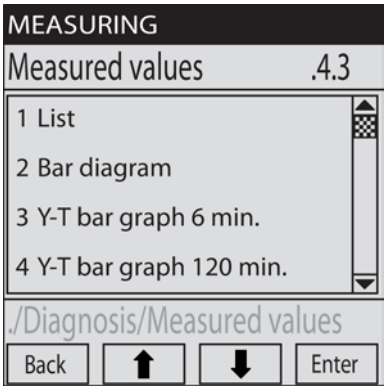
A menu with the status of the individual analyzer modules is then displayed. Depending on the configuration, you can also display the status of individual details within the module, e.g. as shown in the following menu.



Limit status

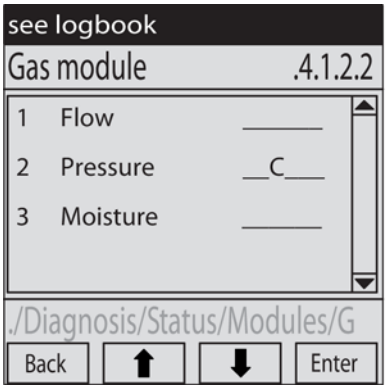
Menu call:
Main menu → Diagnostics → Status → Limits.

The following menu with the limit status of the individual components is then displayed (example).



L means that the associated component is outside the measuring range and the limit has therefore been triggered. If you select the individual measured components, you are provided with information on the limits and the current measured value.

The following menu is then displayed (example):



← Measuring component | measurement status

The characters following the limits have the following meaning:

ok The current measured value is within the set limits

(-) The current measured value is smaller than the limit set for 'Message with low violation'

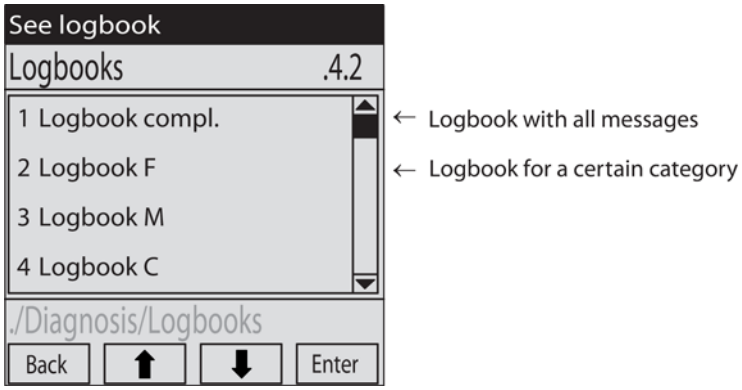
(+) The current measured value is greater than the limit set for 'Message with high violation'

7.2.4 Display logbook

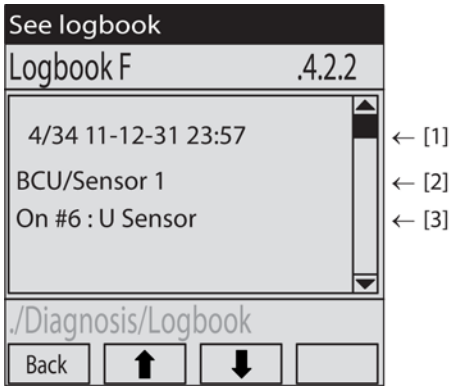
Currently existing system messages are displayed in the logbook. "No entries" is displayed if there are no current system messages.

Menu call:
Main menu → Diagnostics → Logbooks.

The following menu is then displayed with an overview of the logbooks (example)



Use the ⬆, ⬇ and Enter keys to navigate to the individual logbooks. The following menu is displayed (example):



The texts in the lines have the following meaning (in each case from left to right):

[1] Message number/total number of messages, date and time of last change in status

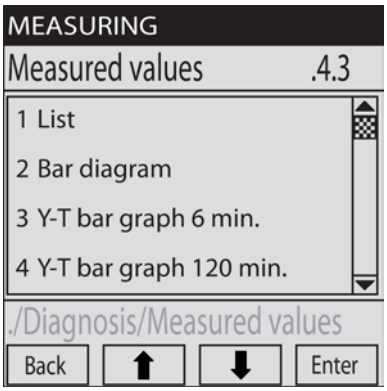
[2] Triggering module/cause of message

[3] Status of this message (last change in status), number of activations of this message since the last resetting of the logbook, fault message (see section)

Navigate to further messages using the ⬆ and ⬇ keys.

7.2.5 Display measured values

This function is used to display measured values. Different types of representation are possible for displaying measured values.
Menu call:
Main menu → Diagnostics → Measured values.
The following menu is then displayed (example):



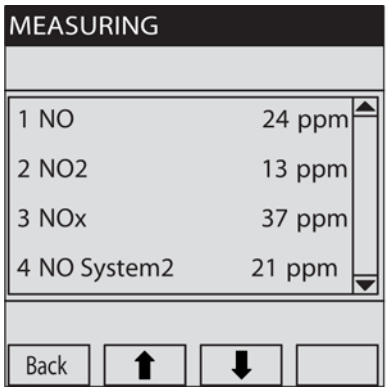
You have the following options for displaying the measured values:

Display in menu	Display
List	All measured values as numbers
Bargraph	All measured values as bargraphs
Time axis (Y-T trend) 6 min.	Measured value progression as trend with appropriate resolution
Time axis (Y-T trend) 120 min.	
Current outputs	Measured values as mA values
Auxiliary values	Auxiliary values as numbers

Use the ⬆ and ⬇ keys to navigate to the types of representation for the measured values, and select the desired representation using Enter.

Measured values as list

Menu call:
Main menu → Diagnostics → Measured values → List.
The following menu is then displayed (example)

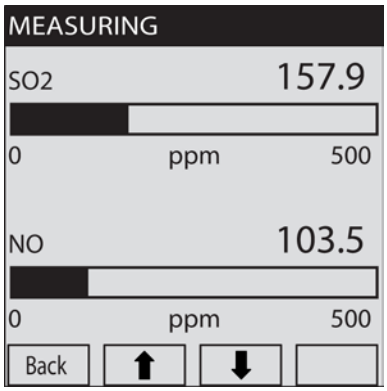


← Measured component | Current measured value

Use the ⬆ and ⬇ keys to navigate to further measured values (if present).

Measured values as bargraph

Menu call:
Main menu → Diagnostics → Measured values → Bargraph.
The following menu is then displayed (example)



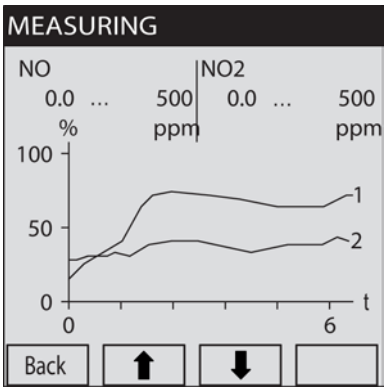
The bargraph contains the following information:

- The measured component is displayed on the left above the bargraph, and the current value on the right
- The start-of-scale value is displayed on the left below the bargraph, and the full-scale value on the right. The unit is displayed between them
- The bargraph is the representation of the measured value in relation to the measuring range.

Use the ⬆ and ⬇ keys to navigate to further measured values (if present).

Measured values as time axis 6 minutes/120 minutes

Menu call:
Main menu → Diagnostics → Measured values → Y-T trend 6 min. or Y-T trend 120 min.
The following menu is then displayed (example)

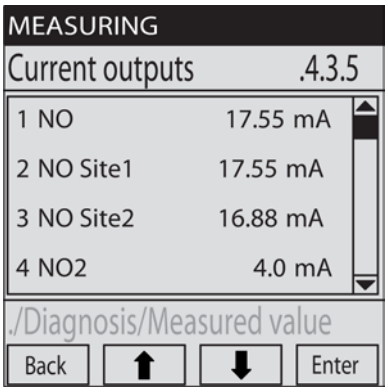


A Y-T trend shows the progression of the measured values within the last 6 or 120 minutes. Up to 8 different Y-T trends can be displayed. If the analyzer has more than 8 measured components, two measured values are displayed in each Y-T trend.

Use the ⬆ and ⬇ keys to navigate to further measured values (if present).

Measured values as output currents (display in mA)

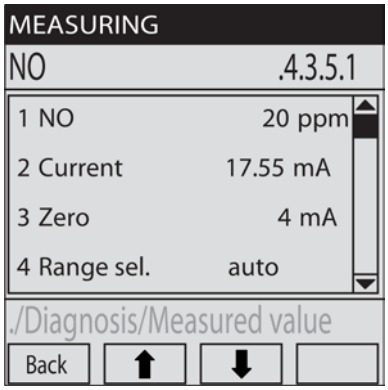
Menu call:
Main menu → Diagnostics → Measured values → Current outputs
The following menu is then displayed (example):



The menu shows the measured values that are output via an analog output as signals of the analog output. The measured values from different measuring points can be seen here in lines 2 and 3. However, measured values with data on the measuring point are only present if measuring point switching had previously been switched on.

Use the ⬆ and ⬇ keys to navigate to the lines, and branch to detailed information there by pressing Enter.

The following menu is then displayed (example):

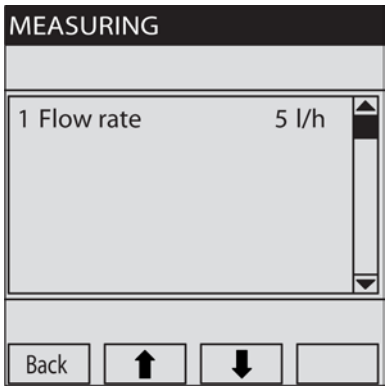


The following detailed information can be viewed:

Notation in the menu	Explanation
NO	Assigned measured component
Current	Actual output value
Zero	Live zero (zero of output current range)
Range sel.	Mode of output range selection
Status (AOnR)	Current output range (0/1) [AOn = assigned analog output]
Range 0	Activation status of output range 0 (on/off)
Range 0 Start	Physical start-of-scale value of output range 0
Range 0 End	Physical full-scale value of output range 0
Range 1	Output range 1: same parameters as range 0
Range 1 Start	
Range 1 End	

Auxiliary values

Menu call:
Main menu → Diagnostics → Measured values → Current outputs
The following menu is then displayed (example):



The menu contents show the possible auxiliary values, in this case the flow rate with the current measured value.

7.2.6 Results of calibrations and validations

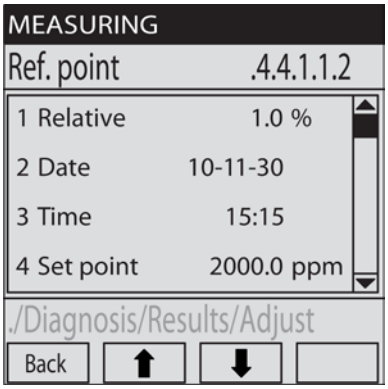
Display calibration results

This function can be used to display the last calibration results for each individual component and the associated drift values.

Menu call:
Main menu → Diagnostics → Calibration results.
A menu with the data of the last calibration is then displayed.

1. Use the ⬆ and ⬇ keys to navigate to the desired component or auxiliary value, and select using the Enter key.
2. Then select one of the parameters 'Zero' 'Ref. point'.

The following menu is now displayed (example):



The following parameters can be displayed:

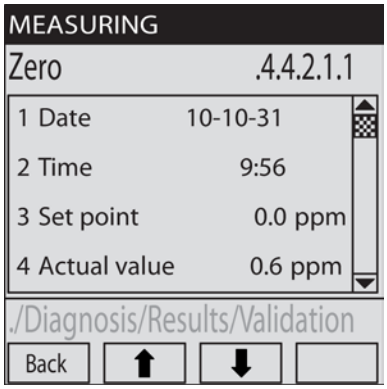
Display	Description
Relative	Drift between this calibration and the previous calibration
Date	Current date (representation: DD-MM-YY)
Time	Current time (24-hour representation)
Setpoint	Setpoint of the used calibration gas
Actual value	Actual value of the used calibration gas (mean value)
Absolute	Absolute drift, i.e. total change in a drift value over several calibrations

Display validation results

Menu call:
Main menu → Diagnostics → Validation results.
A menu with the data of the last validation is then displayed.

1. Use the ⬆ and ⬇ keys to navigate to the desired component or auxiliary value, and select using the Enter key.
2. Then select one of the parameters 'Zero' 'Ref. point'.

The following menu is now displayed (example):



The following parameters can be displayed:

Display	Description
Date	Current date (representation: DD-MM-YY)
Time	Current time (24-hour representation)
Setpoint	Setpoint of the used calibration gas
Actual value	Actual value of the used calibration gas (mean value)

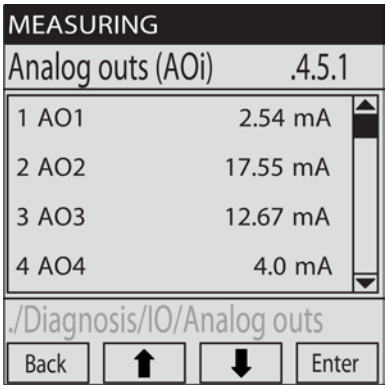
7.2.7 Inputs and outputs

In the menu branch "IO" (inputs, outputs) you can display the status and settings of each signal connection.

Analog outputs

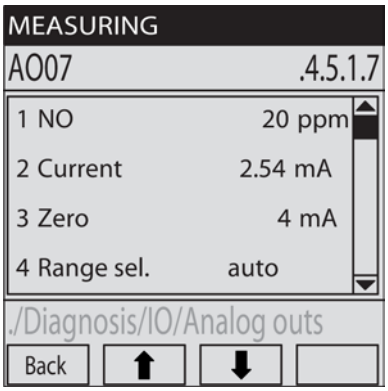
Menu call:
Main menu → Diagnostics → IO → Analog output

The following menu is then displayed (example):



The menu displays all analog outputs which have a signal source, together with their actual output current values. In order to obtain detailed information on an analog output, select it using the ⬆ and ⬇ keys and then by pressing the Enter key.

The following menu is then displayed (example):



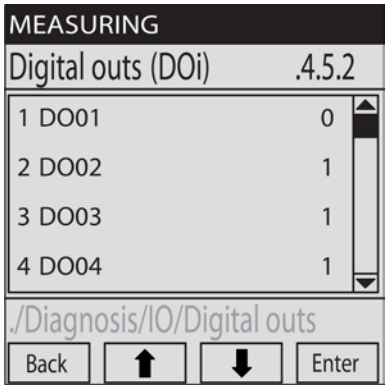
The following detailed information can be viewed:

Notation in the menu	Explanation
NO	Assigned measured component
Current	Actual output value
Zero	Live zero (zero of output current range)
Range sel.	Mode of output range selection
Status (AOnR)	Current output range (0/1) [AOn = assigned analog output]
Range 0	Activation status of output range 0 (on/off)
Range 0 Start	Physical start-of-scale value of output range 0
Range 0 End	Physical full-scale value of output range 0
Range 1	Output range 1: same parameters as range 0
Range 1 Start	
Range 1 End	

Digital outputs

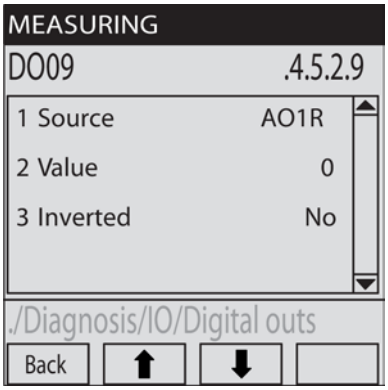
Menu call:
Main menu → Diagnostics → IO → Digital output

The following menu is then displayed (example):



The menu displays all digital outputs which have a function, together with their current statuses (0 = inactive, 1 = active). You must take into account the set switching logic (see menu 5.7.2 in section Configuring the digital outputs (Page 145)). In order to obtain detailed information on a digital output, select it using the ⬆ and ⬇ keys and then by pressing the Enter key.

The following menu is then displayed (example):



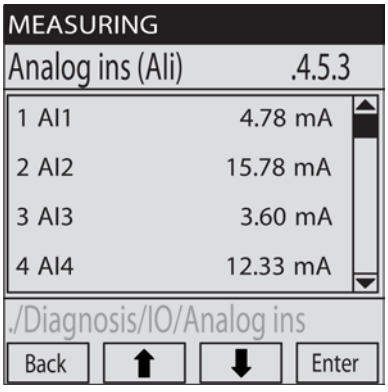
The following detailed information can be viewed:

Notation in the menu	Explanation
Source	Assigned internal signal
Value	Current logical status of the digital output (0 = inactive, 1 = active)
Inverted	Electronic switching logic

Analog inputs

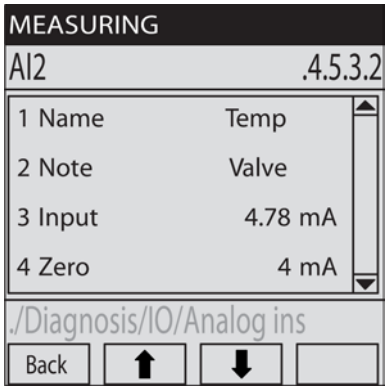
Menu call:
Main menu → Diagnostics → IO → Analog input

The following menu is then displayed (example):



The menu displays all configured analog inputs, together with their actual input current values. In order to obtain detailed information on an analog input, select it using the ⬆ and ⬇ keys and then by pressing the Enter key.

The following menu is then displayed (example):



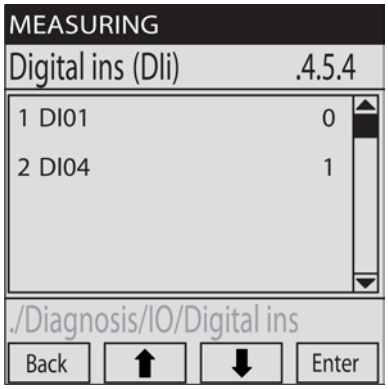
The following detailed information can be viewed:

Notation in the menu	Explanation
Name	Configure the name of analog input
Note	Configured note (reference, comment etc.)
Input	Current input signal
Zero	Zero point of electronic signal range (live zero)
Max. current	Full-scale value of input current range
Measured value	Input signal as measured value
MR start	Start-of-scale value of physical measuring range
MR end	Full-scale value of physical measuring range

Digital inputs

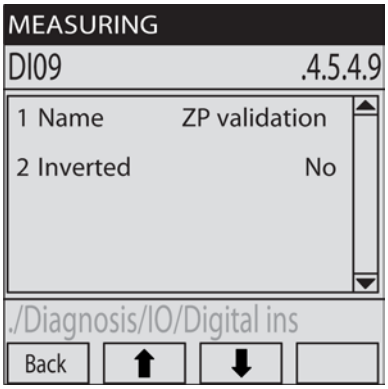
Menu call:
Main menu → Diagnostics → IO → Digital input

The following menu is then displayed (example):



The menu displays all digital inputs which have a function, together with their current statuses (0 = inactive, 1 = active). In order to obtain detailed information on a digital input, select it using the ⬆ and ⬇ keys and then by pressing the Enter key.

