SIEMENS

Continuous gas analysis

SIPROCESS GA700 Operating with the Local User Interface

Operating Manual

7MB3000-.....-....
7MB3010-.....-....
7MB3020-.....-....
7MB3040-.....-....

12/2021
A5E31930478-10

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.

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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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Document order number: A5E31930478
Ⓟ 10/2022 Subject to change

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Introduction

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1.1 Purpose of this documentation

This documentation contains all the information you need to operate the device using the local user interface (LUI).

The LUI consists of a display and keyboard with four keypads with which all analyzer functions can be set using menus.
The analyzer can also be operated with SIMATIC PDM. Additional information on this topic is available by referring the list of references in: Table A-2 References 2 - Operating Manuals PDM (Page 271).

1.2 History

The following table includes information on the different editions of this document.

Table 1-1 Document history

Edition	Comment
01 01/2013	First edition Function "Sync." cannot currently be executed.
02 07/2014	Second edition • Support of option modules 1.1 and 2.2. • "[1] Quick start" menu with new functions for easier commissioning (Local User Interface). • Advanced operating options, e.g., "UNDO key" (Local User Interface) • Switchover to SIMATIC PDM 8.1
03 05/2015	Second edition. Content supplemented by content for the additional analyzer modules ULTRAMAT 7 and CALOMAT 7.
04 03/2016	Fourth edition. Additional module combinations for CALOMAT 7 and ULTRAMAT 7. Extended ULTRAMAT 7 area of application: measurement of components NO, N_2O, SO_2, CH_4, C_2H_4, NH_3
05 06/2017	CALOMAT 7: 1-point calibration with substitute gas to shift the characteristics offset
06 12/2021	General revision/additions

1.3 Notes on warranty

The content of these instructions is neither a part of a previous or existing agreement, promise or legal relationship, nor is it intended to modify these. All obligations on the part of Siemens AG are contained in the respective sales contract, which also contains the complete and solely applicable warranty conditions. Any statements contained in this documentation do not create new warranties or restrict the existing warranty.

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

1.4 Target group

This document is intended for all persons using the modular device for continuous monitoring of process gases in an industrial environment. This specifically includes:

- Measurement technicians
- Plant operators
- Maintenance staff
- Service personnel

1.5 Conventions

Overview

To allow easier navigation within this documentation, the tables below provide information on the use of markups and terminology.

Table 1-2 Conventions on markups

Representation type	Scope	
"Add screen"	• Terminology that appears in the user interface, for example, dialog names, tabs, buttons, menu commands • Required inputs, for example, limits, tag values. • Path information	
"File > Edit"	Operational sequences, for example, menu commands, shortcut menu commands.	
<F1>, <Alt+P>	Keyboard operation	
[1] to [6]	Numbers of the main menu in the LUI, part of the menu name	The square brackets identify the chapter numbers that precede the menu names.
[1. ...] to [6]	Numbering of the menus downstream from the main menu, part of the menu name	
→	Introduces a text-dependent reference to a section or a paragraph in this documentation. The page numbers are always specified in parentheses for references in the document. Example of a reference (hyperlink): → Appendix (Page 269)	

Table 1-3 Conventions on terminology

Term	Convention/alternative name
Local user interface	"LUI" for short.
AUTOHOTSPOT	Incorrect reference
"See also"	At the end of the paragraph/page: Text-independent reference

General information

2

2.1 KC Safety note - Information for Korea only

Class A Equipment (Industrial Broadcasting & Communication Equipment)

This equipment is Industrial (Class A) electromagnetic wave suitability equipment and seller or user should take notice of it, and this equipment is to be used in the places except for home.

MSIP 요구사항 - For Korea only

A급 기기(업무용 방송통신기자재)

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2.2 Safety instructions

⚠ WARNING

Laws and directives

The failure to observe directives and laws when connecting and installing increases the danger of explosion and leakage due to improper handling. When connecting and installing, observe the test certificates, stipulations and laws applicable in your country in order to avoid danger.

These include, for example:

- IEC 60079-14 (international)
- National Electrical Code (NEC - NFPA 70) (USA)
- Canadian Electrical Code (CEC) (Canada)
- EN 60079-14 (formerly VDE 0165, T1) (EU)
- EN 61010
- Ordinance on Industrial Safety and Health (Germany)

⚠ WARNING

Device modifications

Danger to personnel, system and the environment can result from modifications and repairs to the device, especially in hazardous areas.

- Only carry out modifications or repairs that are described in the instructions for the device. Failure to observe this requirement cancels the manufacturer's warranty and the product approvals.

See also

References (Page 271)

WARNING

Information and symbols on the device

- 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.

2.3 Information on use

2.3.1 Prerequisites for safe use

In terms of safety, this device left the factory in perfect condition. In order to maintain this status and to ensure safe operation of the device, observe these instructions and all the information relevant to safety.

2.3.2 Disclaimer

Industrial security

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the Internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

You can find more possible protective measures in the area of industrial security at Industrial security (https://www.siemens.com/industrialsecurity).

Siemens' products and solutions undergo continuous development to make them more secure. Siemens expressly recommends that product updates be applied as soon as they become available and that only the latest product versions be used. Use of product versions that are no longer supported, and failure to apply latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under: Services & Support (https://support.industry.siemens.com/cs/gb/en/sc)

2.3.3 Communications

Note

Communication protocols

The devices described in this documentation are able to communicate using Ethernet and MODBUS TCP. The protocols used are basically non-secure in the sense of IT security.

- Make sure that only secure connections are used for communication.
- Only use the device within appropriately secure networks.

Note

Illegal Ethernet connection

Illegal Ethernet connections to the analyzer device can bypass firewalls.

Make sure that the analyzer device is not connected to or can be connected to two separate Ethernet networks.

2.3.4 Qualified personnel

Qualified personnel are individuals who are familiar with the installation, mounting, commissioning, and operation of the product. These individuals have the following qualifications:

- They are authorized, trained or instructed in operating and maintaining devices and systems according to the safety regulations for electrical circuits, high pressures, and aggressive as well as dangerous media.
- For explosion-proof devices: They are authorized, trained, or instructed in working on electrical circuits for systems in hazardous areas.
- They are trained or instructed in maintenance and use of appropriate safety equipment according to the safety regulations.

2.3.5 Automatic reset

All SIPROCESS GA700 devices feature internal monitoring. When this monitoring is activated, the standard digital outputs switch after about 4 seconds for a period of approx. 60 seconds to "inactive", i.e. to a recognized safe operating mode. These times are valid for devices manufactured as of 09/2017. You can find this information on the nameplate. It can take up to 10 seconds for older devices to switch over, and up to 100 seconds to switch to safe operating mode.

If you are using SIPROCESS GA700 devices in critical processes, observe the following information:

- Monitor the limits externally via the control system.
- If an option module 2.1 is installed, read out the device status via the digital outputs of the option module.
- Use an available manual measuring range switchover instead of the autoranging.
- Only use the "Total" parameter with the "Off" setting for the measuring range switchover.
- If you use the "Correction of cross-interference" and "External pressure compensation" functions, store suitable substitute values.
- Only access the measured value via an analog output.

Description

3

3.1 Overview

Rack-mounted devices have a modular structure. A rack-mounted device comprises a rack-mounted housing and at least one analyzer module. Optionally, rack-mounted devices can be fitted with option modules.

Definition of rack-mounted device and rack-mounted housing

The following terms are used in the operating instructions:

- Basic device, rack-mounted housing
  This includes the metal housing for installation in a 19" rack with local user interface, built-in processing unit (PU) and a power supply unit. A rack-mounted housing (basic device) is prepared for installation of the analyzer and option modules.
- Rack-mounted device
  This includes a rack-mounted housing (basic unit) with at least one analyzer module (AM) installed.