The following menu is then displayed (example):



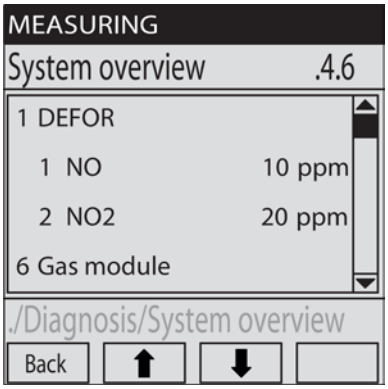
The following detailed information can be viewed:

Notation in the menu	Explanation
Name	Configure the name of digital input
Inverted	Electronic switching logic

7.2.8 System overview

This function provides an overview of the modules present in the analyzer.

Menu call:
Main menu → Diagnostics → System overview.
The following menu is then displayed (example):



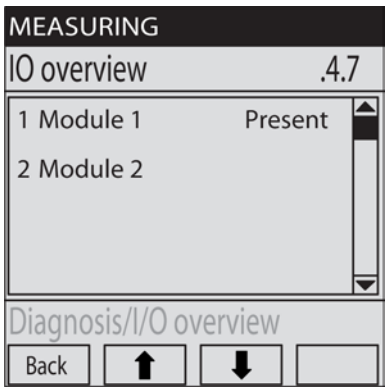
The modules are shown left-justified, the measuring ranges and the components are shown indented.

Navigate to further (hidden) components of the system overview using the ⬆ and ⬇ keys.

7.2.9 IO overview

This function provides an overview of the input/output modules present in the analyzer.

Menu call:
Main menu → Diagnostics → IO overview
The following menu is then displayed (example):



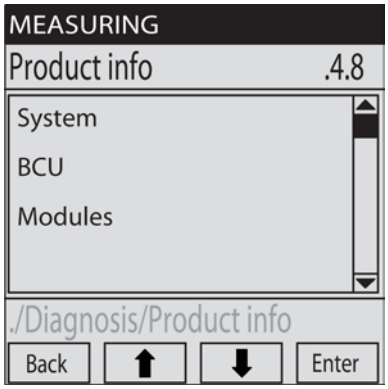
If the field following the module name is empty, the module is not present in the analyzer.

7.2.10 Product information

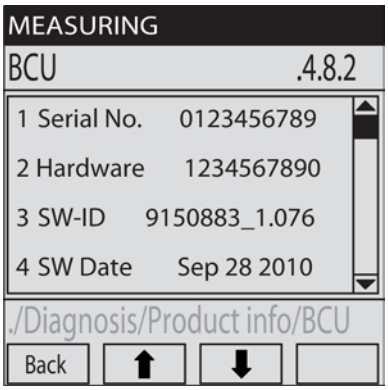
This function provides information on the analyzer hardware and software.

Menu call:
Main menu → Diagnostics → Product info

The following menu is then displayed with the hardware components of the analyzer (example):



All hardware components are displayed in the menu. In order to obtain detailed information on a component, select it using the ⬆ and ⬇ keys and then by pressing the Enter key. The following menu is then displayed (example):



All information on the control unit (BCU) is displayed in the menu. Navigate to further (hidden) parameters using the ⬆ and ⬇ keys. The following parameters can be displayed:

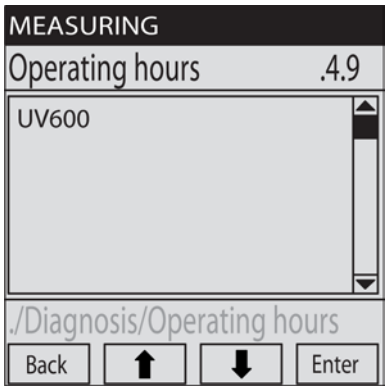
Notation in the menu	Explanation
Serial no.	Serial no. of the device
Hardware	Internal information from the vendor
SW ID	Identification of the installed software (vendor ID, version)
SW date	Release date of the installed software
SW display	Version of display software
Tag No.	Identification of measuring point (only as component of 'System')

7.2.11 Operating hours

This function provides information on the actual operating hours (period of use) of a number of modules. The operating hours of components which have a limited service life (e.g. UV lamp) are also displayed. This is important for timely purchasing of spare parts.

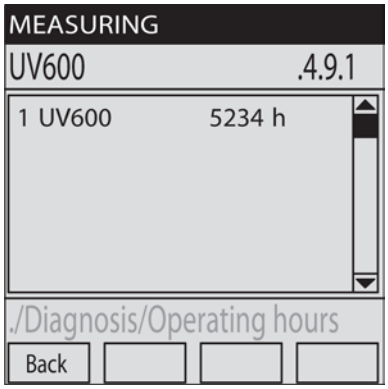
Menu call:
Main menu → Diagnostics → Operating hours

The following menu is then displayed (example):



Use the ⬆, ⬇ and Enter keys to select a module.

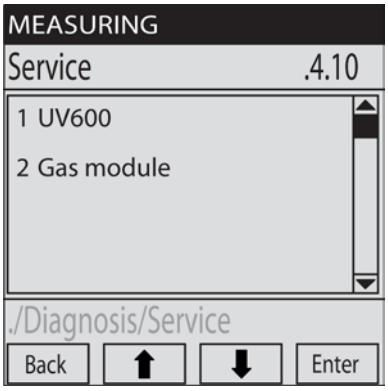
The following menu is displayed (example):



7.2.12 Service information

This function provides information on the internal measured signals and control values. These displays may help the the vendor's servicing department when analyzing function faults. This function is only available in the user level 'Authorized user'.

Menu call:
Main menu → Diagnostics → Service
The following menu is then displayed (example):



Use the ⬆, ⬇ and Enter keys to select a module and to obtain its internal parameters.
The following parameters are possible:

Notation in the menu	Explanation
Electronics temperature *	Current temperature of the module electronics
Name/unit	Name of measured component/physical unit of measured value
Phys. range	Physical measuring range of component
Calibration cell *	Basic values of calibration cell
Drift limit	Programmed drift limits
Raw values	Internal values of measured signal processing
A/D values	Internal values of measured signal processing
Heaters *	Setpoints and actual values of internal heater
Motors *	Operating state of an internal motor
Restart	Restart of module electronics
Maintenance flag	Activation of message "M" (status display) for the module

* Optional parameters

7.3 Calibration and validation functions

7.3.1 Menu tree for calibration and validation functions

You can access the menu branch of the control unit (BCU) as follows: MEAS (main menu) → 3 BCU. The following table provides an overview of all diagnostics functions (display functions) of the menu branch BCU and the associated access privileges (user level).

User level	O Operator (standard)	A Authorized user
Access privileges	□ View	✓ Adjust/start

Menu No.	Menu tree	O	A	Explanation
3	**Calibration and validation functions**		✓	
3.1	**Calibration**		✓	See section Carrying out a manual calibration (Page 108)
3.1.x	Measured component		✓	
3.1.x.1	Zero calibration		✓	
3.1.x.1.1	Results		✓	
3.1.x.2	Reference point calibration		✓	
3.1.x.2.1	Results		✓	
3.1.x.3	Reference point calibration using calibration cell		✓	
3.1.x.3.1	Results		✓	
3.1.x.4	Linearity correction		✓	
3.1.x.4.1	Results		✓	
3.1.x.10	Results		✓	
3.1.x.10.1	Zero point		✓	
3.1.x.10.2	Ref. point		✓	
3.1.x.11	Drift reset		✓	
3.1.x	Auxiliary values		✓	
3.1.x.1	Zero calibration		✓	
3.1.x.1.1	Results		✓	
3.1.x.2	Ref. point calibration		✓	
3.1.x.2.1	Results		✓	
3.1.x.4	Lin. correction		✓	
3.1.x.4.1	Results		✓	
3.1.x.10	Results		✓	
3.1.x.10.1	Zero point		✓	
3.1.x.10.2	Ref. point		✓	

3.2	**Validation**	✓	See section Carrying out a manual validation measurement (Page 113)
3.2.x	Measured component	✓	
3.2.x.1	Zero point validation	✓	
3.2.x.1.1	Results	✓	
3.2.x.2	Reference point validation	✓	
3.2.x.2.1	Results		
3.2.x.3	Reference point calibration using calibration cell	✓	
3.2.x.3.1	Results	✓	
3.2.x.10	Results	✓	
3.2.x.10.1	Zero point	✓	
3.2.x.10.2	Ref. point	✓	
3.3	**Calibration adjustment**	✓	
3.3.1	Measuring duration	✓	See section Setting the measuring duration (Page 92)
3.3.2	Sample gas purging time	✓	See section Setting the sample gas purging time (Page 93)
3.4	**Group functions**	✓	See section Group functions (Page 118)
3.5	**Settings**	✓	
3.5.1	Calibration gases	✓	See section Configuring calibration gases (Page 98)
3.5.1.x	Calibration gas	✓	
3.5.1.x.1	Name	✓	
3.5.1.x.2	Active	✓	
3.5.1.x.3	Pump off	✓	
3.5.1.x.4	Valve	✓	
3.5.1.x.4.1	inv. DOn	✓	
3.5.1.x.5	Use	✓	
3.5.1.x.5.y	Measured component	✓	
3.5.1.x.5.y.1	Component	✓	
3.5.1.x.5.y.2	Active	✓	
3.5.1.x.5.y.3	Concentration	✓	
3.5.1.x.5.y.4	Purging time	✓	
3.5.1.x.5.y.5	As zero gas	✓	
3.5.1.x.5.y.5.1	Val. zero point Y/N	✓	
3.5.1.x.5.y.6	As ref. gas	✓	
3.5.1.x.5.y.6.1	Val. ref. point Y/N	✓	

3.5.2	Automatic calibrations	✓	See section Configuring automatic calibration (Page 94)
3.5.2.1	Zero point validation	✓	
3.5.2.1.1	Active	✓	
3.5.2.1.2	Interval	✓	
3.5.2.1.3	Time unit	✓	
3.5.2.1.4	Starting date	✓	
3.5.2.1.5	Start time	✓	

7.3.2 Settings

7.3.2.1 General settings for calibration and validation

Setting the measuring duration

The measuring duration has an effect on manual calibrations and determines how long the measured values of a connected calibration gas are determined. As a rule of thumb: the longer the measuring duration, the more accurate the calibration. The measuring duration commences in each case following a calibration gas purging time. The mean value of the measured values is:

- With calibrations: the actual value for the calibration.
- With validation measurements: the measured value of the validation measurement.

Criteria for the setting:

- Adaptation to the damping: the measuring duration must be at least 150 to 200% of the set damping time constant (see section Adjusting the damping (Page 136)).
- Adaptation to the measuring response: the measuring duration must be large enough such that generation of the mean value completely compensates variations in measured value and any noise in the measured values.

⚠ CAUTION

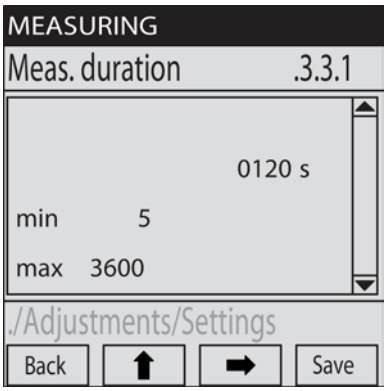
Risk of incorrect calibrations

If the measuring duration is too short, the calibrations will be inexact.

- In case of doubt, you should rather select the measuring duration to be too long and not too short.

Menu call:
Main menu → Calibrations → Settings Calib. → Measuring duration

The following menu is displayed (example):



Lines 3 and 4 show the minimum and maximum values of the measuring duration; the duration can be edited in line 2 as described in section Character input (Page 64).

Setting the sample gas purging time

The sample gas purging time is a waiting time which passes following each calibration or validation before the "Calibration" or "Validation" status is reset. The sample gas purging time belongs to the sequence of the calibration/validation procedure. It is required to take into consideration the analyzer's response time following switching over from the last calibration gas to the sample gas. The setting applies to all calibrations and validations.

Criteria for the setting
The analyzer should be completely filled with the new gas at the end of a purging time and display the "final" measured values of this gas. An appropriate purging time corresponds approximately to the analyzer's response time (dead time + 100% time).

Measure the response time as follows:

- For each component, check how long it takes following switching over to a different gas until the displayed measured value remains constant
- Use the longest response time as the purging time
- On the other hand, do not define the purging times longer than necessary since the normal measuring function is interrupted during a calibration or validation procedure.

⚠ CAUTION

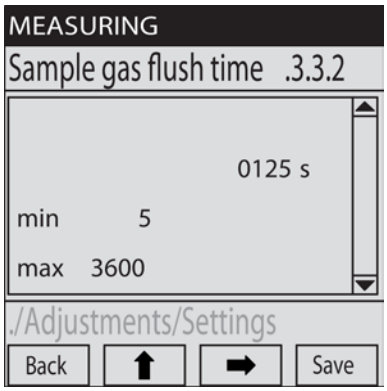
Possible interferences with connected systems

If the sample gas purging time is set too short, the analyzer signals the normal operating state before the measured values correspond to the actual concentrations. If the measured values control connected systems, the result could be faulty control.

- Select a sufficiently long sample gas purging time!

Menu call:
Main menu → Calibrations → Settings Calib. → Sample gas purging time

The following menu is displayed (example):



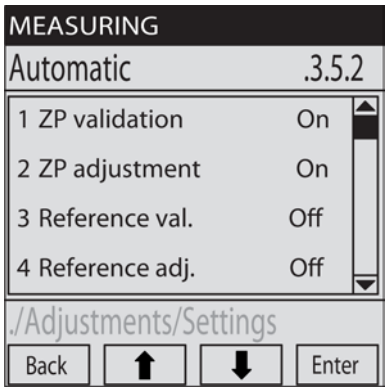
Lines 3 and 4 show the minimum and maximum values of the sample gas purging time in seconds; the duration can be edited in line 2 as described in section .

7.3.2.2 Configuring automatic calibration

This function can be used to 'compose' an automatic calibration procedure.

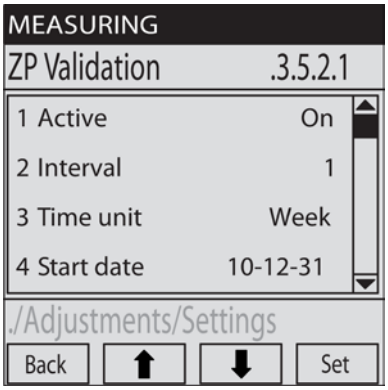
Menu call:
Main menu → Calibrations → Settings → Automatic

The following menu is displayed with the names of the possible automatic procedures and their activation status (example).



Use the ⬆ and ⬇ keys to select the desired procedure, and activate this by pressing the Enter key.

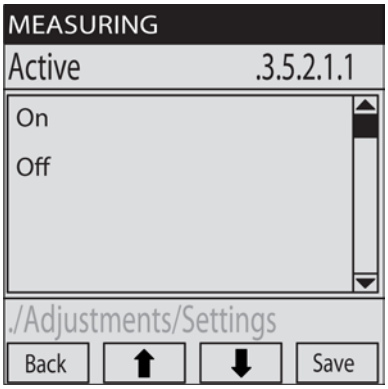
The following menu is displayed with the setting parameters (example):



Parameter settings

Activation/deactivation

The following menu is displayed following selection of the first parameter (1 Active):



You can select from the following:

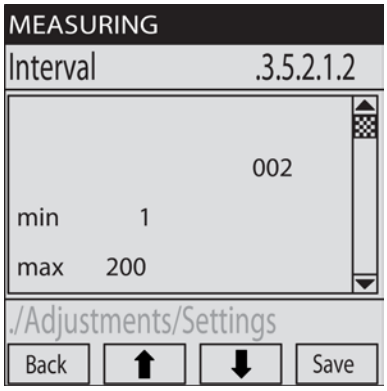
on - active

off - inactive

Set the desired status using the ⬆ and ⬇ keys, and confirm with Save.

Setting the interval of a cyclic procedure

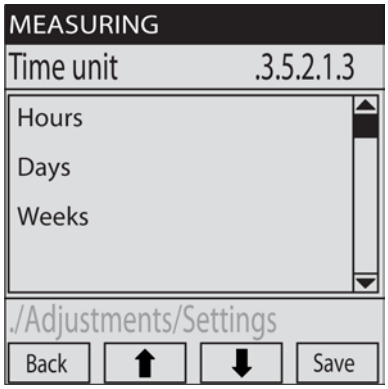
The following menu is displayed following selection of the second parameter (2 Interval):



Lines 3 and 4 show the smallest possible and largest possible numerical values; the desired numerical value can be entered in line 2 as described in section Character input (Page 64).

Setting the time unit

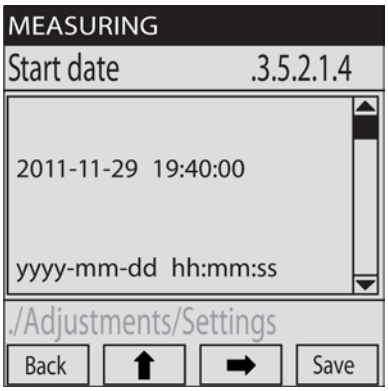
The following menu is displayed following selection of the third parameter (3 Time unit) (example):



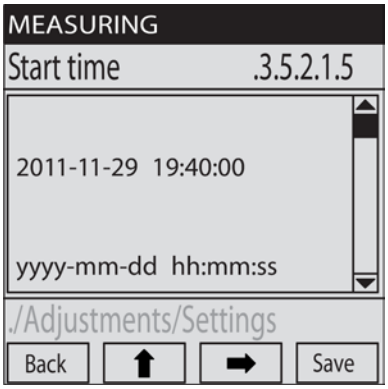
Set the desired time unit using the ⬆ and ⬇ keys, and confirm with Save.

Setting the date of the next automatic calibration

The following menu is displayed following selection of the fourth parameter (4 Start date) (example):



The previously set time is shown in line 2 and can be overwritten. Line 4 shows the display format for the date and time input. Set the desired start date as described in section Character input (Page 64). Switch to the follow-up menu for the time using the Back key.



Set the desired start date as described in section Character input (Page 64).

Input of the time parameters for the automatic calibration procedure or validation measurement has then been completed.

7.3.2.3 Configuring calibration gases

Basics

The calibration gas settings are the basis of the calibrations. The setpoint (concentration) and the sequence parameters for the calibration procedure are defined for a calibration gas in a calibration gas setting. The calibration procedures for which a calibration gas setting can be used are also defined.

It is possible to use a real calibration gas in several calibration gas settings. In this manner a specific calibration gas can be configured with different settings for different calibrations.

All calibration gas settings can also be provided for validation measurements. A total of 12 different calibration gas settings can be configured.

Appropriate calibration gas settings are usually preprogrammed by the manufacturer. If your operating procedure should require different calibration test settings, you can use the following overview as support. We recommend that you use each calibration gas setting for only one specific calibration or validation.

Overview of the calibration gas configuration options

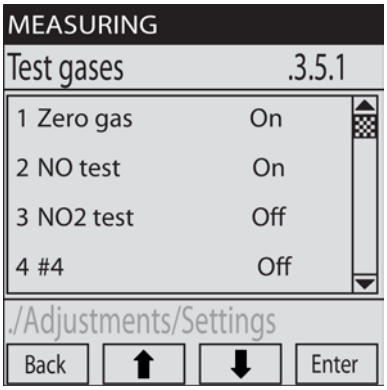
No.	Menu title	Configuration	Described in section
1	Name	Specify name of calibration gas setting	
2	Active	Set availability of calibration gas setting	
3	Pump off	Set pump mode	
4	Valve	Select valve control	
5	Use	Call application menu of a measured component	
6	Component	Assign measured component	
7	Active	Set availability for the measured component	
8	Concentration	Set setpoint for a measured component	
9	As zero gas	Set application as zero gas	
10	As ref. gas	Set application as reference gas	

Basic settings

You can use this function to make the basic settings of the calibration gas configuration.

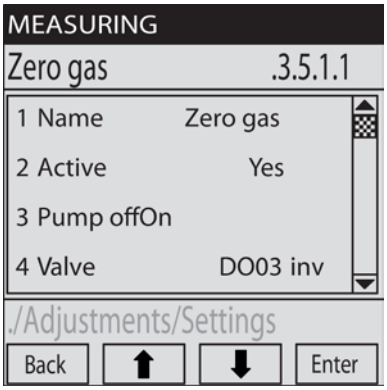
Menu call:
Main menu → Calibrations → Settings → Calibration gases

The following menu is displayed with the existing calibration gas settings (example).



In order to change the parameters of an existing calibration gas configuration, select them using the ⬆ and ⬇ keys and activate them by pressing the Enter key. In order to create a new calibration gas configuration, select a vacant location (#4 in the example) and activate it by pressing the Enter key.

The following menu is displayed with a calibration gas configuration (example):



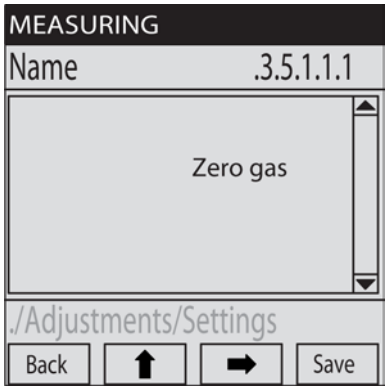
Use the ⬆ and ⬇ keys to select the desired parameter, and activate it by pressing the Enter key.

The parameters have the following meanings:

Notation in the menu	Function
Name	Name of calibration gas configuration (or number of a vacant location)
Active	**Yes** means that this calibration gas for calibrations/validations can be selected
Pump off	Status of sample gas pump during use of the calibration gas
Valve	Digital output which is activated during use of the calibration gas for controlling a solenoid valve
Use	Settings of calibration gas for measurement

Name of calibration gas

You can use this function to specify the name of the calibration gas configuration.
Menu call:
Main menu → Calibrations → Settings → Calibration gases → Calibration gas setting → Name
The following menu is displayed with the previously set name of the calibration gas configuration or the number of the vacant location (example).

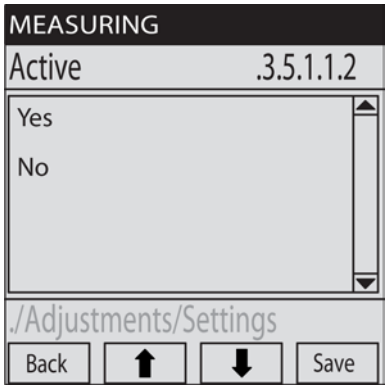


You can now set the desired name as described in section . The name of a calibration gas configuration is freely-selectable with up to 16 characters, e.g.: "Nitrogen" or "Zero gas".

We recommend that you use a name which reflects the composition or the function of the real calibration gas.

Availability of calibration gas

You can use this function to specify the availability of the calibration gas configuration.
Menu call:
Main menu → Calibrations → Settings → Calibration gases → Calibration gas setting → Active
The following menu is displayed (example):



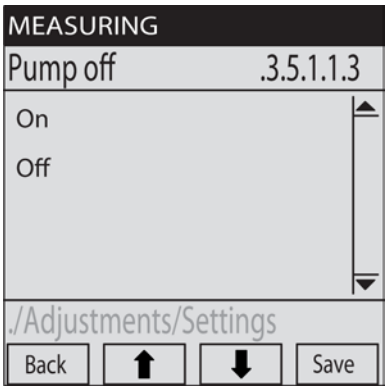
The parameters have the following meanings:

Yes	This calibration gas configuration can be used
No	This calibration gas configuration cannot be used. This setting can be used to completely deactivate a calibration gas configuration without having to delete it.

You can then select the desired status using the ⬆, ⬇ and Enter keys.

Pump mode

The sample gas pump can be switched off automatically if this calibration gas configuration is active – in other words if the associated calibration gas is flowing into the gas analyzer.
Menu call:
Main menu → Calibrations → Settings → Calibration gases → Calibration gas setting → Pump off
The following menu is displayed (example):



The parameters have the following meanings:

On	The sample gas pump is switched off automatically if the calibration gas is used
Off	The sample gas pump remains switched on if the calibration gas is used

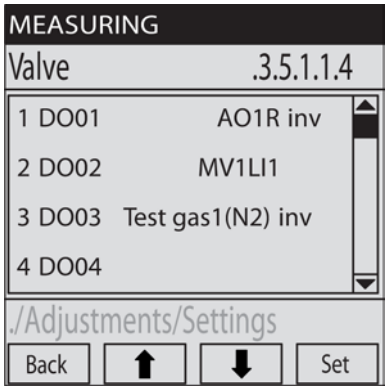
You can then set the desired status using the ⬆, ⬇ and Enter keys.

Valve control

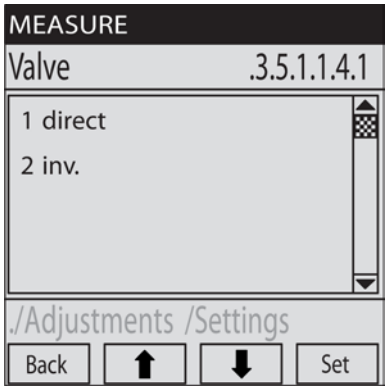
This function determines which digital output is activated if this calibration gas configuration is active during a calibration procedure or validation measurement. The flow of calibration gas can be controlled automatically in this manner.

Menu call:
Main menu → Calibrations → Settings → Calibration gases → Calibration gas setting → Valve

The following menu is displayed with the set digital outputs (example).



You can select the desired digital output using the ⬆ and ⬇ keys. Switch to the follow-up menu for setting the switching logic using the Set key.



The parameters have the following meanings:

Direct	The digital output is electronically activated (relay is pulled-up) if the source is also in the logical activated status (open-circuit principle).
Inverted	The digital output is electronically activated if the source is in the logical deactivated status (closed-circuit principle). If the source is logical activated, the switching output is electronically in the deactivated status (relay dropped-out)

Set the desired switching logic using the ⬆, ⬇ and Save keys.

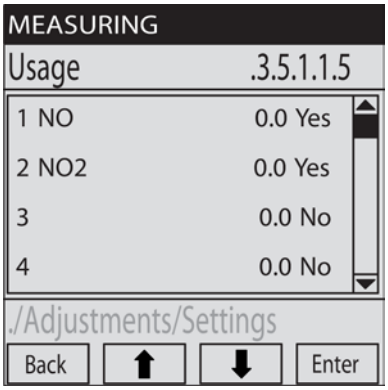
Use

These settings define:

- The measured components for which the calibration gas can be used
- Which physical parameters apply to which calibration procedures and validation measurements.

Menu call:
Main menu → Calibrations → Settings → Calibration gases → Calibration gas setting → Use

The following menu is displayed with the previously set components with their setpoints and use IDs or the vacant locations (example).

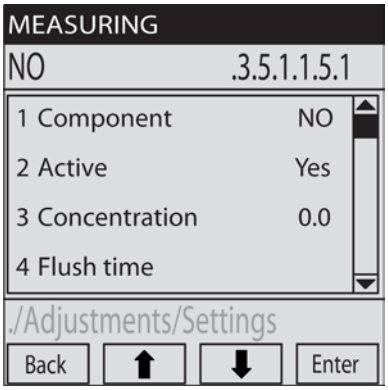


You can now change the settings for the desired component using the ⬆, ⬇ and Enter keys or add a new component by occupying a vacant location.

Parameterization of a measured component

Menu call:
Main menu → Calibrations → Settings → Calibration gases → Calibration gas setting → Use → Measured component

The following menu is displayed with the previously set parameters of the selected component (example).



The parameters have the following meanings:

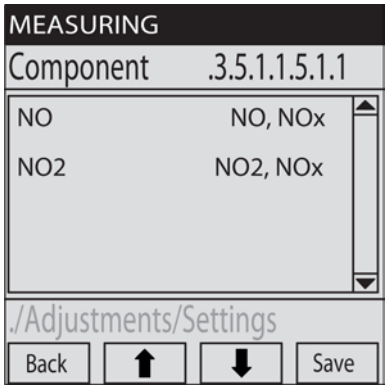
Component	Selected component
Active	"Yes" means that this calibration gas configuration is available in other functions "No" prevents the use for calibrations and validations. This can be used, for example, if the real calibration gas is temporarily unavailable or should not be used.
Concentration	Waiting time between activation of calibration gas and commencement of measurements
As zero gas	"Yes" means that this calibration gas can be used for zero calibrations and validation measurements
As ref. gas	"Yes" means that this calibration gas can be used for full-scale calibrations and validation measurements

Assignment of a measured component

This setting is used to assign a component to the associated location in the "Use" list of the calibration gas configuration.

Menu call:
Main menu → Calibrations → Settings → Calibration gases → Calibration gas setting → Use → Measured component→ Component

The following menu is displayed with the previously set components (real and virtual) (example). The information on the right-hand side indicates the virtual components for whose calculation the real components are used. Only one component is displayed if the real and virtual components are identical.



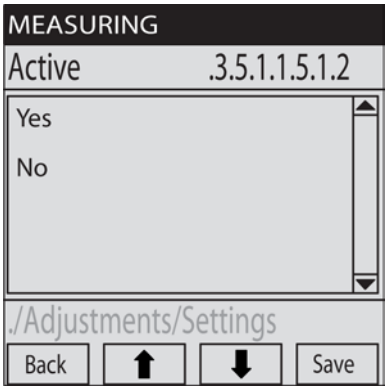
You can then select the desired component using the ⬆, ⬇ and Save keys.

Setting the availability of a measured component

This setting can be used to deactivate the use for the associated component without completely deleting the settings for this component.

Menu call:
Main menu → Calibrations → Settings → Calibration gases → Calibration gas setting → Use → Measured component→ Active

The following menu is displayed (example):



The parameters have the following meanings:

Yes	This calibration gas is available for calibration procedures and validation measurements for this component
No	This calibration gas is not available for calibration procedures and validation measurements for this component

You can then set the availability using the ⬆, ⬇ and Save keys.

Setting the setpoint for a measured component

This setting specifies the setpoint of the gas for the calibrations for which these calibration gas settings are used.

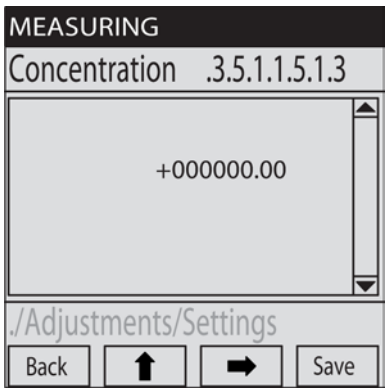
Criteria for the setting:

- The setpoint is usually the actual concentration of the component in the used calibration gas.
- However, it is also possible to set a setpoint which deviates from the actual concentration – e.g. in order to compensate a cross-sensitivity.

It is possible to set different setpoints for different components in the same calibration gas setting. This is meaningful, for example, if a calibration gas mixture is used which contains several components.

Menu call:
Main menu → Calibrations → Settings → Calibration gases → Calibration gas setting → Use → Measured component→ Concentration

The following menu is displayed (example):



You can now set the desired value as described in section Character input (Page 64).

Setting the purging time for calibrations

The purging time is the waiting time between switching over to the calibration gas and commencement of the measurement. It can be individually set for each measured component in each calibration gas setting.

CAUTION

Risk of incorrect calibrations

If the purging time is set too short, this can falsify the calibration results.

- In case of doubt, you should rather select the purging time to be too long and not too short.

Menu call:
Main menu → Calibrations → Settings → Calibration gases → Calibration gas setting → Use → Measured component→ Purging time

The following menu is displayed (example):

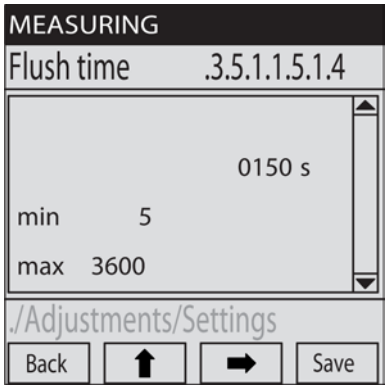


Figure 7-2 3511514_Use_NO_Purging_time

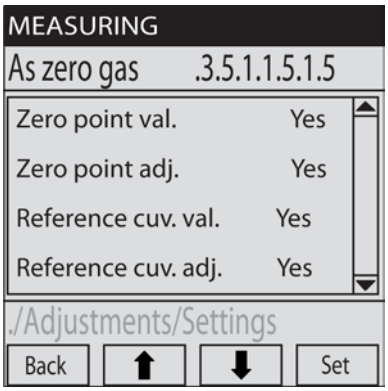
Lines 3 and 4 show the minimum and maximum values of the purging time in seconds; the duration can be edited in line 2 as described in section Character input (Page 64).

Using calibration gas as zero gas

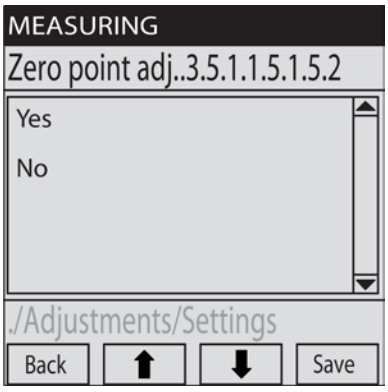
These settings define for which calibrations and validations the associated calibration gas is available as zero gas.

Menu call:
Main menu → Calibrations → Settings → Calibration gases → Calibration gas setting → Use → Measured component→ As zero gas

The following menu is displayed (example):



You can now set the desired calibration or validation procedure using the ⬆ and ⬇ keys and move on to the follow-up menu using the Set key where you can find information on the calibration gas availability. The following menu is displayed (example):



You can then set the availability using the ⬆, ⬇ and Save keys.

The parameters have the following meanings:

Yes	This calibration gas is available for the selected calibration procedures and validation measurements for the associated component
No	This calibration gas is not available for the selected calibration procedures and validation measurements for the associated component

Using calibration gas as zero gas

These settings define for which calibrations and validations the associated calibration gas is available as reference gas.

Menu call:
Main menu → Calibrations → Settings → Calibration gases → Calibration gas setting → Use → Measured component→ As reference gas

Set the reference gas in the same manner as the zero gas.

7.3.3 Carrying out a manual calibration

Various calibration and validation procedures can be started in the menu branch "Calibration & validation". The following prerequisites must be observed:

Note

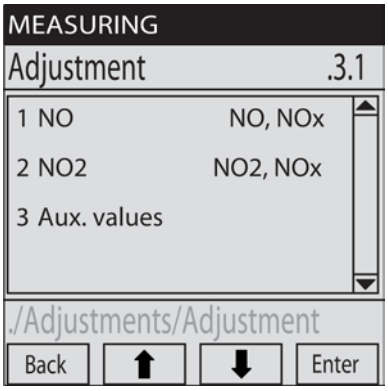
Requirements

- Only use these procedures if they are correctly programmed.
- Make sure that the setpoints of the calibration gases are correctly parameterized.
- Every calibration interrupts measuring mode. Therefore inform affected positions of the interruption in measuring mode.
- The calibration is only correct if the sequence is correct:
  1. Zero point calibration
  2. Reference point calibration

Starting the calibration procedure

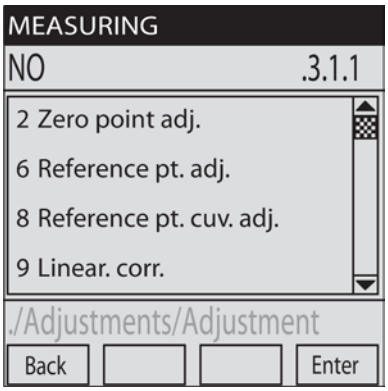
Menu call:
Main menu → Calibrations → Calibration

A menu is displayed with the existing components and auxiliary values.



Use the ⬆ and ⬇ keys to select the desired measured component or auxiliary value, and activate this by pressing the Enter key.

The following menu is displayed with the possible calibration functions (example):



Note

Options for calibration and validation

Only those calibration functions are offered for which corresponding setpoints have been stored in the system.

Likewise, only calibrations are offered which can be carried out in the current operating mode. If at least one status message exists whose cause would make a calibration procedure unreliable or impossible (e.g. module fault, calibration gas fault), the associated calibration procedure is not available for selection.