Overview of analyzer modules

The analyzer modules are matched with specific sample gas components and measuring ranges. Various types of measuring methods are implemented.
The following table provides an overview of the features of the measuring tasks of the analyzer modules.

Table 3-1 Measuring task of the analyzer modules

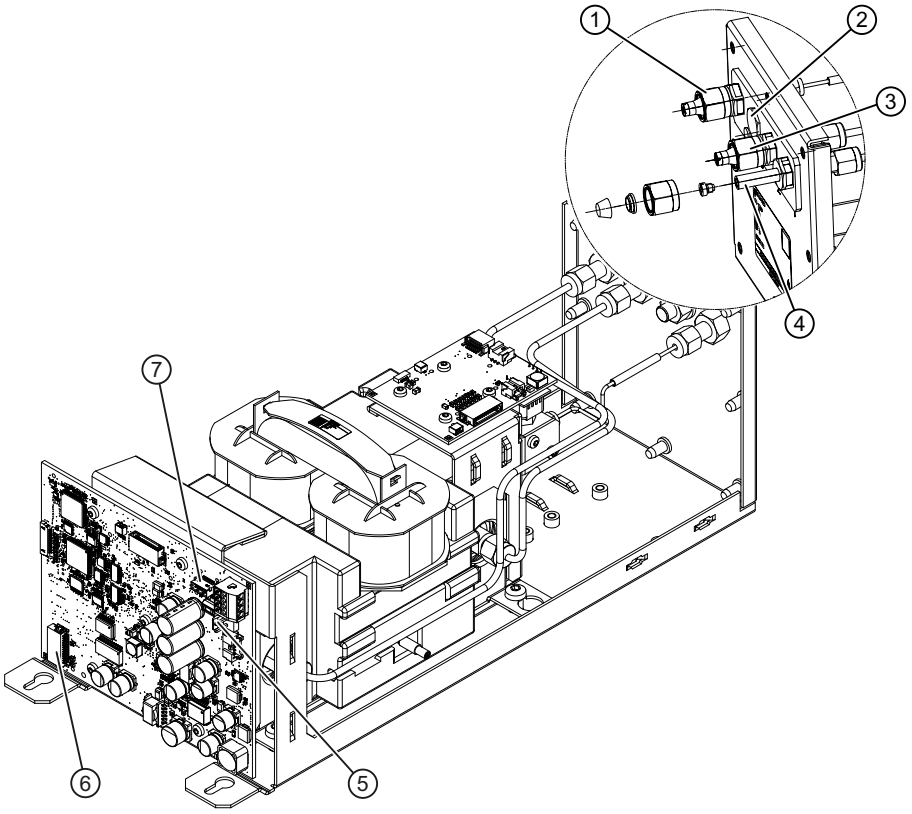
Analyzer modules	Sample gas in gas mixtures	Measuring principle
OXYMAT 7	O_2	Paramagnetic alternating pressure method
ULTRAMAT 7	CO, CO_2, CH_4, C_2H_4, SO_2, NO, N_2O, NH_3	Infrared push-pull chopped radiation method
CALOMAT 7	H_2 and additional gases in binary or quasi-binary gas mixtures	Difference in thermal conductivity of gases

See also

CALOMAT 7 measurement task (Page 27)

3.2 OXYMAT 7

3.2.1 Design



① Reference gas inlet
② Not assigned
③ Sample gas outlet
④ Sample gas inlet
⑤ Power supply connection
⑥ Connection for optional module 2.x (OM2.x)
⑦ Connection for internal bus communication (CAN)

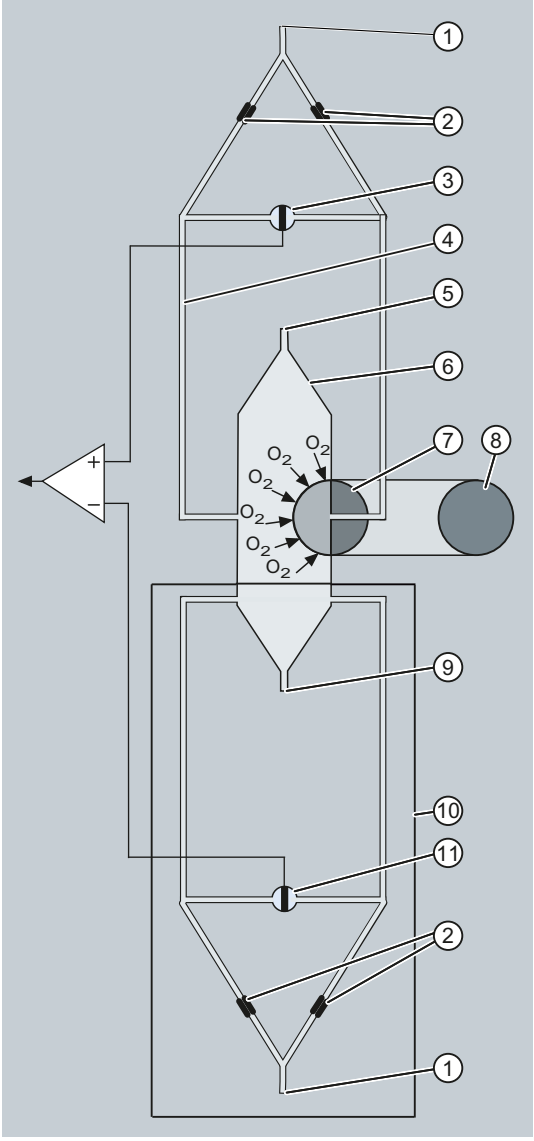
Figure 3-1 Design OXYMAT 7, high-pressure version, measurement gas path with pipes

See also

Functional principles (Page 21)

3.2.2 Functional principles

Overview



①	Reference gas inlet	⑦	Paramagnetic measurement effect
②	Restrictors	⑧	Electromagnet with alternating current strength
③	Microflow sensor	⑨	Sample gas and reference gas outlet
④	Reference gas channels	⑩	Vibration compensation system (optional)
⑤	Sample gas inlet	⑪	Microflow sensor in the vibration compensation system (flow-type)
⑥	Sample chamber		

Figure 3-2 Principle of operation of OXYMAT 7

Measuring principle

Oxygen is highly paramagnetic compared to other gases. This physical property is used to determine oxygen concentration in gases.

Oxygen molecules in an inhomogeneous magnetic field always move toward the higher field strength. A higher concentration or partial pressure of oxygen is generated at this point.

If two gases with differing oxygen content are combined in a magnetic field, a difference in partial pressure results between them.

The measuring effect is therefore always based on the difference in the oxygen content of the two gases, the sample and reference gases.

How it works

To measure oxygen in the OXYMAT 7, the reference gas (air, oxygen, or nitrogen) flows through two reference gas channels into the sample chamber. One of these partial flows enters the sample chamber in the area of the magnetic field.

If the sample gas contains no oxygen, the reference gas flows freely into the sample chamber. If the sample gas does contain oxygen, the oxygen molecules concentrate in the area of the magnetic field. The reference gas can then no longer flow freely into the sample chamber. There is a slight build-up of dynamic pressure, which depends on the concentration of oxygen in the sample gas.

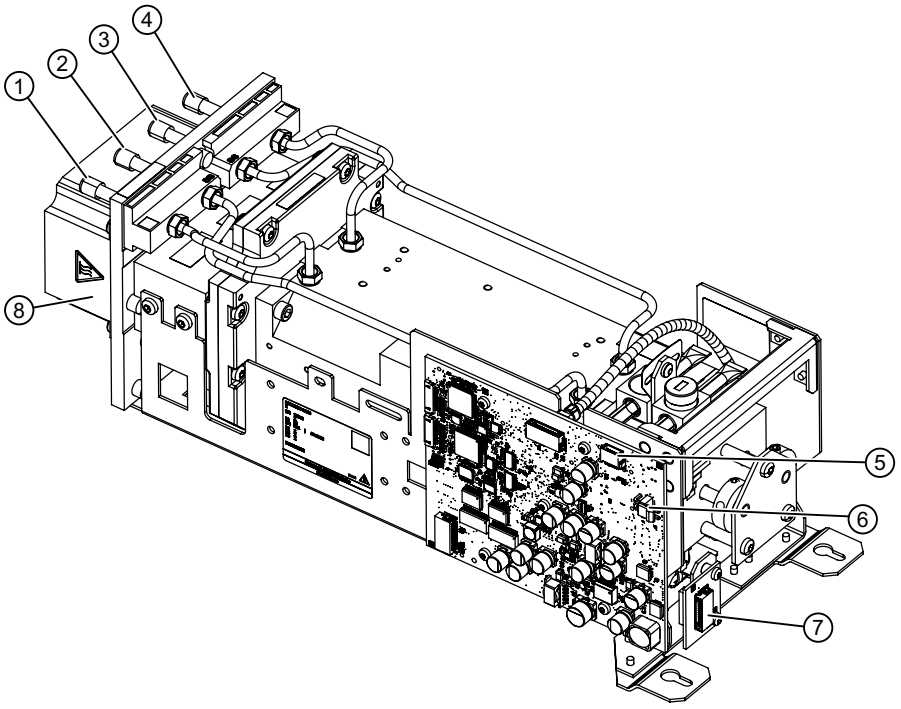
In an oscillating magnetic field, oscillating pressure is also generated and this results in alternating flow. This alternating flow is converted into an alternating voltage signal by a microflow sensor located between the reference gas channels. The alternating flow results in a change in resistance which is a measure for the oxygen concentration in the sample gas.

Any vibrations occurring at the installation site may impair the measured signal. Two additional optional microflow sensors serve as vibration sensors and thus compensate for the undesirable behavior.

3.3 ULTRAMAT 7

3.3.1 Design

Overview

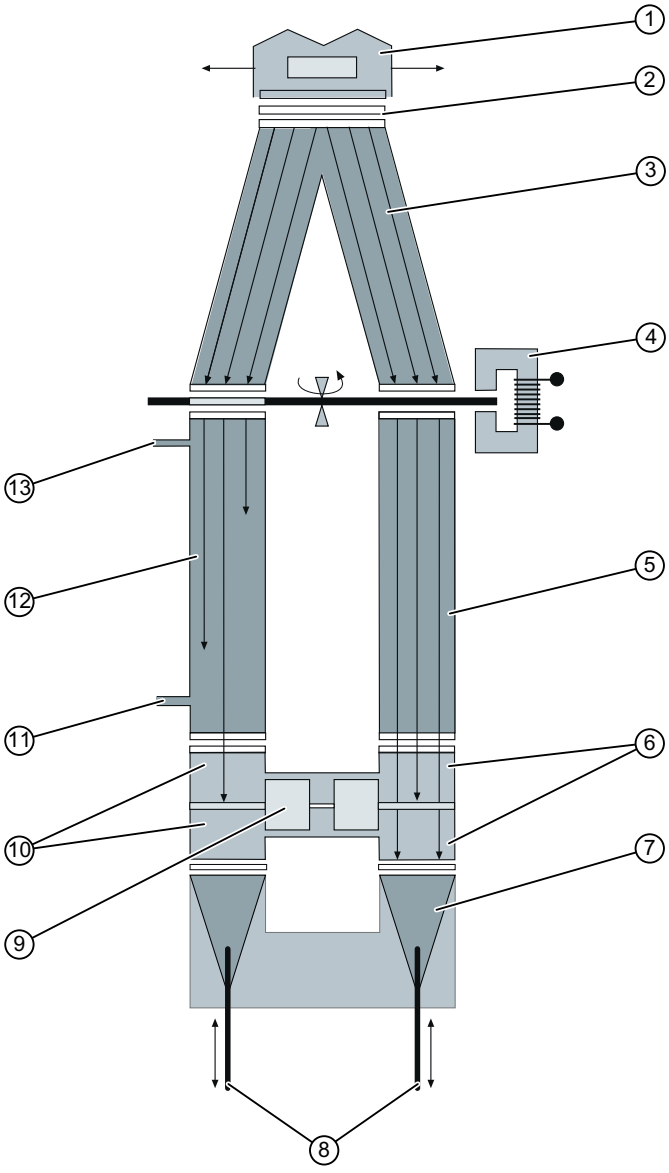


①	Sample gas inlet	⑤	Heat sink
②	Sample gas outlet	⑥	CAN connection
③	Reference gas outlet	⑦	Power supply
④	Reference gas inlet	⑧	Analog interface

Figure 3-3 Example: Design of ULTRAMAT 7, measurement and reference gas path with pipes

3.3.2 How the ULTRAMAT 7 works

Overview



① Source, adjustable
② Optical filter
③ Beam splitter/Y cell
④ Chopper
⑤ Reference chamber
⑥ Receiver chamber comparison side
⑦ Decoupler
⑧ Slider, adjustable
⑨ Microflow sensor
⑩ Receiver chamber measuring side
⑪ Sample gas outlet
⑫ Sample chamber
⑬ Sample gas inlet

Figure 3-4 Principle of operation of ULTRAMAT 7

Measuring principle

The ULTRAMAT 7 can simultaneously measure up to 4 infrared-active measuring components.

The measurements are based on the molecular-specific absorption of infrared radiation bands (absorption bands). ULTRAMAT 7 analyzer modules use a spectral range which includes wavelengths of 2 to 9 µm. Although the absorbing wavelengths are characteristic of individual gases, they may partially overlap. This results in cross-sensitivities which are reduced to a minimum by the following measures:

- Beam splitter (gas filter)
- Double-layer detector, each gas compartment with adjustable weighting between the first and second detector layer
- Application-specific factory-fitted interference filter

ULTRAMAT 7 analyzer modules operate according to the infrared push-pull chopped radiation principle and are equipped with a double-layer detector.

An IR source ① with a temperature of approximately 600 °C generates infrared radiation which is emitted in the beam splitter ③ . The beam splitter ③ acts as a filter chamber and divides the beam equally between the sample gas and reference gas compartments.

The chopper ④ produces a periodic modulation of the infrared radiation, and thus enables relaxation of the receiver.

The reference beam passes through the reference chamber ⑤ and enters the detector chamber ⑥ virtually unattenuated. The detector chamber ⑥ is filled with a precisely defined concentration of the gas component to be measured.

The sample beam, by contrast, passes through the sample chamber ⑫ filled with sample gas and enters the detector chamber ⑩ attenuated to various degrees. The degree of attenuation depends on the respective sample gas concentration.

The detector is designed as a double-layer detector. The detector layer at the source end serves primarily to absorb the middle of the band. The band edges, however, are absorbed equally by both of the layers.

The detector layers at both compartments of the detector are pneumatically connected to each other via a microflow sensor ⑨ . This sensor element converts the pressure difference in the detector into an electrical signal.