The following calibration functions are possible:

Display in menu	Function
Calib. Zero point	Zero calibration
Calib. Ref. point	Reference point calibration
Calib. Ref. point cell	Reference point calibration with calibration cell (optional, only for analyzers with calibration cells)
Lin. correction	Linearity correction
Results	Display results of last calibration
Drift reset	Delete saved drift values, i.e. reset to '0'

Note

Calibration sequence

Always calibrate the zero point first and then the full-scale value (reference point), otherwise the calibration of the full-scale value (reference point) will be inexact!

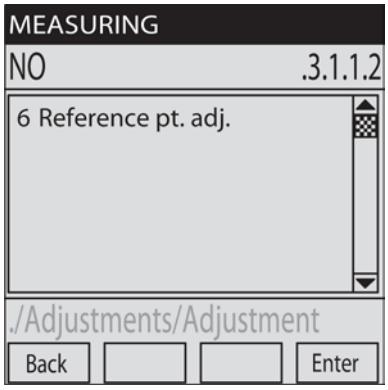
Use the ⬆ and ⬇ keys to select the desired calibration or validation function, and activate this by pressing the Enter key.

A menu is displayed with the selected calibration or validation function, in this case the calibration of the full-scale value (reference point).

Carrying out a calibration procedure

Menu call:
Main menu → Calibrations → Calibration → Measured component → Calibration function

The following menu is displayed (example):



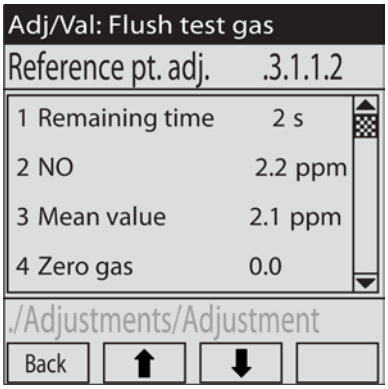
Proceed as follows:

1. Connect the calibration gas to the sample gas inlet of the analyzer.
2. Select Enter to start with the calibration.

The calibration procedure commences. The individual phases are displayed on the screen during execution of the calibration procedure. The meanings are as follows:

Phase	Text in the status line
1 - Flow of calibration gas	Purging with cal. gas
2 - Determination of measured value of calibration gas (actual value)	Measuring
3 - Validation: the results are calculated and saved Calibration: calibration running	Calculating
4 - Flow of sample gas	Purging with sample gas

The following menu is displayed (example):

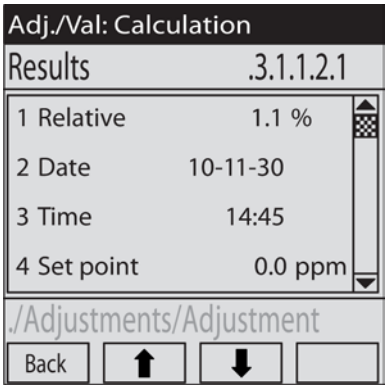


The phase is displayed in the status line, the other parameters are as follows:

Display on screen	Description
1 Remaining time	Remaining time for current phase
2 NO	Component with current measured value (actual value)
3 Mean value	Mean value of measured values (during the 'Measuring' phase)
4 Zero gas	Name of calibration gas with setpoint
5 Cancel (not shown here)	Cancel current procedure

The procedure is finished when the message 'Display results?' appears. You can now:

- Leave the calibration procedure/validation measurement using the Back key
- View the results using the Enter key.
  The following menu is displayed (example):



Meaning of the various parameters:

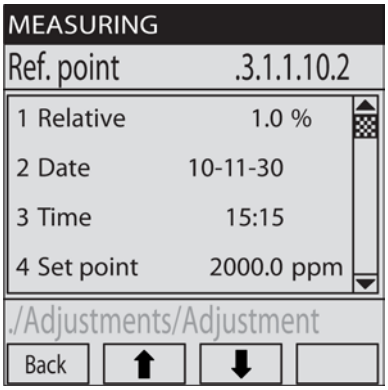
Display on screen	Description
Relative	Drift between this calibration and the previous calibration
Date	Current date in representation YY-MM-DD
Time	Current time in 24-hour representation
Setpoint	Setpoint of the used calibration gas
Actual value	Mean value of the measured actual values
Absolute	Absolute drift

7.3.4 Display calibration results

You can use this function to display the result of the last calibration of the selected component or auxiliary value

Menu call:
Main menu → Calibrations → Calibration → Measured component → Results → Zero/reference point

The following menu is displayed (example):



Meaning of the various parameters:

Display on screen	Description
Relative	Drift between this calibration and the previous calibration
Date	Current date in representation YY-MM-DD
Time	Current time in 24-hour representation
Setpoint	Setpoint of the used calibration gas
Actual value	Mean value of the measured actual values
Absolute	Absolute drift

7.3.5 Carrying out a manual validation measurement

A validation measurement is a measuring procedure with a calibration gas. A validation measurement is executed just like a calibration procedure; the results are evaluated as with a calibration procedure (including drift calculation) and saved.
The calibration is not changed by this.
Validation measurements can only be carried out for measured components, not for auxiliary values or virtual components.

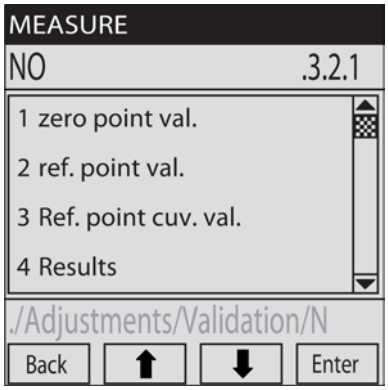
Starting the validation procedure

Menu call:
Main menu → Calibrations → Validation

A menu is displayed with the current measured components.

Use the ⬆ and ⬇ keys to select the desired measured component, and activate this by pressing the Enter key.

The following menu is displayed with the possible validation functions (example):



Note

Possibilities for validation

Only those validation functions are offered which can be carried out in the current operating mode. If at least one status message exists whose cause would falsify a validation measurement or make it impossible (e.g. module fault, calibration gas fault), the associated validation procedure is not available for selection.

The following validation functions are possible:

Display in menu	Function
Val. Zero point	Zero calibration
Val. Ref. point	Reference point calibration
Val. Ref. point cell	Reference point calibration with calibration cell (optional, only for analyzers with calibration cells)
Results	Display results of last calibration

Use the ⬆ and ⬇ keys to select the desired validation function, and activate this by pressing the Enter key.

A menu is displayed with the selected calibration or validation function, in this case the validation of the zero point.

Carrying out a validation procedure

CAUTION
Interferences with connected positions A validation measurement interrupts measuring mode. • Inform affected positions prior to a validation of the impending interruption in measuring mode.

Menu call:
Main menu → Calibrations → Calibration → Measured component → Validation function

The following menu is displayed (example):

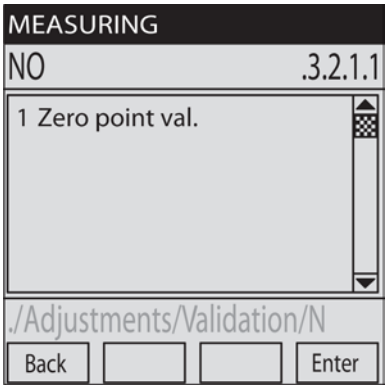


Figure 7-3 3211_Val_Zero_point

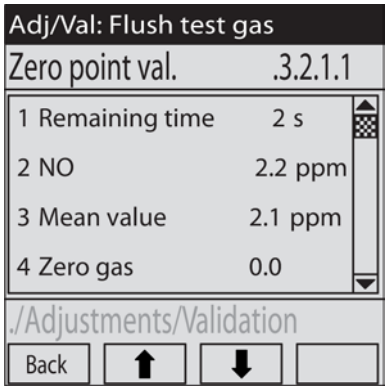
Proceed as follows:

1. Connect the calibration gas to the sample gas inlet of the analyzer.
2. Select Enter to start with the validation.

The validation procedure commences. The individual validation phases are displayed on the screen during the procedure. The meanings are as follows:

Phase	Text in the status line
1 - Flow of calibration gas	Purging with cal. gas
2 - Determination of measured value of calibration gas (actual value)	Measuring
3 - Validation: the results are calculated and saved Calibration: calibration running	Calculating
4 - Flow of sample gas	Purging with sample gas

The following menu is displayed (example):

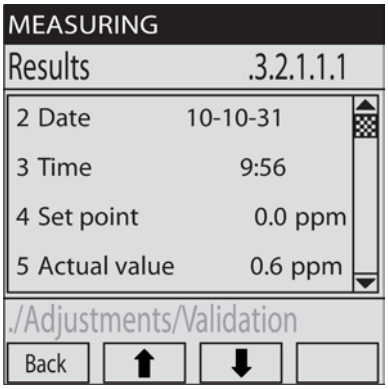


The phase is displayed in the status line, the other parameters are as follows:

Display on screen	Description
1 Remaining time	Remaining time for current phase
2 NO	Component with current measured value (actual value)
3 Mean value	Mean value of measured values (during the 'Measuring' phase)
4 Zero gas	Name of calibration gas with setpoint
5 Cancel (not shown here)	Cancel current procedure

The procedure is finished when the message 'Display results?' appears. You can now:

- Leave the calibration procedure/validation measurement using the Back key
- View the results using the Enter key.
  The following menu is displayed (example):



Function 1 (relative) is not provided for the validation measurement. The list therefore commences with 2. Meaning of the various parameters:

Display on screen	Description
Date	Current date in representation YY-MM-DD
Time	Current time in 24-hour representation
Setpoint	Setpoint of the used calibration gas
Actual value	Mean value of the measured actual values

7.3.6 Display validation results

This menu can be used to display the data of the last validation measurement.
If the date and time are not displayed, a validation measurement has not yet been carried out.

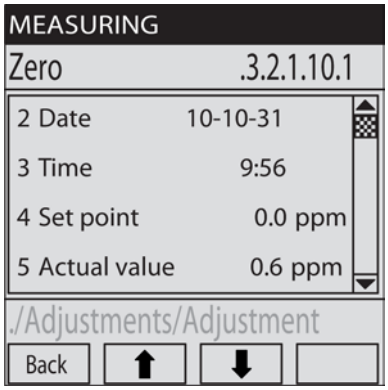
Note

Display function

A validation cannot be started from this menu!

Menu call:
Main menu → Calibrations → Calibration → Measured component → Results → Zero/reference point

The following menu is displayed (example):



Function 1 (relative) is not provided for the validation measurement. The list therefore commences with 2. Meaning of the various parameters:

Display on screen	Description
Date	Current date in representation YY-MM-DD
Time	Current time in 24-hour representation
Setpoint	Setpoint of the used calibration gas
Actual value	Mean value of the measured actual values

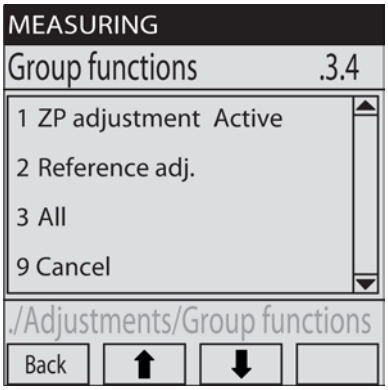
7.3.7 Group functions

This function can be used to manually start preconfigured, automatic calibration procedures. Usually a number of calibration procedures which match the individual analyzer are specified by the manufacturer.

Only those calibration procedures are available which can be carried out in the current operating mode. If a status message exists whose cause would make a calibration procedure unreliable or impossible, the associated calibration procedures cannot be selected. Calibration procedures which are currently "active" cannot be started.

Menu call:
Main menu → Calibrations → Group functions

The following menu is displayed (example):



Use the ⬆ and ⬇ keys to select the desired calibration procedure, and activate this by pressing the Enter key.
The question is displayed 'Start calibration procedure?' which you can answer as follows:

Use the Enter key to start the calibration procedure

Use the ⬆, ⬇ and Set keys to select the 'Cancel' function in order to cancel or abort the calibration procedure. In order to continue with the measurements, you must always wait for the end of the calibration procedure. The message 'Display results?' appears.

7.4 Maintenance functions

7.4.1 Menu tree for maintenance functions

You can access the menu branch of the control unit (BCU) as follows: MEAS (main menu) → 3 BCU. The following table provides an overview of all maintenance functions of the menu branch BCU and the associated access privileges (user level).

User level	O Operator (standard)	A Authorized user
Access privileges	□ View	✓ Adjust/start

Menu No.	Menu tree	O	A	Explanation
2	**Maintenance**		✓	
2.1	**Maintenance signal**		✓	See section Maintenance status on/off (Page 121)
2.2	**Data backup**		✓	See section Saving/restoring data (Page 122)
2.2.1	System		✓	
2.2.1.1	Backup		✓	
2.2.1.2	Download		✓	
2.2.2	Modules		✓	
2.2.2.1	Control unit (BCU)		✓	
2.2.2.1.1	Backup		✓	
2.2.2.1.2	Download		✓	
2.3	**Input/output tests (I/O test)**		✓	See section Testing the input and output functions (Page 123)
2.3.1	Analog output AOnO		✓	
2.3.1.n	AOnO		✓	
2.3.2	Digital output DOnO		✓	
2.3.2.n	DOnO		✓	
2.3.3	Analog input AInI		✓	
2.3.4	Digital input DInI		✓	
2.4	**Restart BCU**		✓	See section Restart BCU (Page 126)

7.4.2 Maintenance status on/off

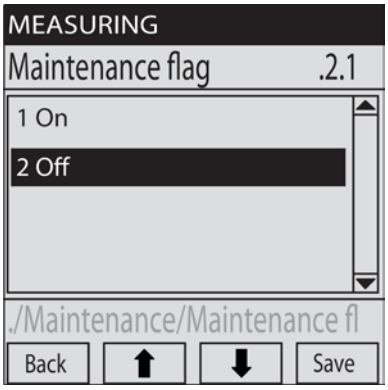
This menu activates the status flag "C (Check)". If a digital output is connected accordingly, a signal can then be sent to an external system indicating that the SIPROCESS UV600 is not in measuring mode, for example because maintenance work is currently being carried out.

Note

We recommend that you set this status flag not only when carrying out direct maintenance work on the analyzer but also when working on the upstream gas preparation since changes to the system components can also influence the measurements.

Menu call:
Main menu → Maintenance → Maintenance signal

The following menu is displayed:



The parameters have the following meanings:

On: Maintenance signal activated

Off: Maintenance signal switched off

Select the desired setting using the ⬆ and ⬇ keys, and confirm the selected setting with Enter.

Note

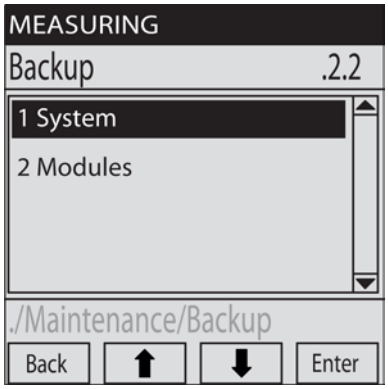
The maintenance flag can only be deactivated if it was previously set in this menu. If there are other reasons for the "Maintenance" status, the status remains set until the reasons have been eliminated.

7.4.3 Saving/restoring data

Using the data backup functions you can internally save a copy of the current settings ("Save") or replace the current settings by a saved copy ("Download").
Two copies can be saved in each case ("last", "last but one"). Downloading of the original factory settings is suitable e.g. for tests.

Menu call:
Main menu → Maintenance → Data backup

The following menu is displayed:



Initially select the scope of data backup using the ⬆, ⬇ and Enter keys.

- System: complete system (all analyzer modules)
- Module: a specific module which can be selected under point 2.
  You must select this module using the ⬆, ⬇ and Enter keys.

Then select the desired function using the ⬆, ⬇ and Enter keys.

- Save: a copy of the current settings is saved.
  The following message is displayed if this function is selected: "...save?" which you can confirm by pressing the Enter key.
- Download: the current settings are replaced by a saved copy.
  If this function is selected, a further menu is displayed with the options:
  - Last: replaces the current settings by the last saved copy
  - Last but one: replaces the current settings by the penultimate saved copy
  - Factory: replaces the current settings by the factory settings.

  The following message is displayed if the desired function is selected: "...download?" which you can confirm by pressing the Enter key.

The analyzer is automatically restarted following the backup procedure. As a result, the measuring function is temporarily canceled. The analyzer is ready for operation again following execution of the restart.

7.4.4 Testing the input and output functions

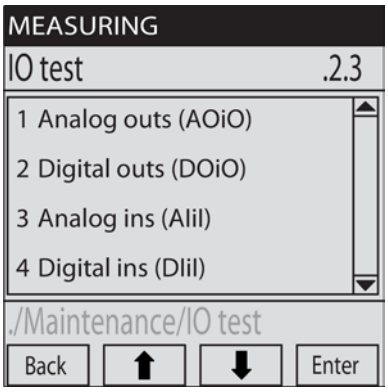
You can use the functions of the menu branch "I/O test" to manually control the signal outputs or to display the current status of signal inputs. In this manner the function of the signal connections and the interaction with connected devices can be tested.

The test functions for outputs have an effect on the selected signal output. The other signal connections remain in the normal operating state.

NOTICE
Risk for connected systems As soon as the test function of a signal output is selected, the normal operating function of this signal output is deactivated. The signal output is then switched to the electronic state which is selected in the test function. The status 'C' (Check) is set for as long as the test function is running. ‣ Make sure that the test situation does not cause any problems with connected positions

Menu call:
Main menu → Maintenance → I/O test

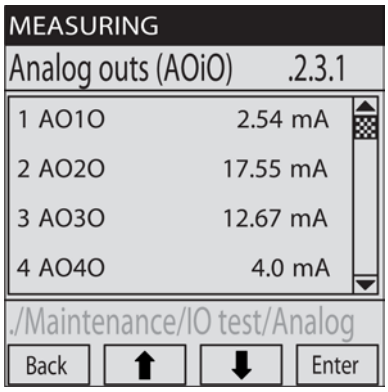
The following menu is displayed:



Select the output to be tested using the ⬆, ⬇ and Enter keys.

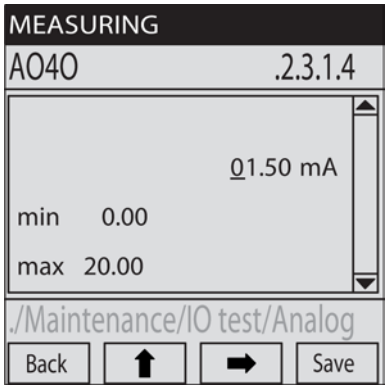
Analog outputs

Following selection of the analog outputs, the following menu is displayed with the possible analog outputs.