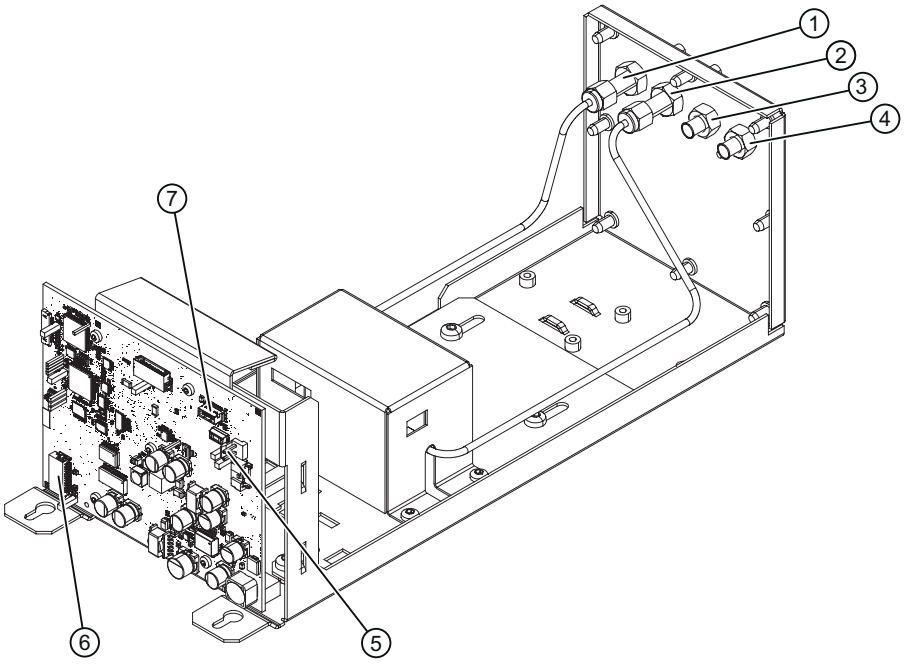
The weighting between the first and second detector layer is preset to a dew point of 4°C by default at the factory using the decoupler. This minimizes the effect of interfering components.

To ensure the long-term stability of the measured value, the ULTRAMAT 7 analyzer module supports the predictive self-diagnostics of the analyzer. This function enables you to plan maintenance measures in a timely manner.

3.4 CALOMAT 7

3.4.1 Design

Overview



① Sample gas inlet
② Sample gas outlet
③ n.c.
④ n.c.
⑤ Power supply connection
⑥ Analog output/digital output
⑦ CAN connection

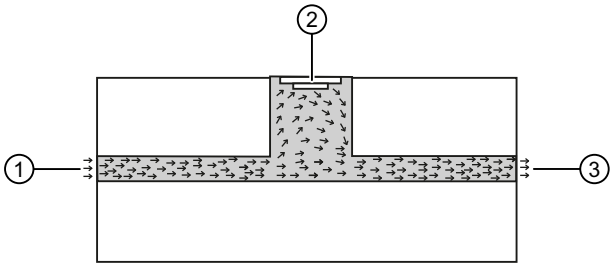
Figure 3-5 Example: Design of CALOMAT 7, sample gas path with pipes

See also

How the CALOMAT 7 works (Page 27)

3.4.2 How the CALOMAT 7 works

Overview



① Sample gas inlet
② Measuring membrane with thin-film resistors
③ Sample gas outlet

Figure 3-6 Principle of operation of CALOMAT 7

How it works/measuring principle

The measuring method is based on the different levels of thermal conductivity of gases. CALOMAT 7 analyzer modules work with a micromechanically produced Si chip, the measuring membrane of which is equipped with thin-film resistors.

The resistors contained in the membrane are regulated for constant temperature. The amperage required fluctuates in accordance with the thermal conductivity of the sample gas. This raw value determined in this way is processed further electronically to calculate the gas concentration.

The sensor is in a thermostatically controlled stainless steel enclosure in order to suppress the effect of the ambient temperature. To rule out flow influences, the sensor is mounted in a bore hole next to the flow channel.

3.4.3 CALOMAT 7 measurement task

Overview

The following gas components can be measured with CALOMAT 7 analyzer modules.

Table 3-2 CALOMAT 7 measurement task

Number	Gas mixtures (measurement of...)
20	Helium in hydrogen
25	Hydrogen in nitrogen
29	Hydrogen in argon
31	Helium in nitrogen

Number	Gas mixtures (measurement of...)
33	Helium in argon
35	Methane in nitrogen
40	Argon in nitrogen
42	Argon in oxygen
52	Hydrogen in nitrogen with correction of cross-interference (blast furnace gas)
53	Hydrogen in nitrogen with correction of cross-interference (converter gas)
51	Hydrogen in nitrogen with correction of cross-interference (wood gasification)
55	Methane in argon
56	Carbon dioxide in nitrogen

3.5 Option modules

Option module 1.1

Option module 1.1 (OM1.1) provides eight additional digital inputs and twelve additional digital outputs. Because the module is a "passive" module, the processing unit is in charge of controlling the OM.

Option module 2.1

The option module 2.1 (OM2.1) is a "passive" module whose control is handled by the relevant analyzer module. For every component measured by the analyzer module, the OM2.1 makes an analog output available. This option module also provides three digital outputs per analyzer module with a fixed function assignment.

If the device is retrofitted with an option module 2.1, this must be activated via LUI or PDM.

Option module 2.2

Option module 2.2 (OM2.2) is a system module connected directly via the CAN bus. Just like the analyzer modules, this module is an "intelligent" module with the following core properties:

- Independent identification in the menu of the LUI
- Plug & measure capability
- Parameter assignment including parameter block transfer (save and restore)
- Diagnostics and test functions
- Inclusion in the logbook
- Download of firmware and parameter blocks

Compared to option module 2.1, the option module 2.2 provides four analog inputs and four digital inputs. The additional analog inputs can be used as measured value source for the correction of cross-interference and/or pressure compensation. You can also output the analog input measured values in the display of the additional process values (main view).

Test mode can be activated for analog as well as digital inputs.

Inputs/outputs of option modules OM2.1 and OM2.2

Table 3-3 Inputs/outputs at a glance

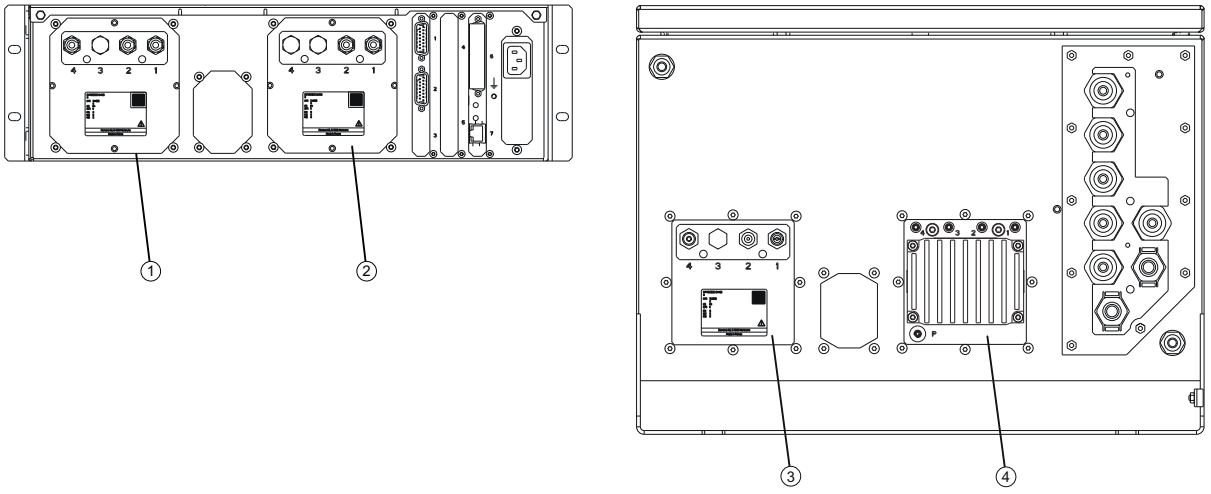
Option module 2.1	Option module 2.2
The option module 2.1 has the following inputs/ outputs: • 6 digital outputs (3 digital outputs per analyzer module): These digital outputs are assigned fixed to a function • 6 analog outputs	The option module 2.2 has the following inputs/ outputs: • 4 analog inputs • 4 digital inputs • 6 analog outputs

See also

General information (Page 54)

Combined operation

The figure below shows the slots for the analyzer modules.