Use the ⬆, ⬇ and Enter keys to select the analog output to be tested, and terminate the test by pressing the Back key.

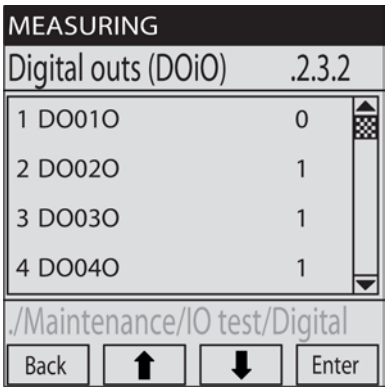
Analog output 4 has been selected here as example.



Lines 3 and 4 show the minimum and maximum values; you can set the value which the analog output should have in line 2.

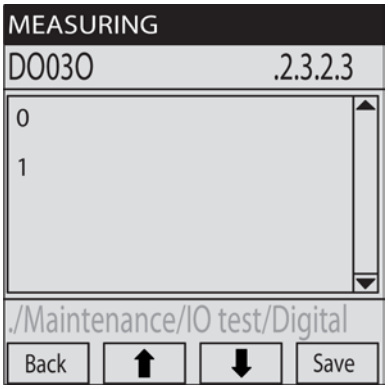
Digital outputs

Following selection of the digital outputs, the following menu is displayed with the possible digital outputs.



Use the ⬆, ⬇ and Enter keys to select the digital output to be tested, and terminate the test by pressing the Back key.

Digital output 3 has been selected here as example.



Set the state to be assumed by the digital output. The following meanings apply:

- 0 - Output deactivated
- 1 - Output activated

Analog inputs

Following selection of the analog inputs, the menu is displayed with the possible analog inputs. Testing of the analog inputs is carried out as described in the section 'Analog outputs'.

Digital inputs

Following selection of the digital inputs, the menu is displayed with the possible digital inputs. Testing of the digital inputs is carried out as described in the section 'Digital outputs'.

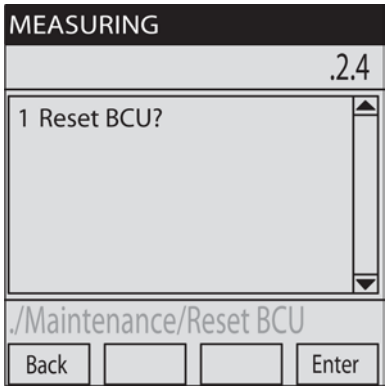
7.4.5 Restart BCU

Restarting the control unit (BCU) can be meaningful if unclear function faults are present. Measured value processing then restarts; all saved values remain unchanged.

NOTICE
Risk for connected systems The normal measuring function is temporarily interrupted during the restart, and the maintenance signal is activated. The analyzer is ready for operation again following execution of the restart. ‣ Make sure that this situation does not cause any problems with connected positions.

Menu call:
Main menu → Maintenance → Restart BCU

The following menu is displayed (example):



Press the Enter key to trigger the restart.

7.5 Parameter assignments

7.5.1 Menu tree for parameterization functions

You can access the menu branch of the control unit (BCU) as follows: MEAS (main menu) → 3 BCU. The following table provides an overview of all diagnostics functions (display functions) of the menu branch BCU and the associated access privileges (user level).

User level	O Operator (standard)	A Authorized user
Access privileges	□ View	✓ Adjust/start

Menu No.	Menu tree	O	A	Explanation
5	**Parameter assignments**		✓	
5.1	**Measured values**		✓	See section Configuration of measured-value display (Page 132)
5.1.x	Measured component		✓	
5.1.x	Auxiliary values		✓	
5.1.x.y	Results		✓	
5.2	**Measured value display**		✓	See section Configuration of measured-value display (Page 132)
5.2.x	Measured component		✓	
5.2.x.1	Format		✓	
5.2.x.2	Hiding of measured value		✓	
5.2.x.2.1	Hold value		✓	
5.2.x.2.2	Span		✓	
5.3	**Output ranges**		✓	See section Selecting output ranges (Page 134)
5.3.x	Measured component		✓	
5.3.x.1	Range selection		✓	
5.3.x.2	Status		✓	
5.3.x.2.1	inv. DOn		✓	
5.4	**Damping**		✓	See section Adjusting the damping (Page 136)
5.4.x	Measured component		✓	
5.4.x.1	El. T90%		✓	
5.4.x.1.1	Time constant		✓	

5.4.x.2	Dyn. damping	✓	
5.4.x.2.1	Status	✓	
5.4.x.2.2	Time constant	✓	
5.4.x.2.3	Threshold	✓	
5.5	**Limits**	✓	See section Setting limits (Page 139)
5.5.x	Measured component	✓	
5.5.x.1	Limit 1	✓	
5.5.x.1.1	Value	✓	
5.5.x.1.2	Type	✓	
5.5.x.1.3	Hysteresis	✓	
5.5.x.1.4	Signal type	✓	
5.5.x.1.5	Status (MV1LI1)	✓	
5.5.x	Auxiliary values	✓	
5.5.x.y	Auxiliary value	✓	
5.6	**Pump**	✓	See section Pump settings (Page 140)
5.6.1	Pump off	✓	
5.6.2	Power	✓	
5.7	**Inputs and outputs**	✓	
5.7.1	Analog outputs (AO)	✓	See section Configuring the analog outputs (Page 142)
5.7.1.n	AOn	✓	
5.7.1.n.1	Source	✓	
5.7.1.n.1.y	Value/measuring point	✓	
5.7.1.n.2	Zero	✓	
5.7.1.n.3	Range 0	✓	
5.7.1.n.3.1	On/off	✓	
5.7.1.n.3.2	Start	✓	
5.7.1.n.3.3	End	✓	
5.7.1.n.4	Range 1	✓	
5.7.1.n.4.1	On/off	✓	
5.7.1.n.4.2	Start	✓	
5.7.1.n.4.3	End	✓	
5.7.1.n.5	Range selection	✓	
5.7.1.n.6	Status	✓	
5.7.1.n.6.1	DOn	✓	
5.7.2	Digital output (DOn)	✓	See section Configuring the digital outputs (Page 145)
5.7.2.n	inv. DOn	✓	
5.7.2.n.1	Source	✓	

5.7.2.n.1.1	System status (xO)	✓	
5.7.2.n.1.2	Module status (SixO)	✓	
5.7.2.n.1.2.x	Module (S1xO)	✓	
5.7.2.n.1.3	Measured value status (MVix)	✓	
5.7.2.n.1.3.x	Measured value (MVx1)	✓	
5.7.2.n.1.4	Limit status (MViLIj)	✓	
5.7.2.n.1.4.x	Measured value (MV1LIj)	✓	
5.7.2.n.1.5	Current output (AOiR)	✓	
5.7.2.n.1.6	Measuring point status (MPS)	✓	
5.7.2.n.1.7	Measuring point (MPiS)	✓	
5.7.2.n.1.8	Pump off (BVO1)	✓	
5.7.2.n.1.9	Sample gas (BVO4)	✓	
5.7.2.n.1.10	Calibration gases	✓	
5.7.3	Digital input (DIn)	✓	See section Configuring the digital inputs (Page 147)
5.7.3.n	DIn	✓	
5.7.3.n.1	Destination	✓	
5.7.3.n.2	Input	✓	
5.8	**Communication**	✓	
5.8.1	LAN	✓	See section Configuring a LAN connection (Page 150)
5.8.1.1	IP address	✓	
5.8.1.2	Subnet	✓	
5.8.1.3	Gateway	✓	
5.8.2	Modbus	✓	See section Configuring a Modbus connection (Page 151)
5.8.2.1	On/off	✓	
5.8.2.2	Slave address	✓	
5.8.2.3	Type	✓	
5.8.2.4	TCP parameters	✓	
5.8.2.4.1	TCP port	✓	
5.8.2.5	RTU parameters	✓	
5.8.2.5.1	TCP port	✓	
5.8.2.5.2	Parity	✓	

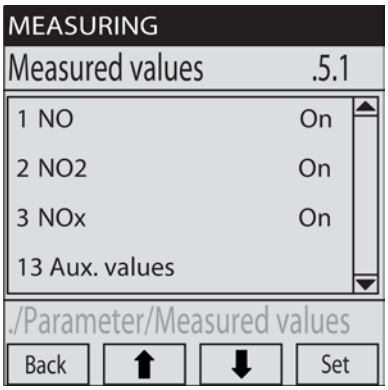
5.9	**Date - time**	✓	See section Setting the date and time (Page 151)
5.9.1	Date	✓	
5.9.2	Time	✓	
5.10	**Extra functions**	✓	
5.10.1	Measuring point switchover	✓	
5.10.1.1	Measuring points (MPi)	✓	
5.10.1.1.x	Name of measuring point	✓	See section Programming the measuring point switchover (Page 153)
5.10.1.1.x.1	On/off	✓	
5.10.1.1.x.2	Name	✓	
5.10.1.1.x.3	Purging time	✓	
5.10.1.1.x.4	Measuring time	✓	
5.10.1.1.x.5	Status	✓	
5.10.1.1.x.5.n	DOn	✓	
5.10.1.2	Status (MPS)	✓	See section Status output for the switchover phase (Page 155)
5.10.1.2.1	DOi	✓	
5.10.1.3	Measured values	✓	See section Selecting the measuring point display (Page 155)
5.10.2	User functions	✓	See section Starting user functions (Page 156)
5.10.3	Display setting	✓	
5.10.3.1	Timeout with login	✓	See section Setting the waiting time for automatic logoff (Page 157)
5.10.3.2	Automatic light-off	✓	See section Setting the waiting time for automatic display switch-off (Page 158)

7.5.2 Activate/deactivate measured values

This function enables you to hide the measured values of a component. This can be advantageous if the current measured values are implausible (e.g. because of an external fault) or if the analyzer cannot measure temporarily (e.g. because a module is defective).

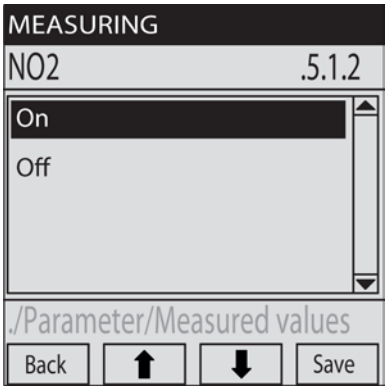
Menu call:
Main menu → Parameters → Measured values

The following menu is displayed (example):



Use the ⬆ and ⬇ keys to select the desired measured component or auxiliary value, and activate this by pressing the Set key.

The following menu is displayed with the possible setting functions (example):



Use the ⬆, ⬇ and Save keys to set the desired state.

7.5.3 Configuration of measured-value display

Number of decimal places

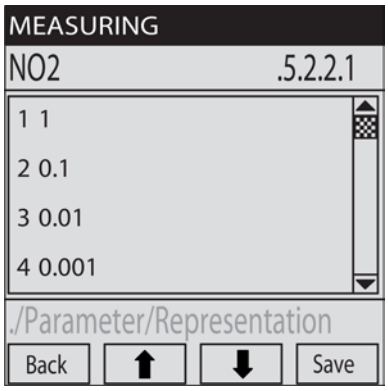
Up to 6 digits are available for displaying the measured value. If a measured value includes decimal places, you can individually select the desired number of decimal places for each measured component.

When configuring the measured-value display, please note the following:

- If the measured-value display has more than 3 digits, the value is displayed more accurately than the actual measuring accuracy. In addition, the last digits of the display may change frequently even though the measured value - with consideration of the possible accuracy - is more or less constant (measured-value noise). You can influence this effect by means of damping (see section).
- If you limit the number of decimal places such that the display only has 2 or 3 digits, it may be the case that changes in measured value are not recognized in time.

Menu call:
Main menu → Parameters → Measured-value display → [Measured component] → Format

The following menu is displayed (example):



Use the ⬆, ⬇ and Save keys to set the desired state.

Hiding of measured value

In the case of measured values close to a "hold value", it is possible to display the hold value instead of the current measured value. In this case the hold value is always displayed in a certain measured-value range, i.e. this range is then always "hidden". The magnitude of the range to which this applies (parameter: "span") and the hold value can be individually set for each component. This function can be used to hide e.g. variations in measured value around the zero point in order to suppress negative displays or to prevent irritation for connected controllers in the case of small measured values.

The ranges "hidden" in this manner have an effect on all measured-value displays, i.e. displayed values, analog outputs, and digital outputs.

⚠ CAUTION

Risk of undesirable effects with connected positions

With hiding of measured value:
Within hidden measured-value ranges, the displayed value does not usually correspond to the actual measured value. As soon as the measured value leaves the hidden range, the actual measured value is displayed again. This effect also occurs in the opposite direction. This response must be taken into consideration if external controllers are connected.

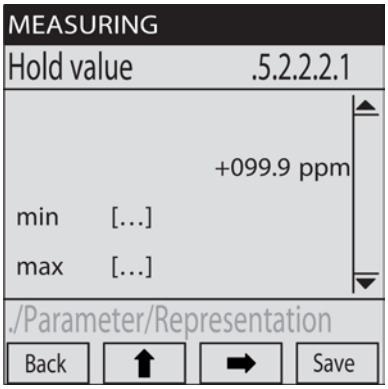
Without hiding of measured value:
The measured-value displays consistently followed the measured signals, also at the start of the measuring range. Thus negative values can also occur. Check what the effect of hiding of measured values has with connected positions.

- Therefore, before setting the hiding of measured values, check what effect this will have with connected positions.

Menu call:
Main menu → Parameters → Measured-value display → [Measured component] → Hiding of measured value

In order to set the hold value:

Select the "Hold value" parameter. The following menu is displayed (example):



Lines 3 and 4 show the smallest possible and largest possible numerical values; the desired numerical value can be entered in line 2 as described in section Character input (Page 64).

Configure the "Span" parameter in the same manner.

7.5.4 Selecting output ranges

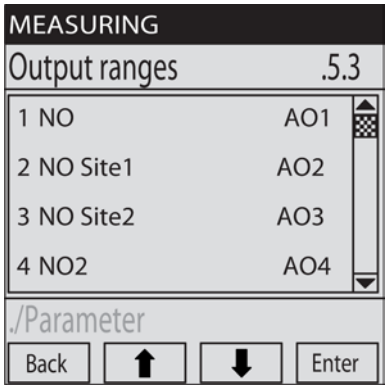
This function provides the following options:

- Determination of the analog output for output of a specific measured value
- Specification of a specific output range or both output ranges
- Specification of which digital output signals the current output range

These settings can be selected for each individual component (also for virtual components). If measuring point switching is set, the settings can be made for each individual measuring point.

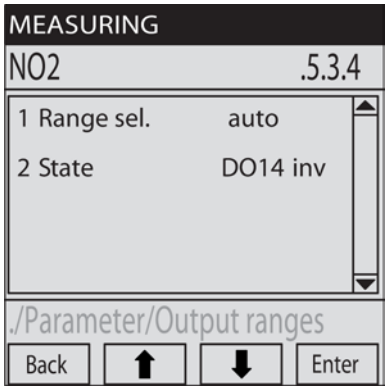
Menu call:
Main menu → Parameters → Output ranges

The following menu is displayed (example):



Use the ⬇ and ⬆ keys to select the desired measured component, and confirm this by pressing the Enter key.

The following menu is displayed (example):



You can now set the "Range selection" and "Status" parameters for the selected components.

Range selection

The following output ranges are possible for the "Range selection" parameter:

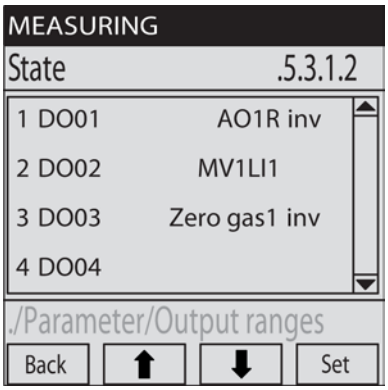
0	Output range 0 permanently activated
1	Output range 1 permanently activated
auto	Autoranging

Autoranging responds as follows:

- If the current measured value is in the small output range (in the output range with the smaller span), the small output range is automatically active.
- As soon as the measured value exceeds the full-scale value of the small output range, the large output range is activated automatically (i.e. the electronic signal span of the analog output is adapted).
- As soon as the actual measured value in the large output range falls below 90% of the full-scale value of the small output range, the small output range is activated again.

Digital output for status of output range

By selecting the "Status" parameter you access the following menu (example):



Use the ⬇ and ⬆ keys to select the desired digital output. If you subsequently wish to change the switching logic, press the Set key to branch to the follow-up menu.

Set the desired switching logic (direct or inverted) there using the ⬇, ⬆ and Save keys.

7.5.5 Adjusting the damping

Constant damping (T_{90} time)

The current measured value is not displayed if the constant damping is activated. In this case a mean value of the current and previous measuring values is displayed (sliding average).

This parameter is used to attenuate fluctuations in measurements (noise) and also to smooth varying values if e.g. only the average measured value is relevant.

Note

The damping is effective on the measured-value display and output, and is also active during a calibration/validation.

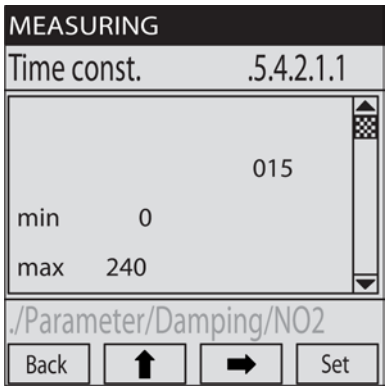
If the constant damping is increased, the response time of the analyzer (T_{90} time) is accordingly longer. If the constant damping is reduced, the noise can become larger. A time constant with the value 0 means there is no damping.

Menu call:
Main menu → Parameters → Damping → [Measured component] → El. T90%

The following menu is displayed (example):

Press the Set key to change the time constant.

The following menu is displayed:



The smallest and largest values are displayed in the bottom lines. In order to set the desired time constant, proceed as described in section Character input (Page 64).

NOTICE
Risk of incorrect calibration/validation measurement
With automatic calibration/validation, the waiting time following the switching over of gases (in particular when changing from sample gas to calibration gas) must be at least 200% of the set time constant.
Therefore check each time you change the T_{90} time that the waiting time settings for the calibration/validation have been adapted accordingly (see also Manual "SOPAS ET" /7/)

Dynamic damping

Dynamic damping can be used to compensate variations in measured values without greatly increasing the response time. In contrast to constant damping, dynamic damping is automatically deactivated when the measured value changes rapidly.

Small variations in the measured value can be smoothened in this manner, and fast changes in measured value are nevertheless displayed correctly.

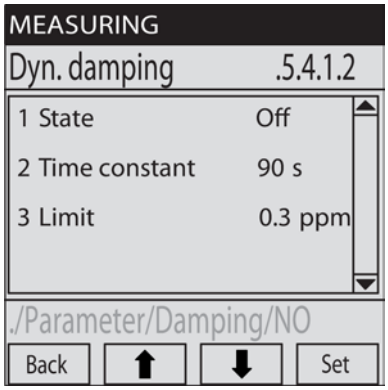
The response is defined using the parameter "Threshold (in units of measured component)" as follows:

- If the difference between successive measured values is smaller than the set threshold, the measured values are dampened with the set time constant, i.e. the dynamic damping is active.
- If the difference between successive measured values is greater than the set threshold, the dynamic damping is deactivated. It remains deactivated for as long as the measured values change rapidly.
- If the measured values only change slowly, the dynamic damping responds like constant damping.

The dynamic damping acts on all measured-value displays and outputs.

Menu call:
Main menu → Parameters → Damping → [Measured component] → Dyn damping

The following menu is displayed (example):



The parameters are selected using the ⬆ and ⬇ keys and imported with Set.

The respective subsequent menu is then displayed with the respective options:

- Status
  Switching on and off of dynamic damping.
  - Status ON means:
    the dynamic damping is activated as soon as the difference between two successive measured values is smaller than the set threshold.
  - Status OFF means that the dynamic damping is not active under any circumstances.
- Time constant: setting of the desired damping constant
- Threshold: threshold for activation of dynamic damping with status ON

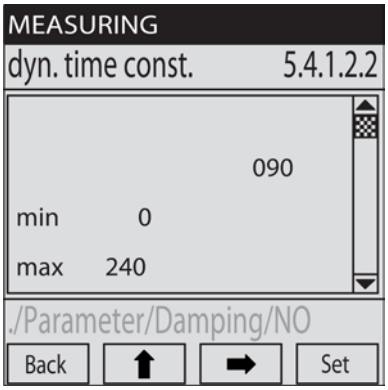


Figure 7-4 Dynamic time constant (example)

Change the 'Status' parameter by selecting the desired status using the ⬆ and ⬇ keys and saving using the Save key.

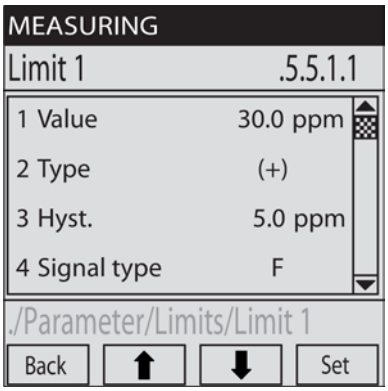
The values of the time constants and the threshold can be changed as described in section Character input (Page 64).

7.5.6 Setting limits

Two limits for monitoring the measured value can be set for each measured component and auxiliary value. The limit message can be triggered either with high or low violation of the limit. It is also possible to set the switching hysteresis and the category to which the message is to belong ("*Signal type*").*{"Parameter";"Limit setting"}*

Menu call:
Main menu → Parameters → Limits → [Measured component] → Limit [n]

The following menu is displayed (example):



You can then set the individual parameters as follows:

Setting a limit

Use the ⬆, ⬇ and Set keys to select the first parameter "Value".

Set the desired limit in the follow-up menu as described in section Character input (Page 64).

Selecting the message type

Use the ⬆, ⬇ and Set keys to select the second parameter "Type".

Set the message type in the follow-up menu using the ⬆, ⬇ and Save keys. You can select from the following:

- (+) High violation
  and
- (-) Low violation.

Hysteresis

Use the ⬆, ⬇ and Set keys to select the third parameter "Hysteresis".

Set the desired value in the follow-up menu as described in section Character input (Page 64).

Selecting the signal type (category) for the limit message

Use the [⬆], [⬇] and [Set] keys to select the fourth parameter "Type".

Set the signal type in the follow-up menu using the [⬆], [⬇] and [Save] keys. You can select the following:

Status (flag)	Description	Possible cause
F	Fault	Internal fault/malfunction (unsafe operating state)
M	Maintenance	Maintenance request/maintenance status
C	Check	An internal function is currently running, e.g. a calibration. Measuring function is interrupted
U	Uncertain	Unsafe operating state or measured value
E	Extended	Internal message

Selection of digital output for limit message

Use the [⬆], [⬇] and [Enter] keys to select the fifth parameter "Status".

A menu is displayed with the available digital outputs. Use the [⬆], [⬇] and [Set] keys to select the desired digital output.

A further menu is displayed in which you can select the electronic switching logic (direct or inverted).

7.5.7 Pump settings

Switching the pump on and off

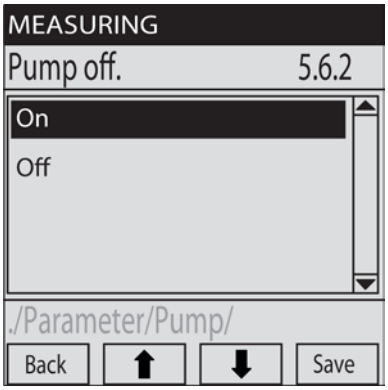
This function can be used to manually switch the sample gas pump (option) on and off. This function controls the integral sample gas pump and the associated tag BVO1. The pump cannot be switched on if it is switched off for other reasons.

The pump remains switched off automatically

- if the temperature of the measuring system is too low following switching-on of the analyzer
- if the temperature of the measuring system is too low following switching-on of the analyzer
- if the condensation sensor (option) has been triggered
- during the flow of calibration gas if this is set in this manner
- if a digital input is configured with the "Pump off" function and activated

Menu call:
Main menu → Parameters → Pump → Pump off

The following menu is displayed (example):



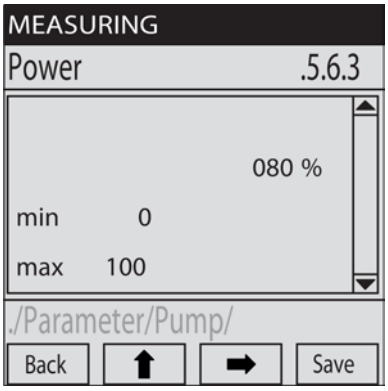
Use the [⬆], [⬇] and [Save] keys to set the desired state.

Setting the pump capacity

The setting defines the electric supply to the pump which in turn influences the delivery rate of the pump. This function is used to set the desired volume flow of sample gas. This is better than operating the pump at full power and throttling the volume flow using a control valve. As a result of this measure, there is a reduced load on the pump and the service life is extended.

Menu call:
Main menu → Parameters → Pump → Pump off

The following menu is displayed (example):



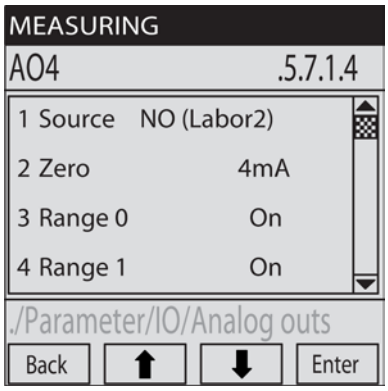
You can now modify the value of the relative pump capacity in line 2 as described in section Character input (Page 64).

7.5.8 Setting parameters for inputs and outputs

7.5.8.1 Configuring the analog outputs

Menu call: Parameters -> IO -> Analog output (AOn) -> AOn

The following menu is displayed (example):

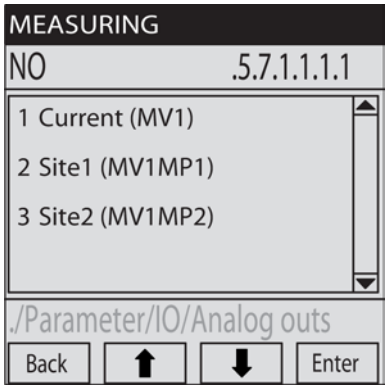


The parameters have the following meanings:

Source	Assigned internal signal source
Zero	Zero point of the electronic signal span
Range 0	Activation status of output range 0
Range 1	Activation status of output range 1
Range sel.	Mode of range selection
Status	Digital output for status of output range

Assigning the internal signal source to an analog output

In the previous menu, select parameter 1 (**Source**). The following menu is displayed (example):



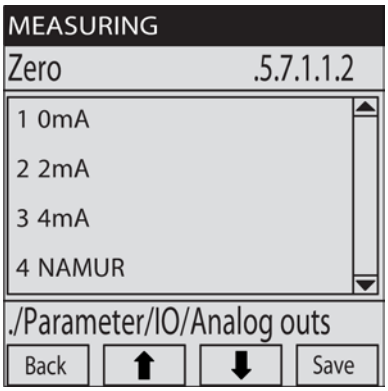
The parameters have the following meanings (the information in parentheses represents the name of the source):

Current	The analog output permanently outputs the current measured value of the component
[Name of a] measuring point	• If this measuring point is active: the analog output outputs the current measured value of the component • If other measuring points are active: the analog output constantly outputs the measured value which was measured by this measuring point.

1. Select the component whose measured values are to be output by the analog output. In order to select an auxiliary value: Select "Auxiliary values" and then the desired value. – Set "None" in order to switch off the analog output.
2. Set the desired source using the ⬆, ⬇ and Save keys.

Setting the 'live' zero

In the first menu, select parameter 2 (**Zero**). The following menu is displayed (example):



The functional principle 'NAMUR standard' means:

	Measured values in range 4 to 20 mA
Operating state	
Message of category C or M	Constant 2 mA
Message of category F	Constant 0 mA

Select the desired setting of the zero point using the ⬆, ⬇ and Save keys.

Note

Possibility of misinterpretation

If the setting '2 mA' or '4 mA' was selected for the zero point, signals below these values may be interpreted as a fault.

Configuring an output range

In the first menu, select parameter 3 (**Range 0**) or 4 (**Range 1**). You can now:

- Use the ⬆, ⬇ and Set keys to activate or deactivate the selected output range: (**on/off**).
  and
- use the ⬆, ⬇ and Save keys to set the selected status
- Set the start-of-scale value of the output range. To do this:
  - Use the ⬆, ⬇ and Set keys to select "Start" and
  - set the physical value which is to correspond to the electronic zero.
- Set the full-scale value of the output range. To do this:
  - Use the ⬆, ⬇ and Set keys to select "End" and
  - set the physical value which is to correspond to the full-scale value of the electronic signal span (20 mA).
- Set the mode of range selection. To do this:
  - Use the ⬆, ⬇ and Set keys to select the range selection ('Range sel.')
    and
  - use the ⬆, ⬇ and Save keys to set the selected mode.
    The following modes are possible:

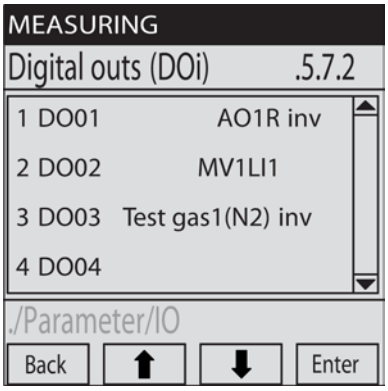
auto	Autoranging
0	Output range 0 permanently active
1	Output range 1 permanently active

- Select the digital output for the output range status. To do this:
  - Select "Status"
  - Use the ⬆, ⬇ and Set keys to select the desired digital output.
  - In the subsequent menu, select the electronic switching logic.
  - In the subsequent menu, use the ⬆, ⬇ and Save keys to select the electronic switching logic.

7.5.8.2 Configuring the digital outputs

Menu call: Parameters -> IO -> Digital output (DOn) -> DOn

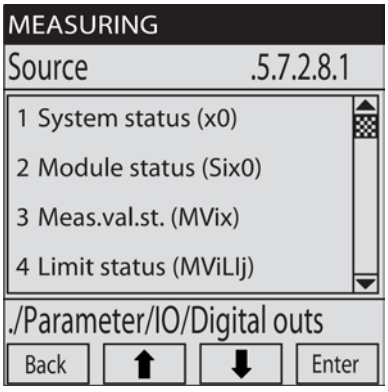
The following menu is displayed (example):



An internal status or control function can be assigned to each digital output. This "source" controls the status of the digital output. A unique ID (tag) is assigned to each source. The electronic switching logic is inverted ('inv' on the screen) or direct (blanks).

Assigning the status or control function (source) to a digital output

In the previous menu, select the digital output. In the subsequent menu, select 'Source'. The following menu is displayed (example):



The parameters have the following meanings:

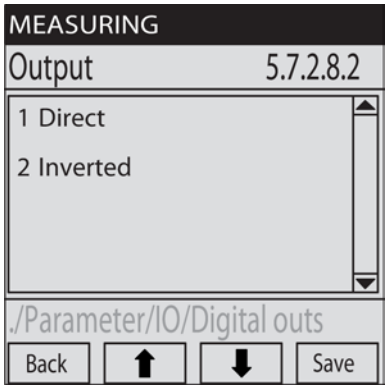
System status (xO)	Group message of category x
Module status (Six0)	Status message from module i, message category x
Measured value status (MVix)	Measured value-based message from module i, message category x
Limit status (MViLIj)	Limit message for measured value i, limit j
Current output (AOiR)	Output range status of analog output i
Measuring point status (MPS)	Status of measuring point switchover [1]
Measuring point (MPiS)	Activation status of measuring point i (control signal for external valve)
Pump off (BVO1)	Control signal for the gas pump
Sample gas (BVO4)	Control signal for external sample gas valve
Calibration gases	Activation status of a calibration gas (control signal for external valve)
None	Not occupied (digital output is in logical status "0")

[1] 0 = purging time, 1 = measuring time

1. Select the desired source using the ⬆, ⬇ and Enter keys.
2. Search for the desired source in the follow-up menus.

Selecting the electronic switching logic

In the previous menu, select the 'Output' parameter. The following menu is displayed (example):



The parameters have the following meanings:

Direct	The digital output is electronically activated (relay is pulled-up) if the source is also in the logical activated status (open-circuit principle).
Inverted	The digital output is electronically activated if the source is in the logical deactivated status (closed-circuit principle). If the source is logical activated, the switching output is electronically in the deactivated status (relay dropped-out)

Set the desired switching logic using the ⬆, ⬇ and Save keys.

⚠ CAUTION

Risk for connected devices/systems

Before using the digital outputs you must clarify the safety-related consequences in the event of the following malfunctions:

- Power supply failure (e.g. local failure of power supply, inadvertent switch-off, blown fuse)
- Electronic fault of digital output
- Interruption in the electric connection

Select the switching logic according to safety aspects:

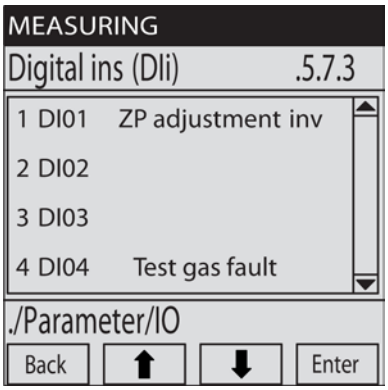
- In the event of a power supply failure, digital outputs with direct switching logic signal that the associated function is not activated.
- In the event of a power supply failure, digital outputs with inverted switching logic signal that the associated function has been triggered.

Carefully clarify the consequences prior to assignment, and ensure that a dangerous situation cannot occur in the event of a fault or failure.

7.5.8.3 Configuring the digital inputs

Menu call: Parameters -> IO -> Digital input (DIn) -> DIn

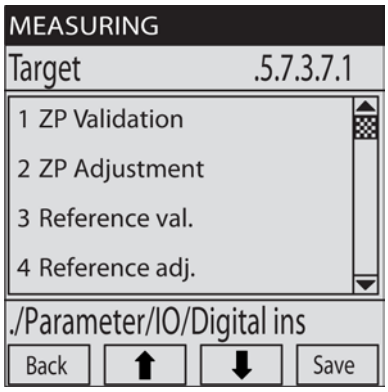
The following menu is displayed (example):



An internal status or control function can be assigned to each digital input. This "source" controls the status of the digital input. A unique ID (tag) is assigned to each source. The electronic switching logic is inverted ('inv' on the screen) or direct (blanks).

Assigning the internal function (destination) to a digital input

In the previous menu, select the digital input. In the subsequent menu, select 'Destination'. The following menu is displayed (example):



The parameters have the following meanings:

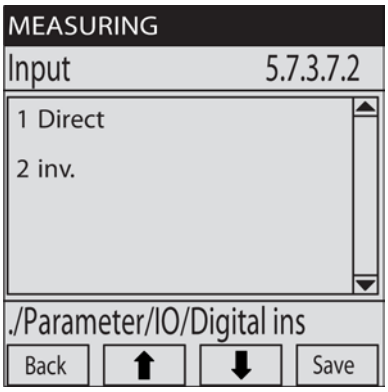
Name of calibration	Programmed automatic calibration
Name of validation	Programmed automatic validation measurement
Cancel Cal./Val.	Cancel a running calibration/validation
Failure	Activate status flag "F" (for complete system)
Maintenance	Activate status flag "M" (for complete system)
Pump off	External control signal for switching off the gas pump
Calibration gas fault	External fault message "Calibration gas not available" [1]
Disable Cal./Val.	External control signal to prevent calibrations/validations [1]
None	Not occupied (electronic status of digital input has no effect)

[1] Prevents calibrations and validations

1. Select the desired destination using the ⬆, ⬇ and Enter keys.
2. Search for the desired function which the digital input is to control in the follow-up menus.

Selecting the electronic switching logic

In the previous menu, select the 'Output' parameter. The following menu is displayed (example):



The parameters have the following meanings:

Direct	The digital output is electronically activated (relay is pulled-up) if the source is also in the logical activated status (open-circuit principle).
Inverted	The digital output is electronically activated if the source is in the logical deactivated status (closed-circuit principle). If the source is logical activated, the switching output is electronically in the deactivated status (relay dropped-out)

Set the desired switching logic using the [⬆], [⬇] and [Save] keys.