Rack-mounted device - rear view:

① Slot 1 (AM1), example OXYMAT 7

② Slot 2 (AM2), example CALOMAT 7

Wall-mounted device - rear view:

③ Slot 1 (AM1), example OXYMAT 7

④ Slot 2 (AM2), example ULTRAMAT 7

Figure 4-1 Slots for analyzer modules

Note

High-temperature analyzer modules

The-high-temperature analyzer modules OXYMAT 7 and ULTRAMAT 7 are designed solely for wall-mounted devices and, because of their size, can only be installed individually into the wall-mounted device. A high-temperature analyzer modules takes up both slots (AM1 and AM2). For additional information on the layout of the gas connections for the OXYMAT 7, refer to the OXYMAT 7 (Page 39).

4.1 Operating modes

4.1.1 Setting note

Note

Operating mode-specific parameter assignment of the gas path in serial/parallel operation

Analyzer modules can be operated in series or in parallel.

- If you are only using one analyzer module or want to operate two analyzer modules in series, set the value "Shared" in the "Gas path" parameter field.
- If you are operating two analyzer modules in parallel, however, select the setting "Separate".

You can find the corresponding setting options in the menu → [2.12].

4.1.2 Serial/parallel operation

If you are using two analyzer modules in one basic device, the analyzer modules can be operated in series or in parallel:

- Serial operation: The sample gas flows through the analyzer modules consecutively.
  To do this, connect the sample gas outlet of the analyzer module filled first to the sample gas inlet of the second analyzer module.
- Parallel operation: The sample gas flows separately through the analyzer modules.
  To do this, connect each sample gas inlet individually to the sample gas in such a way that the analyzer modules are supplied separately with sample gas.

The analyzer modules can be operated in pressure operation and in suction operation:

- Pressure operation: The sample gas is fed into the analyzer module with overpressure from the gas line or gas bottle.
- Suction operation: The sample gas is sucked out of the analyzer module by a downstream pump.

See also

Connection information (Page 34)

4.1.3 Changing the operating mode

Please observe the following points when switching between the operating modes:

- Check the mounting positions of sample gas restrictors or clamping screws at the sample gas connections. If required, change them in accordance with the selected operating mode. For additional information, refer to the section "Application planning (Page 48)".
- In the menu, adapt the parameter field of the gas path.
  Additional information is available in the operating manuals: [2.12] Settings > Gas path/ process tag label (Page 183).
- If necessary, adjust the signal frequency of the module combination.
  Additional information is available in the operating manuals: [2.20.03] Factory calibrations (Page 190).

4.2 Gas connections

4.2.1 General safety instructions for gas connections

⚠ WARNING

Parts in contact with sample gases unsuitable for sample gas

Danger of injury or poisoning, device damage

Hot, poisonous and corrosive sample gases can be released at the connections if the device parts and accessories coming into contact with sample gas are unsuitable for the sample gas.

- Use only sample gas-contacting connecting parts (pipes, unions and sealing material) that are suitable for the connection and for the sample gases. Refer to the information in the section "Technical specifications (Page 271)".

⚠ WARNING

Possible leakages of gas path

Danger of poisoning

Leaky gas paths lead to accumulation of the sample gas in the device.

- Tighten the clamping screws in accordance with the mounting specifications of the manufacturer using a suitable open-ended wrench.
  In the process, make sure that you counter properly.

4.2.2 Connection information

Note

Leaky gas connections

A gas-tight connection cannot be achieved if you install the clamping ring connections before a sample gas restrictor or clamping screw was screwed onto the connecting socket. The gas connection is then irreversibly leaky. Leaky gas paths lead to accumulation of the sample gas in the device.

- Observe the information provided by the manufacturer of the clamping screws. Observe the installation guidelines.
- Before you install the clamping ring connections, make sure that the connecting socket is either equipped with a sample gas restrictor or with a clamping screw.
- Tighten the clamping screws in accordance with the mounting specifications of the manufacturer using a suitable open-ended wrench. In the process, make sure that you counter properly.

Note

Unstable measured value display due to pressure surges

Pressure surges can result in unstable measured value displays when the sample gas flow is superimposed by fast pressure fluctuations or a sample gas pump delivers sample gas into the device. To protect the device from pressure surges, we recommend that:

- Install the supplied sample gas restrictors into the gas path.
- Use a pneumatic low-pass filter (restrictor and damping vessel), if necessary.

Note

Equipping analyzer modules with sample gas restrictors and/or clamping screws

In the delivery state, the analyzer modules are equipped as follows at the factory:

- OXYMAT 7: With a sample gas restrictor at the sample gas inlet, otherwise clamping screws everywhere.
- ULTRAMAT 7: Does not require clamping screws/sample gas restrictors. Subsequent upgrading or retrofitting is not possible and not required.
- CALOMAT 7: With clamping screws only.

Note

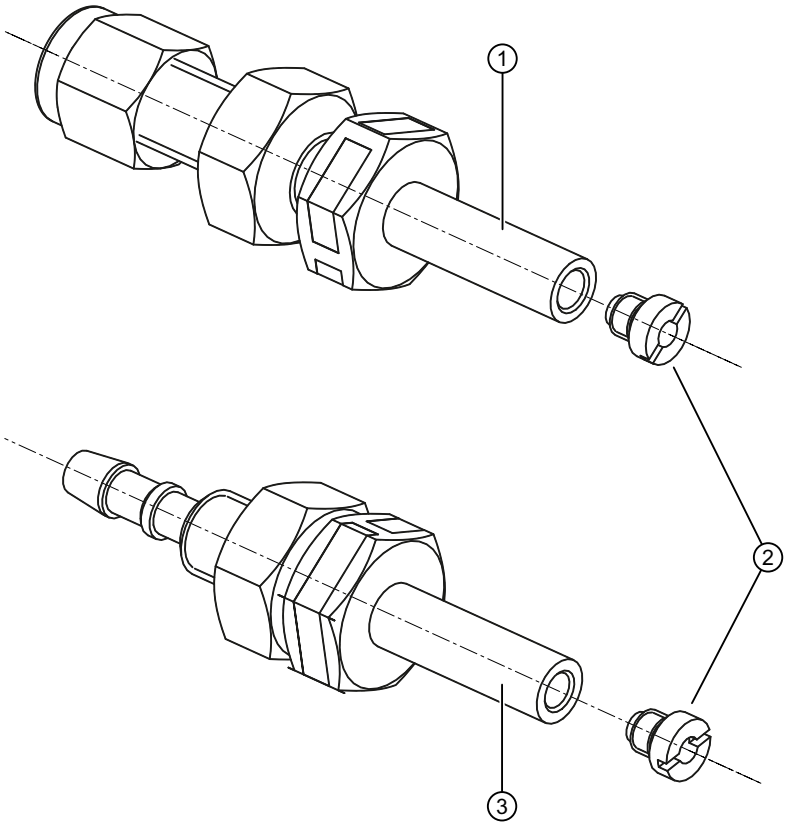
Avoiding pressure fluctuations in the sample gas outlet

When the sample gas is conducted into a collective exhaust gas line, the exhaust gas line must be free of "rapid" pressure fluctuations. If such pressure fluctuations are present, implement the following remedial measures:

- Install a special exhaust line.
- Alternatively: Install a damping vessel (> 1 l) with a downstream restrictor between the device and the exhaust line (pneumatic low pass).
- To avoid steam condensation in the exhaust gas line, lay the exhaust gas line as vertically as possible.