7.5.8.4 Configuring the analog inputs

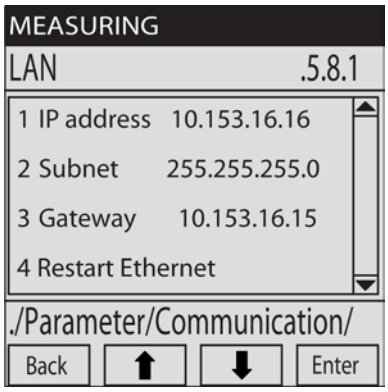
The functionality of the analog inputs can only be configured using the 'SOPAS ET' PC software /7/. There are no menu functions for this.

7.5.9 Parameterization of digital communication

7.5.9.1 Configuring a LAN connection

Menu call:
Main menu → Parameters → Communication → LAN

The following menu is displayed (example):



The "5 MAC address" parameter is not shown here

You can now change one of the addresses as follows:

- Use the [⬆], [⬇] and [Set] keys to select the associated address
- Set the new address in the follow-up menu as described in section Character input (Page 64).

Restarting the internal LAN controller

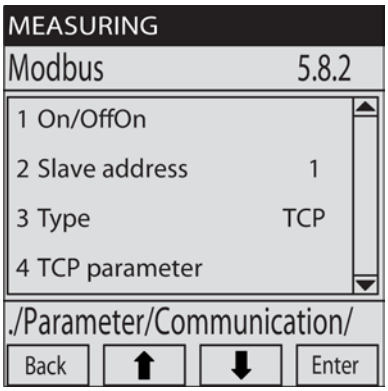
Use the [⬆], [⬇] and [Enter] keys to select the "4 Restart Ethernet" parameter, and activate the function by pressing the [Enter] key.

This function is always used should the LAN connection be faulty or cannot be established in the normal manner.

7.5.9.2 Configuring a Modbus connection

Menu call:
Main menu → Parameters → Communication → Modbus

The following menu is displayed (example):



You can then change the Modbus parameters as follows:

- Use the ⬆, ⬇ and Enter keys to select the associated parameter
- Change the parameters in the follow-up menu according to your requirements.

You can configure the following Modbus parameters:

Notation in the menu	Function
On/off	Modbus active/inactive
Slave address	Device address in accordance with Modbus specification
Type	Interface type (TCP or RTU)
TCP parameters	TCP port
RTU parameters	Baud rate, parity, data bits, stop bits

7.5.10 Setting the date and time

The current date is set in this menu.

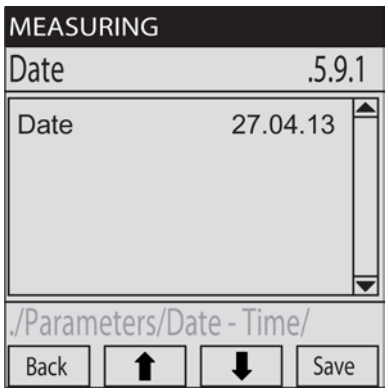
Note

Date and time setting

The date and time are retained for approximately 3 to 5 days following disconnection of the device from the power supply.

Menu call:
Main menu → Parameters → Date-time → Date

The following menu is displayed (example):



You can now set the date as described in section .

Using the menu: "Main menu → Parameters → Date-time → Time' you can call the menu for setting the time. The time is set there in the same manner.

7.5.11 Automatic measuring point switchover

Measuring points are sampling points for the sample gas. The analyzer can control up to eight measuring points using the automatic function, i.e. output control signals for switching over the sample gas path. The following can be set for each measuring point:

Parameter	Explanation
Name of measuring point	Freely selectable name
Purging time	Waiting time following switching over before the measured value is output
Measuring time	Duration of measurement at the measuring point
Digital output	Digital output for controlling the switchover

Requirements

- Separate equipment for switching over the gas supply between the measuring points (e.g. solenoid valves).
- Electric connections to the controlling digital outputs (if required: additional, intermediate electronic equipment, e.g. power relay).
- Programmed measuring points (process tags)

Effects

If measuring points are programmed and active, there are measured values of a component from the individual measuring points in addition to the current value of the component. Component, measuring point, and last measured value are displayed in the menus for the measured-value displays. Therefore not only the current measured value of a component can be selected, but also the values from the individual measuring points. This effect can also be deactivated.

Holding the measured value

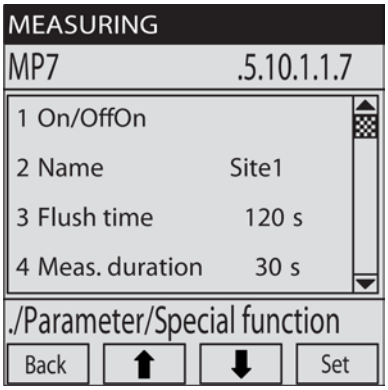
- If a measuring point is active, the measured values from it correspond to the current value of the gas analyzer following the purging time.
- While other measuring points are active, the measured value for this point is displayed as the constant value which was last measured at this point (hold amplifier function).

Holding of the measured value also functions with analog outputs which output the value from a measuring point.

7.5.11.1 Programming the measuring point switchover

Menu call:
Main menu → Parameters → Additional functions → Measuring point switchover → Measuring points (MPi) → Measuring point

The following menu is displayed (example):



The parameters have the following meanings:

On/off	Activation status
Name	Name of measuring point
Purging time	Set purging time
Measuring time	Set measuring time
Status	Digital output for status of output range

Activate/deactivate measuring point

1. Use the ⬆, ⬇ and Set keys to select 'On/Off'
2. In the follow-up menu, use the ⬆, ⬇ and Save keys to set the desired state. The following meanings apply:

On	This measuring point is used for the measuring point switchover
Off	This measuring point is not used for the measuring point switchover

Entering the name of the measuring point

1. Use the ⬆, ⬇ and Set keys to select 'Name'
2. Set the name in the follow-up menu as described in section Character input (Page 64).

Setting the purging time

1. Use the ⬆, ⬇ and Set keys to select 'Purging time'
2. Set the purging time in the follow-up menu as described in section Character input (Page 64). Information on the correct setting of purging times can be found in section Setting the sample gas purging time (Page 93).

Setting the measuring time

1. Use the ⬆, ⬇ and Set keys to select 'Name'
2. Set the measuring time in the follow-up menu as described in section Character input (Page 64).

Assigning a status output to the measuring point

The assigned digital output is to control a solenoid valve which switches over the sample gas path to this measuring point. The digital output is logically active as long as the measuring point is activated. The electronic switching logic can be inverted.

1. Use the ⬆, ⬇ and Enter keys to select 'Status'
2. In the follow-up menu, use the ⬆, ⬇ and Set keys to select the desired digital output.
3. In the follow-up menu, use the ⬆, ⬇ and Save keys to select the desired switching logic. The following meanings apply:
   - inverted = inv
   - direct = no display

7.5.11.2 Status output for the switchover phase

The logic status of the assigned digital output indicates whether the purging time or the measuring time is active during the automatic measuring point switchover.

Digital output status	Description
0	Purging time
1	Measuring time

Menu call:
Main menu → Parameters → Additional functions → Measuring point switchover → Status (MPS)

In the menu, use the ⬆, ⬇ and Set keys to select the desired digital output.

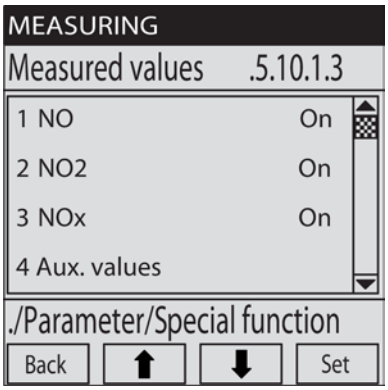
In the follow-up menu, use the ⬆, ⬇ and Save keys to select the desired switching logic. The following meanings apply:

- inverted = inv
- direct = no display

7.5.11.3 Selecting the measuring point display

Menu call:
Main menu → Parameters → Additional functions → Measuring point switchover → Measured values

Example of the displayed menu:



Setting the measured component

1. Use the ⬆, ⬇ and Set keys to select the desired component.
2. Use the ⬆, ⬇ and Save keys to set the desired state.

Setting the auxiliary value

1. Use the ⬆ and ⬇ keys to select parameter 4 'Auxiliary values'.
2. In the follow-up menu, use the Set key to select the desired parameter.
3. Use the ⬆, ⬇ and Save keys to set the desired state.

The states have the following meanings:

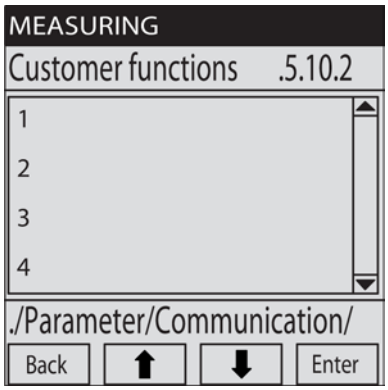
On	The current measured value and the measured values of all measuring points are available in menus and measured-value displays for the measured components and auxiliary values
Off	Only the current measured value is available in menus and measured-value displays for the measured component and auxiliary value

7.5.12 Starting user functions

User functions are individual functions programmed using the "SOPAS ET" PC software. You can use this menu to carry out a manual start. The menu is empty if no user functions are programmed.

Menu call:
Main menu → Parameters → Additional functions → Measuring point switchover → Measured values

Example of the displayed menu:



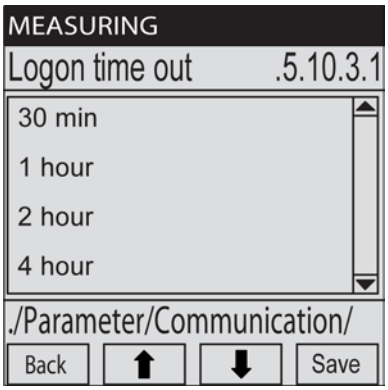
7.5.13 Display settings

7.5.13.1 Setting the waiting time for automatic logoff

The waiting time set for automatic logoff determines the period for which a selected user level remains active if a function key containing text is not activated.

Menu call:
Main menu → Parameters → Additional functions → Display settings → Logon timeout.

The following menu is displayed (example):



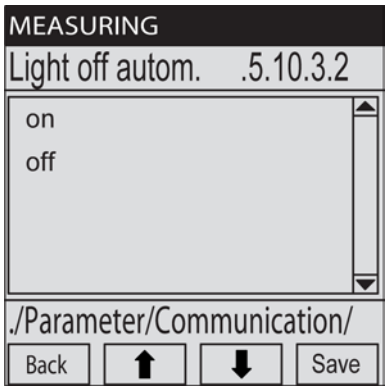
Select the desired waiting time using the ⬆ and ⬇ keys, and confirm the setting with Save.

7.5.13.2 Setting the waiting time for automatic display switch-off

With this function you can activate or deactivate automatic suppression of the display backlighting (screen saver function).

Menu call:
Main menu → BCU → Parameterization → Device → Display settings. → Auto light-off.

The following menu is displayed:



Select the desired setting using the ⬆ and ⬇ keys, and confirm the selected setting with Save. The parameters have the following meanings:

On	Display backlighting goes off automatically
Off	Display backlighting remains on permanently

Note

The automatic switch-off is activated when delivered, i.e. the display backlighting is canceled if a function key containing text (e.g. ENTER, BACK, SAVE ...) is not activated within 30 minutes.

The display backlighting can be switched on again by clicking on the right or left function key.

Maintenance and troubleshooting 8

8.1 Safety instructions

⚠ WARNING

Health hazard resulting from contact with toxic, aggressive or corrosive gases

When opening parts wetted by the sample gas, residues of harmful gases could be released.

- Carry out decontamination before opening parts wetted by the sample gas:
  - Remove gaseous residues by purging all parts wetted by the sample gas for at least two hours with dry nitrogen
  - Remove liquid and/or solid residues by carrying out decontamination in accordance with the requirements resulting from such contamination. If necessary, contact the Siemens servicing department.

If the enclosure has also come into contact with harmful gases during the application, it must also be decontaminated before carrying out maintenance or repair measures.

- Carry out decontamination of the enclosure in accordance with the requirements resulting from the type of contamination. Also observe all appropriate cleaning information.

8.2 Cleaning

Observe the following information when cleaning the enclosure:

- Use a soft, lint-free cloth to clean the enclosure
- Moisten the cloth with water and a mild detergent if necessary. Do not use mechanically or chemically aggressive cleaning agents!
- Make sure that no liquid can penetrate the analyzer.

⚠ CAUTION

Danger resulting from penetrating liquid

If liquid has penetrated the analyzer:

- Do not touch the analyzer!
- Take the analyzer immediately out of operation by interrupting the power supply at an external point (e.g. by disconnecting the power plug from the power socket or switching off the external line fuse)
- Contact the Siemens servicing department or other trained specialists in order to have the analyzer repaired.

8.3 Maintenance

The analyzer and the associated peripheral units must be regularly checked and serviced in order to guarantee correct functioning of the SIPROCESS UV600 and fault-free operation.

The following information provides an overview of the work to be carried out as well as the maintenance intervals.

It is up to the operating company to decide on shortening or extension of the maintenance interval depending on the plant.

8.3.1 Maintenance carried out by user

Overview

Table 8- 1 Maintenance work carried out by user

Maintenance interval				Work
D*	W*	M*	6M*	
(x)	x	x	x	Visual inspection
	(x)	x	x	Calibration
	x	x	x	Check/clean gas inlet and outlet lines
			x	Check operating hours of UV lamp

* Explanations: D = daily, W = weekly, M = monthly, 6M = six-monthly

Visual inspection

We recommend a visual inspection at least every 2 days. The following points should be checked:

- Display / logbook of maintenance requests and fault messages
- Calibration gas supply: remaining pressure, status of gas line and associated valves
- Gas preparation (if present): state of individual components.

Cleaning the enclosure

Observe the following when cleaning the enclosure:

- Only use a soft, lint-free cloth for cleaning.
- Moisten the cloth if necessary and use a mild detergent.
- Never use mechanically or chemically aggressive cleaning agents!
- Make sure that no liquid can penetrate the analyzer.

⚠ WARNING

Moisture in the analyzer

If liquid has penetrated the analyzer, it may no longer function. In this case:

- Do not touch the analyzer!
- Immediately interrupt the power supply and gas supply!
- Inform the customer service department.

8.3.2 Maintenance carried out by authorized specialists

Table 8- 2 Maintenance work carried out by user

Maintenance interval				Work
6M*	1Y*	2Y*	10Y*	
x	x	x	x	Check the following components if present, and repair or replace as necessary: • Flow sensor • Moisture sensor • Barometric pressure sensor • Pressure sensor for sample gas
x	x	x	x	Check I/O module
	x	x	x	Readjust calibration unit (if present)
		x	x	Check gas paths for leaks
		x	x	Replace UV lamp
		x	x	Replace gas filter for NO measurement
			x	Replace battery of control unit

* 6M = six-monthly, 1Y = annually, 2Y= every 2 years, 10Y = every 10 years

8.4 Troubleshooting

8.4.1 Measures in event of complete failure

- Check the power cord and its connections
- Check the external master switch, if present
- Check the power supply
- Check the internal line fuse
- Check whether the internal operating temperatures are correct, i.e. check if corresponding fault messages are present
- Check the supply of sample gas
- Following high external influences (e.g. high electromagnetic interferences) it could be the case that the software no longer functions correctly. In such cases, switch off the SIPROCESS UV600 and switch it on again after a few seconds.
- If the internal overtemperature fuse has tripped, inform the customer service department so that the fuse can be replaced.

8.4.2 Response in case of fault displays

If the "Fault" LED lights up, you must check the diagnostics functions of the control unit as well as those of the UV module for set status flags. If one of the Failure (F), Maintenance (M) or Unsafe (U) status flags is set, check the current entries in the corresponding logbook.

The faults are listed in the logbook in tables with a fault code.

Notify the service personnel with specification of the fault code.

8.5 Shutting down

In order to shut down the analyzer correctly, you must perform the following actions:

- Terminate the gas supply.
- Disconnect the SIPROCESS UV600 from the sample gas path.
- Purge all gas paths of the device for several minutes using a dry, neutral gas (e.g. N_2). If necessary, you must also extend this action to all components of the gas preparation . The SIPROCESS UV600 is heated during operation. This prevents condensation of individual components in the analyzer. When the analyzer is now disconnected from the power supply, the sample gas remaining in the analyzer can condense and damage the internal gas path. Therefore you must purge all gas paths.
- Disconnect the analyzer from the power supply.
- Close all gas connections of the SIPROCESS UV600!