4.2.3 Sample gas restrictor/clamping screw

Overview



① Version with pipes:
Sample gas bushing with 6 mm nozzles

② Sample gas restrictors

③ Version with hoses:
Sample gas bushing with 6 mm nozzles

Figure 4-2 Sample gas connections with sample gas restrictors

The sample gas connections of the analyzer modules are 6 mm nozzles. Depending on the analyzer module, either clamping screws or sample gas restrictors are mounted onto these nozzles that are then connected tightly to the incoming gas lines and outgoing gas lines. Sample gas restrictors as well as clamping screws ensure a gas-tight connection between the gas connection and the gas line.

Depending on the application, however, you may also need to remove the sample gas restrictor or move it to another module. The sample gas restrictor is screwed (grub screw) onto the bushing of the gas path.

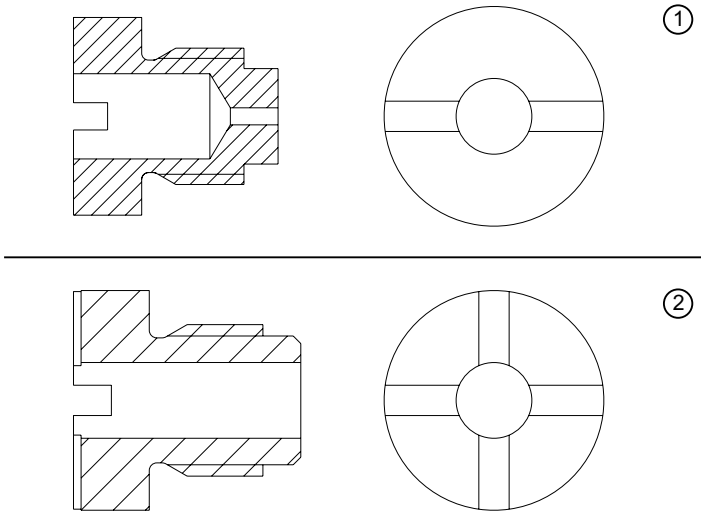
If no sample gas restrictors are installed, the clamping screws take on the role of length compensation for the gas connections.

4.2.4 Distinction between sample gas restrictor/clamping screw

Distinction between sample gas restrictors and clamping screws

The sample gas restrictor and clamping screw differ in the bolt head and at the outlet diameter at the bottom end.

- Sample gas restrictor: Slotted screw, outlet diameter 0.5 mm
- Clamping screw: Cross-tip screw, outlet diameter 2 mm

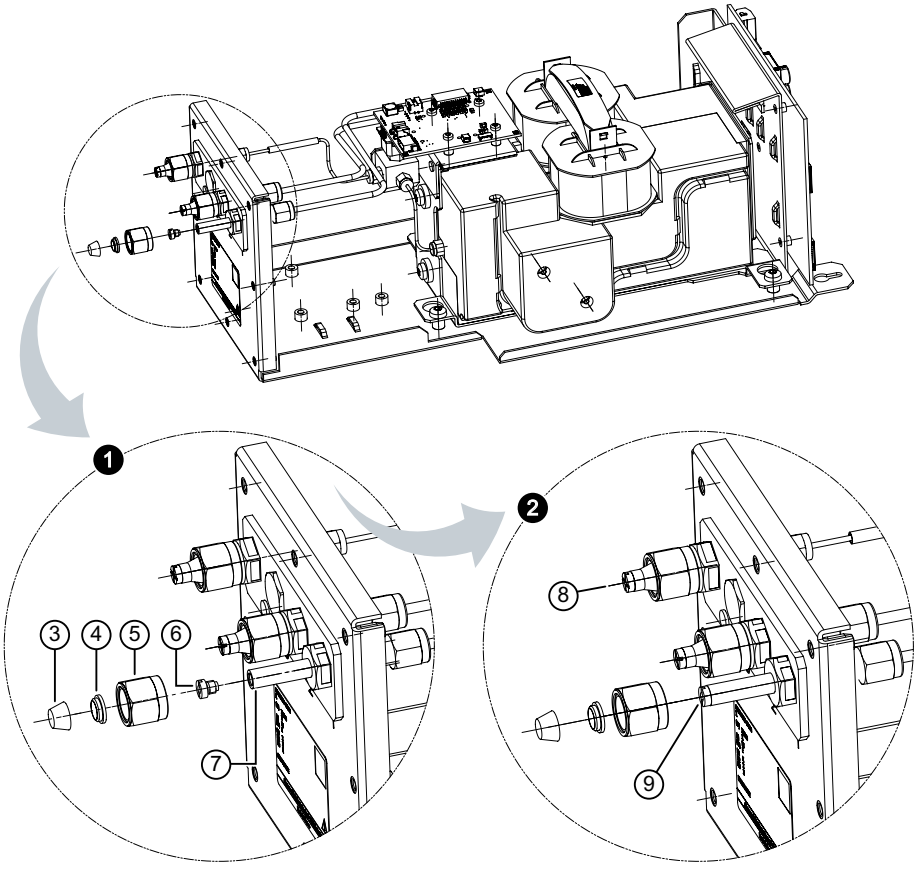


① Sample gas restrictor
② Clamping screw

Figure 4-3 Sample gas restrictor and clamping screw, sectional drawing and view from above

4.2.5 Mounting position of the sample gas restrictor/clamping screw

Overview of mounting position



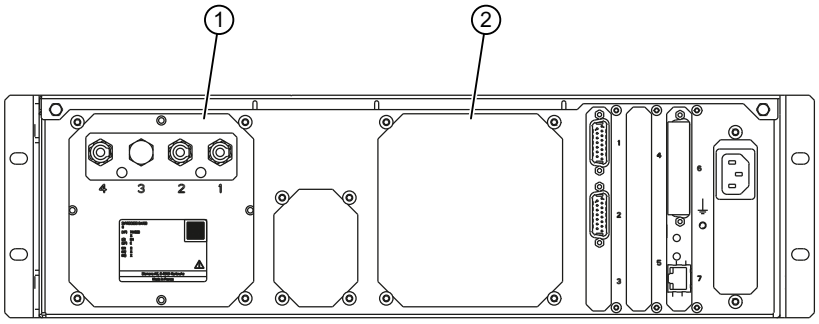
① Gas connection before installation of sample gas restrictor or clamping screw
② Gas connection after installation of sample gas restrictor or clamping screw
③ Rear clamp ring
④ Front clamp ring
⑤ Union nut
⑥ Sample gas restrictor or clamping screw
⑦ Gas connection
⑧ Correctly installed gas connection
⑨ Gas connection nozzle with sample gas restrictor or clamping screw

Figure 4-4 Mounting position sample gas restrictor or clamping screw using an OXYMAT 7 as an example