Spare parts/accessories

9

9.1 19" rack housing

Table 9- 1

Order No.	Designation	Recommended requirement		
		1 year	2 years	5 years
A5E03707235	Safety filter FI64		1	2
A5E03707236	Power supplies 24 V 10 A			1
A5E03707238	Connecting cable: appliance plug - power supply			
A5E03707239	Connecting cable: power supply - distribution board			
A5E03707240	Distribution board			1
A5E03707241	Connecting cable: power supply - sensor module			
A5E03707242	Connecting cable CAN bus 0.5 m yellow: distribution board - I/O module			
A5E03707243	Connecting cable CAN bus 0.5 m blue: distribution board - sensor module			
A5E03707244	Connecting cable CAN bus 0.5 m red: distribution board - operator module			
A5E03707757	FKM hose d 3/5, 1 m long	1	2	5
A5E03707758	Straight screwed gland D4, SS316, Swagelok			
A5E03707759	Angled screwed gland D4, SS316, Swagelok			
A5E03707760	Reduction gland D4-D6, pipe nipple SS316			
A5E03707761	Accessory plug for 19" enclosure			
A5E03707762	Accessory plug set, Phoenix			
A5E03707763	Appliance cable, 2 m long			

9.2 Control unit

Table 9- 2

Order No.	Designation	Recommended requirement		
		1 year	2 years	5 years
A5E03707764	Display frame with operator module and motherboard			
A5E03707765	Cable: display - operator module and motherboard			
A5E03707766	Operator module and motherboard			
A5E03707239	Display unit for operator module			

9.3 Input/output module

Table 9- 3

Order No.	Designation	Requirement for		
		1 year	2 years	5 years
A5E03707917	Input/output module			

9.4 UV module

Table 9- 4

Order No.	Designation	Recommended requirement		
		1 year	2 years	5 years
A5E03707918	UV lamp with heater		1	2
A5E03707919	Motor flange 3			1
A5E03707920	Motor flange 2			1
A5E03707921	Gas filter with holder, for measurement of NO		1	2
A5E03707922	Mirror bracket			
A5E03707923	Beam divider			
A5E03707924	UV reference chamber 300 mm, aluminum			
A5E03707925	UV sample chamber 300 mm, aluminum			1
A5E03707936	UV sample chamber 80 mm, aluminum			
A5E03707937	UV sample chamber 21 mm, aluminum			
A5E03707938	UV sample chamber 5.6 mm, aluminum			
A5E03707939	UV sample chamber 1.5 mm, aluminum			
A5E03707940	UV sample chamber 0.4 mm, aluminum			
A5E03707941	Calibration chamber with holder for NO			1
A5E03707942	Calibration chamber with holder for SO_2 and H_2S			
A5E03707943	Calibration chamber with holder for NO_2			
A5E03707944	Detector 1			
A5E03707945	Detector 2			
A5E03707965	Motherboard SIPROCESS UV600 AS 02			
A5E03707966	Motherboard SIPROCESS UV600 AS 02, loaded with current software			
A5E03707967	Motherboard SIPROCESS UV600, loaded with current software and analyzer data			
A5E03707968	Heater with 380 mm long cable, for SIPROCESS UV600: UV lamp, chamber, motor flange		1	2

9.5 Gas module and pneumatic supply

Table 9- 5

Order No.	Designation	Recommended requirement		
		1 year	2 years	5 years
A5E03707969	Moisture sensor		1	2
A5E03707970	Pressure sensor with gasket and O-ring, set			1
A5E03707971	Flow sensor with temperature sensor		1	2
A5E03707972	Straight screwed gland D4, SS316, Swagelok			
A5E03707973	Angled screwed gland D4, SS316, Swagelok			
A5E03707974	Reduction gland D6-D4, pipe nipple SS316			
A5E03707986	Diaphragm pump type 123, 24 V/50 Hz			1
A5E03707987	Diaphragm set EPDM for type 123		1	2
A5E03707988	O-ring for gas pump suspension		1	2
A5E03708919	Electronics board SIPROCESS UV600 small module AS 02			
A5E03708920	Electronics board SIPROCESS UV600 small module AS 02 with software			
A5E03708921	Electronics board SIPROCESS UV600 small module AS 02 with software and factory data			

Technical data

10

10.1 Technical data

General technical data

Table 10- 1

General technical data	
Measuring ranges	3, autoranging See instrument pass of individual analyzer Spans: see table 'Spans'
Degree of protection	IP40
Conformity	CE mark
UV lamp - Design - Service life	 EDL, electrodeless discharge lamp ≈ 2 years (17 500 hours)
Dimensions (analyzer)	See dimensions for preparing installation
Weight (analyzer)	17 kg

Requirements of location of use

Table 10- 2

Requirements of location of use	
Location of use	Within closed building
Atmospheric pressure in the environment	700 to 1200 hPa
Relative humidity	10 ... 95 %, non-condensing
Permissible contamination	Pollution degree 1
Maximum geographic height of location of use	2500 m above sea level
Operating position	Front panel vertical, max. ±15° inclination in each spatial axis [1]
Permissible vibration/shock – Oscillation path – Amplitude of excitation acceleration	 0.035 mm (in range 5 … 59 Hz) 5 m/s^2 (in range 59 … 160 Hz)
Permissible ambient temperature – Operation – Transport and storage	 + 5 ... +45 °C (41 ... 113 °F) -10 ... +70 °C (14 ... 158 °F)

[1] Maximum permissible inclination of base during operation with constant operating position

Electrical characteristics

Table 10- 3

Electrical characteristics	
Power supply (optional, see rating plate)	93 ... 132 V AC 186 ... 264 V AC
Line frequency (AC)	47 ... 63 Hz
Permissible overvoltages (transients in the power supply network)	Up to overvoltage category II in accordance with IEC 60364-4-443
Power consumption (analyzer)	Approx. 50 VA, max. 300 VA
Electrical safety	Tested in accordance with EN 61010-1
EMC– interference immunity (electromagnetic compatibility)	In accordance with EN 61326-1, EN 61326-2-1, EN 61000-6-2, EN 61000-6-4 and EU directive 2004/108/EU. With irradiation of electromagnetic fields in the frequency range 750 MHz ± 20 MHz, increased errors in measurement may occur with small measuring ranges
Internal line fuse - Primary - Secondary	 6.3 A, not replaceable 8 A

Measuring behavior

Table 10- 4

Measuring behavior (relating to sample gas pressure 1013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)	
Reference point drift	< ±1%/week of respective span
Zero drift - Standard measuring ranges - Small measuring ranges (≤ 2x smallest measuring range) - Measured components NO, NO_2, SO_2	 < ±1%/week of respective span < ±2%/week of respective span < ±1%/day of respective span
Repeatability	< ±1% of respective span
Linearity deviation	< ±1% of respective span
Detection limit (2σ) - Standard measuring ranges - Small measuring ranges (≤ 2x smallest measuring range)	 < 0.5% of span < 1% of span
Influence of ambient temperature: - Standard measuring ranges - Small measuring ranges (≤ 2x smallest measuring range)	 < 1%/10 K < 2%/10 K
Setting time (T_{90})	4 s
Starting time	< 60 minutes

Spans

Table 10- 5

Measured component (depending on the order configuration)	Smallest possible span				Largest possible span	
	vpm				vpm	
NO	0 ... 10	0 ... 20	0 ... 25	0 ... 50	0 ... 300	0 ...1000
NO_2	0 ... 10 [2]	0 ... 20	0 ... 25	0 ... 50	0 ... 300	0 ...1000
SO_2	0 ... 10 [2]	0 ... 20	0 ... 25	0 ... 50	0 ... 300	0 ...1000
H_2S	0 ... 50		0 ... 50		0 ... 500	0 ... 1000

Approvals: EN 15267-3, EN 14181

[2] With operation in air-conditioned environment (≤±2 °C temperature deviation) and daily zero calibration

Gas inlet conditions

Table 10- 6

Gas inlet conditions	
Sample gas	
Sample gas pressure	Relative to ambient/atmospheric pressure: –200 ... +300 hPa (–0.2 … +0.3 bar)
Sample gas flow	20 l/h ... 120 l/h (333 cm^3/min ... 2000 cm^3/min)
Sample gas temperature	5 ... 55 °C (41 ... 131 °F)
Dew point	Below the ambient temperature
Purging gas	
Features	Dry inert gas (chemically neutral gas or gas mixture without condensing components)
Purging gas pressure	15 ... 30 hPa
Purging gas flow	20 l/h ... 100 l/h (333 cm^3/min ... 1667 cm^3/min)

Materials used in the sample gas path

Table 10- 7

Component	Material
Analyzer unit (sample chamber):	Aluminum or stainless steel mat. no. 1.4404 [3], epoxy resin
Optical window	CaF_2 or quartz [3], epoxy resin
Gas path, gaskets	FKM (Viton™), PTFE, stainless steel mat. no. 1.4571 [3]
Gas inlet/outlet	PVDF, stainless steel 316 [3]
Moisture sensor	Stainless steel mat. no. 1.4571, platinum, epoxy resin
Diaphragm pump Pump body Diaphragm	 PVDF FKM (Viton™), EPDM

[3] Depending on version

Electric inputs and outputs

Table 10- 8

Electric inputs and outputs	
Analog output	4, 0 ... 24 mA ; floating (electrically isolated), residual ripple 0.02 mA, resolution 0.1% (20 µA), accuracy 0.25% of full-scale value, max. load 500 Ω, max. output voltage 15 V, adjustable start or fault status
Analog inputs	2, 0 ... 20 mA, reference potential GND, max. signal strength 30 mA, max. overcurrent protection ±1 A, input load 50 Ω, converter accuracy 0.5%, max. voltage ±50 V
Relay outputs	8, with changeover contacts, max. voltage ±50 V Loading capacity: see table 'Max. load on relay contacts'
Digital inputs	8, switching range 14 ... 42 V (external control voltage), max. voltage ±50 V
Serial interface	RS485, Ethernet (LAN)

Maximum load on relay contacts

Table 10- 9

Field of application		AC voltage	DC voltage	Current (V_{rms})
Standard		Max. 30 V AC	Max. 48 V DC	Max. 500 mA
CSA	either:	Max. 30 V AC	Max. 48 V DC	Max. 50 mA
	or:	Max. 15 V AC	Max. 24 V DC	Max. 200 mA
	or:	Max. 12 V AC	Max. 18 V DC	Max. 500 mA

10.2 Dimension drawing

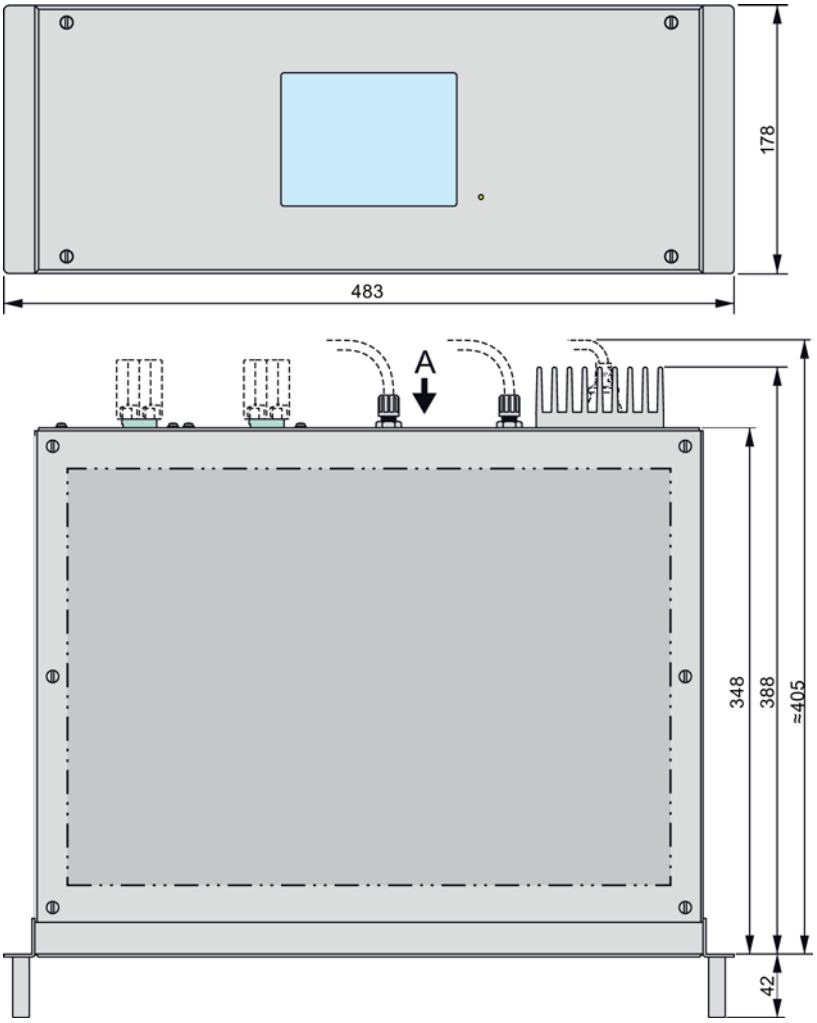


Figure 10-1 Dimension drawing of enclosure

Appendix

A

A.1 ESD guidelines

Definition of ESD

All electronic modules are equipped with large-scale integrated ICs or components. Due to their design, these electronic elements are highly sensitive to overvoltage, and thus to any electrostatic discharge.

The electrostatic sensitive components/modules are commonly referred to as ESD devices. This is also the international abbreviation for such devices.

ESD modules are identified by the following symbol:

NOTICE
ESD devices can be destroyed by voltages well below the threshold of human perception. These static voltages develop when you touch a component or electrical connection of a device without having drained the static charges present on your body. The electrostatic discharge current may lead to latent failure of a module, that is, this damage may not be significant immediately, but in operation may cause malfunction.

Electrostatic charging

Anyone who is not connected to the electrical potential of their surroundings can be electrostatically charged.

The figure below shows the maximum electrostatic voltage which may build up on a person coming into contact with the materials indicated. These values correspond to IEC 801-2 specifications.

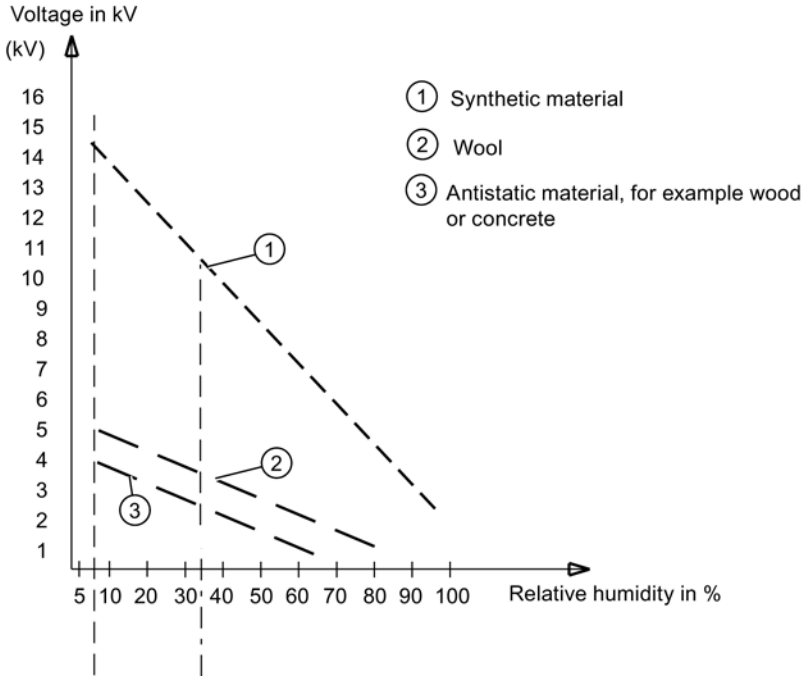


Figure A-1 Electrostatic voltages on an operator

Basic protective measures against electrostatic discharge

- Ensure good equipotential bonding:
  When handling electrostatic sensitive devices, ensure that your body, the workplace and packaging are grounded. This prevents electrostatic charge.
- Avoid direct contact:
  As a general rule, only touch electrostatic sensitive devices when this is unavoidable (e.g. during maintenance work). Handle the modules without touching any chip pins or PCB traces. In this way, the discharged energy can not affect the sensitive devices.

  Discharge your body before you start taking any measurements on a module. Do so by touching grounded metallic parts. Always use grounded measuring instruments.

Lists

B

B.1 List of abbreviations

Abbreviation	Description
>	Greater than
<	Smaller than
≥	Greater than or equal to
≤	Smaller than or equal to
=	Equal to
≠	Not equal to
≡	Congruent
±	Plus/minus
≈	Approximately
"	Inch (1 inch corresponds to 25.4 mm)
%	Percent (1 percent corresponds to the hundredth part of the whole)
vol. %	Volume percent
°	Degrees (angular)
°C	Degrees Celsius
°F	Degrees Fahrenheit
A	**A**mpere
AC	**A**lternative **C**urrent
AI	**A**nalog **I**nput
among others	among others
AO	**A**nalog **O**utput
or	or
Approx.	approx.
CaF_2	Calcium fluoride
CAN	Controller Area Network, an asynchronous serial fieldbus system
CH_4	Methane
Cl_2	Chlorine
CLD	Chemiluminescence detector
cm	Centimeter
CO	Carbon monoxide
CO_2	Carbon dioxide
COS	Carbonyl sulfide
CS_2	Carbon disulfide
CSA	Canadian Standards Association

Abbreviation	Description
DC	Direct Current
DD	Device Description
i.e.	In other words
DI	Digital Input
DIN	**D**eutsche Industrie Norm (German Industry Standard)
DO	Digital Output
DP	Decentralized periphery, a PROFIBUS version
EDL	Electrodeless Discharge Lamp
e.g.	For example
EN	European standard
EPDM	Ethylene propylene diene monomer, a synthetic rubber
ESD	Electrostatic sensitive device
FKM	Fluorocaoutchouc (DIN ISO 1629 name), commercial name e.g. Viton™
Fct.	Function
GFC	Gas Filter Correlation A measuring method
Possibly	Possibly
GND	Chassis ground
GSD	Device master data
h	Hour (from lat. 'hora')
H_2O	Water (vapor)
H_2S	Hydrogen sulfide
HU	Height unit (1 HU correspondence to 1 3/4 inch, i.e. 44.45 millimeter)
hPa	Hectopascal (1 hPa corresponds to one millibar (mbar))
Hz	Hertz
IEC	International Electrotechnical Commission
IFC	Interference Filter Correlation A measuring method of the SIPROCESS UV600
IP	Ingress Protection Degree of protection
K	Kelvin
kg	Kilogram
l	Liter
LAN	LAN (Local Area Network)
LCD	Liquid Crystal Display:
LED	Light Emitting Diode
l/h	Liter per hour, a unit for flow quantity
m	Meter
mA	Milliampere
mat. no.	Material number
max.	Maximum
MR	Measuring range
MHz	Megahertz
min	Minute
min.	Minimum

Abbreviation	Description
MLFB	Machine-readable product designation
mm	Millimeter
m/s^2	Meter per second squared, a unit for acceleration
N_2	Nitrogen
NAMUR	Standards working committee for measuring and control technology in the chemical industry
NC	No connection
MSL	Mean sea level (height above sea level)
NO	Nitrogen oxide
NO_2	Nitrogen dioxide
NO_x	Nitrous oxides: collective name for the gaseous oxides of nitrogen.
No.	Number
O_2	Oxygen
or similar	or similar
PA	Process Automation
PA	Polyamide, a plastic, commercial name, e.g. nylon
PE	Protective Earth
ppm	Parts per million = 10^{-6} = 0.0001 %
PROFIBUS	Process fieldbus
PTFE	Polytetrafluoroethylene, a plastic, commercial name, e.g. Teflon
PVDF	Polyvinylidene fluoride, a plastic
RAM	Random access memory (memory with random (direct) access)
RC	R = resistor, C = capacitor
R.H., RH	Relative humidity
RS232	Serial interface for data communication
RS485	Serial interface for high-speed data transfer
s	Second
SO_2	Sulfur dioxide
SRU	Sulfur Recovery Unit
SS-316	Stainless Steel 316 (US classification for stainless steel mat. no. 1.4401)
SW	Software
t	Time (from lat. 'tempus')
T	Slow-blow (fuse values)
™	**T**rade **M**ark
UV	Ultraviolet
V	Volt
VA	Volt-ampere
V_{rms}	RMS voltage, peak-to-peak voltage
WA	Maintenance request

Abbreviation	Description
Δ	Difference
µA	Microampere
µF	Microfarad
µm	Micrometer
Ω	Ohm

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