4.2.6 Gas connections at the device

4.2.6.1 OXYMAT 7

OXYMAT 7: Arrangement of the gas connections in the rack-mounted device



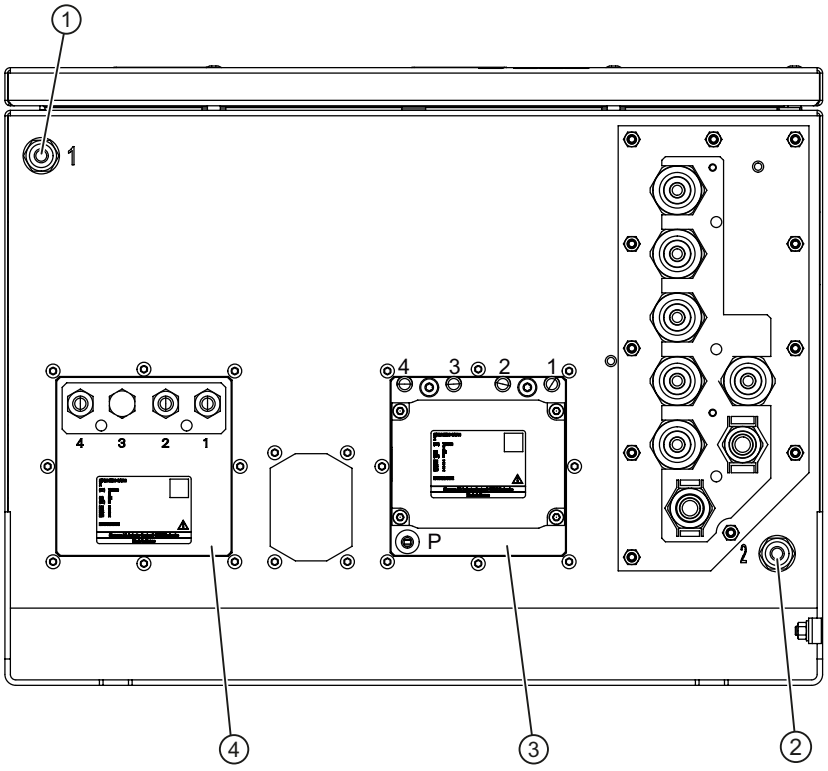
① Slot of analyzer module 1: OXYMAT 7

1 Sample gas inlet
2 Sample gas outlet
3 Not assigned, bypass outlet for version with external reference gas pump
4 Reference gas inlet

② Slot of analyzer module 2

Figure 4-5 OXYMAT 7 gas connections in the rack unit, rear

OXYMAT 7: Arrangement of the gas connections in the wall-mounted device

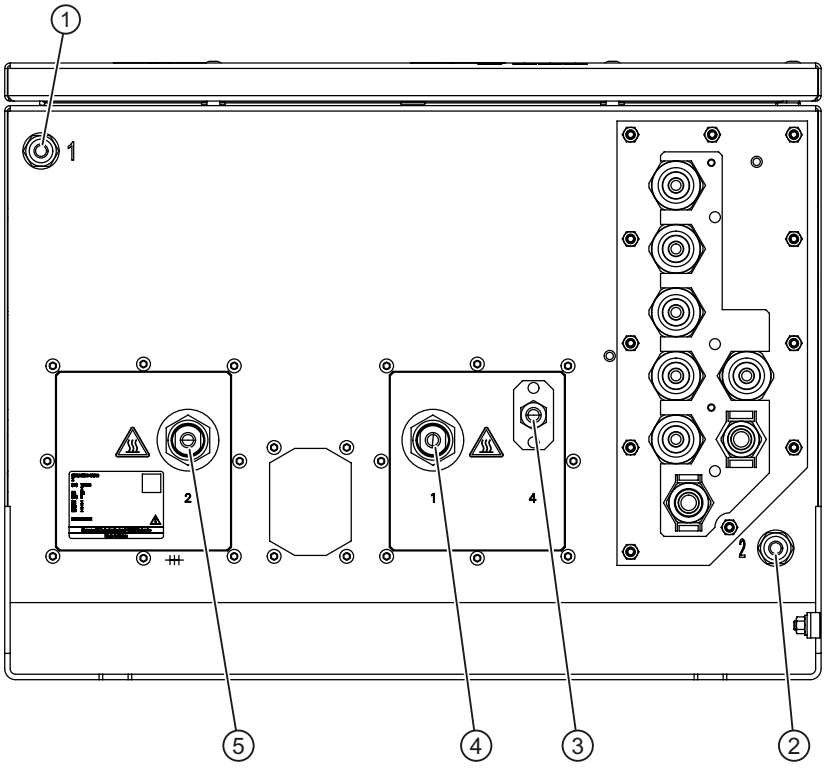


① Purging gas inlet
② Purging gas outlet
③ Slot of analyzer module 2
④ Slot of analyzer module 1: OXYMAT 7

1 Sample gas inlet
2 Sample gas outlet
3 Not assigned, bypass outlet for version with external reference gas pump
4 Reference gas inlet

Figure 4-6 OXYMAT 7 gas connections in the wall-mounted device, bottom

OXYMAT 7 high-temperature: Arrangement of the gas connections in the wall-mounted device



① Purging gas inlet
② Purging gas outlet
③ Reference gas inlet
④ Sample gas outlet
⑤ Sample gas inlet

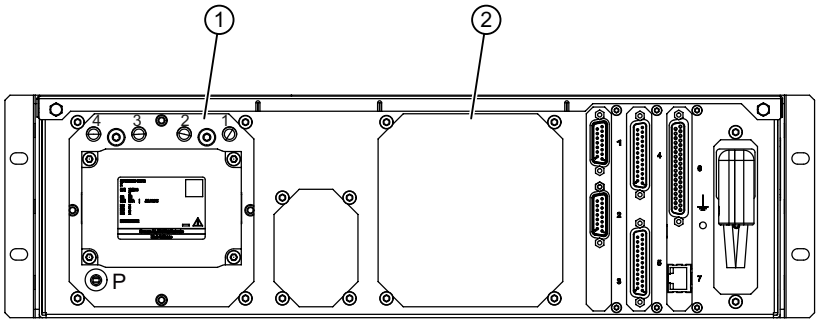
Figure 4-7 Gas connections for OXYMAT 7 high-temperature in the wall-mounted device, bottom

Design of the gas connections

Gas connection	Material	Nozzle external diameter
Version with pipes		
Sample gas	Stainless steel Material No. 1.4571 or Hastelloy Material No. 2.4819	6 mm
Reference gas	Stainless steel Material No. 1.4404	6 mm
Version with hoses		
Sample gas	Stainless steel Material No. 1.4571	6 mm
Reference gas	Stainless steel Material No. 1.4404	6 mm

4.2.6.2 ULTRAMAT 7

ULTRAMAT 7: Arrangement of the gas connections in the rack-mounted device



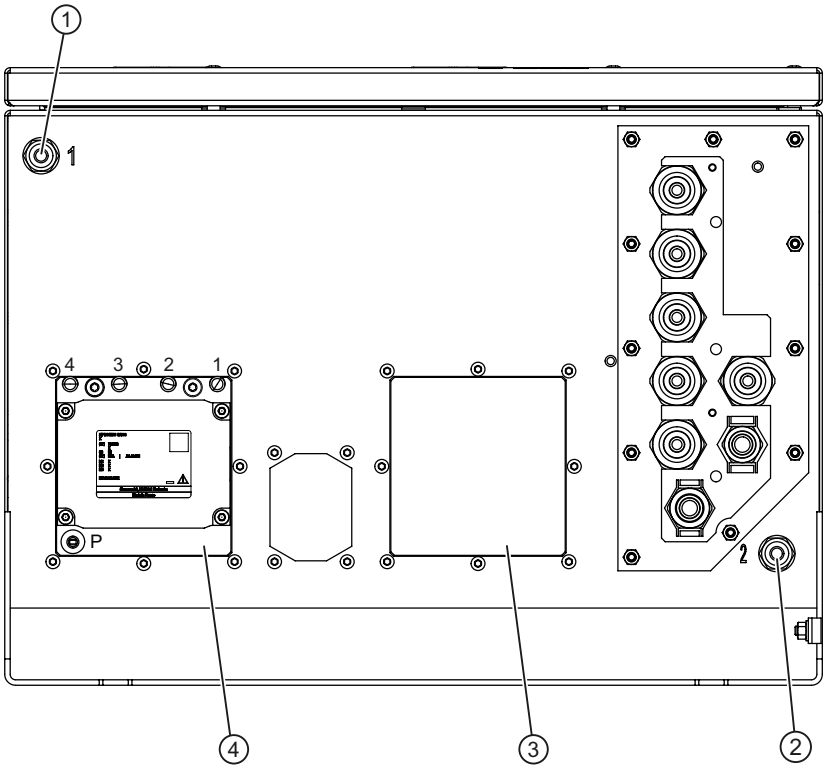
① Slot of analyzer module 1: ULTRAMAT 7

1 Sample gas inlet
2 Sample gas outlet
3 Reference gas outlet
4 Reference gas inlet
P Atmospheric pressure sensor

② Slot of analyzer module 2

Figure 4-8 ULTRAMAT 7 gas connections in the rack-mounted device, rear

ULTRAMAT 7: Arrangement of the gas connections in the wall-mounted device

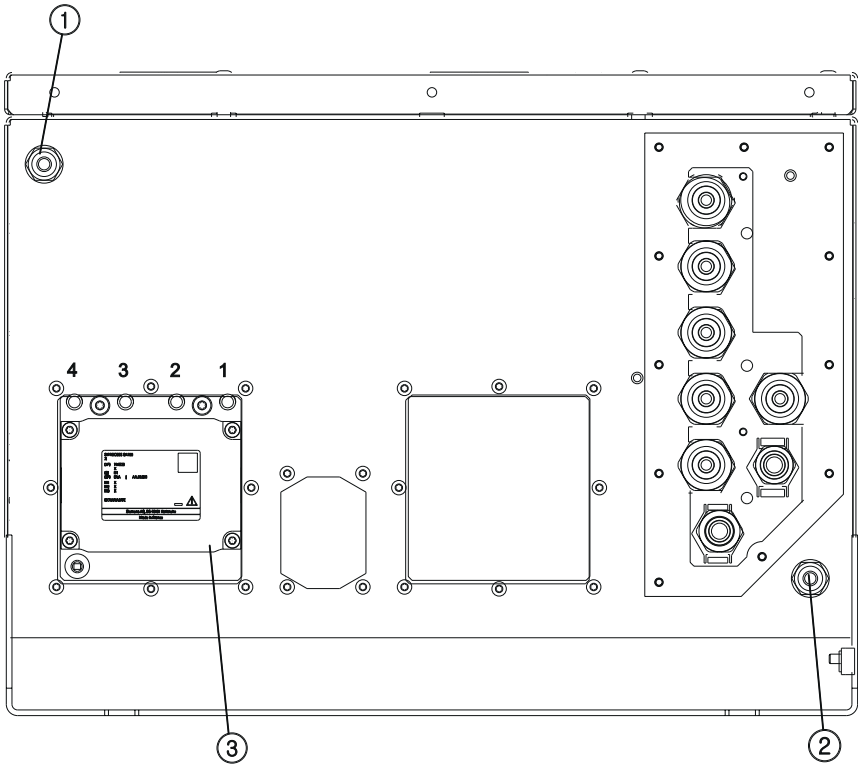


① Purging gas inlet
② Purging gas outlet
③ Slot of analyzer module 2
④ Slot of analyzer module 1: ULTRAMAT 7

1 Sample gas inlet
2 Sample gas outlet
3 Reference gas outlet
4 Reference gas inlet
P Atmospheric pressure sensor

Figure 4-9 ULTRAMAT 7 gas connections in the wall-mounted device, bottom

ULTRAMAT 7 high-temperature: Arrangement of the gas connections in the wall-mounted device



① Purging gas inlet
② Purging gas outlet
③ Slot of analyzer module 1: ULTRAMAT 7 high-temperature
1 Sample gas inlet
2 Sample gas outlet
3 Reference gas inlet
4 Reference gas outlet

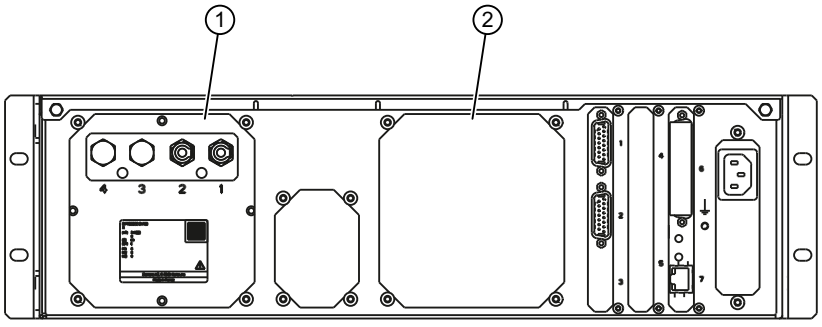
Figure 4-10 Gas connections for ULTRAMAT 7 high-temperature in the wall-mounted device, bottom

Design of the gas connections

Gas connection	Material	Nozzle external diameter
Sample gas	Stainless steel Material No. 1.4404 or Hastelloy Material No. 2.4819	6 mm
Reference gas	Stainless steel Material No. 1.4404	6 mm

4.2.6.3 CALOMAT 7

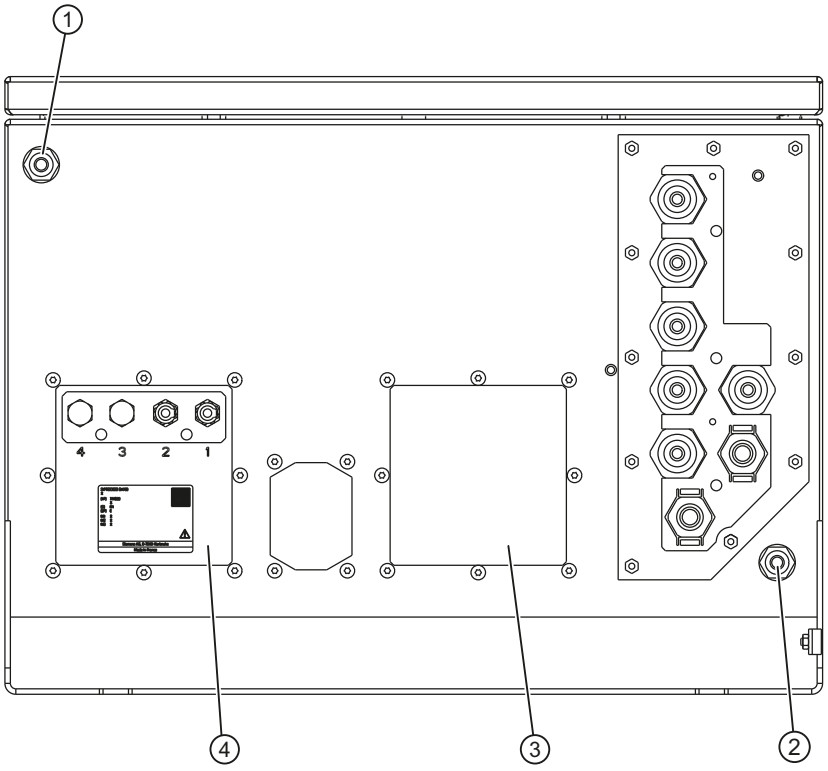
Arrangement of the gas connections in the rack-mounted device



① Slot of analyzer module 1: CALOMAT 7
② Slot of analyzer module 2
1 Sample gas inlet
2 Sample gas outlet
3 Not assigned
4 Not assigned

Figure 4-11 CALOMAT 7 gas connections in the rack unit, rear

Arrangement of the gas connections in the wall-mounted device



① Purging gas inlet
② Purging gas outlet
③ Slot of analyzer module 2
④ Slot of analyzer module 1: CALOMAT 7
1 Sample gas inlet
2 Sample gas outlet
3 Not assigned
4 Not assigned

Figure 4-12 CALOMAT 7 gas connections in the wall-mounted device, lower side

Design of the gas connections

Gas connection	Material	Nozzle external diameter
Sample gas	Stainless steel Material No. 1.4571	6 mm

4.2.6.4 Purging gas connections

Overview

When measuring toxic or corrosive gases, the gas path may start to leak and sample gas can accumulate in the device. This means that devices, in particular those that are used in hazardous areas, must be purged with purging gas (oil-free dry air or inert gas). The gas to be discharged by purging must be routed via an exhaust gas line for environmentally-friendly disposal.

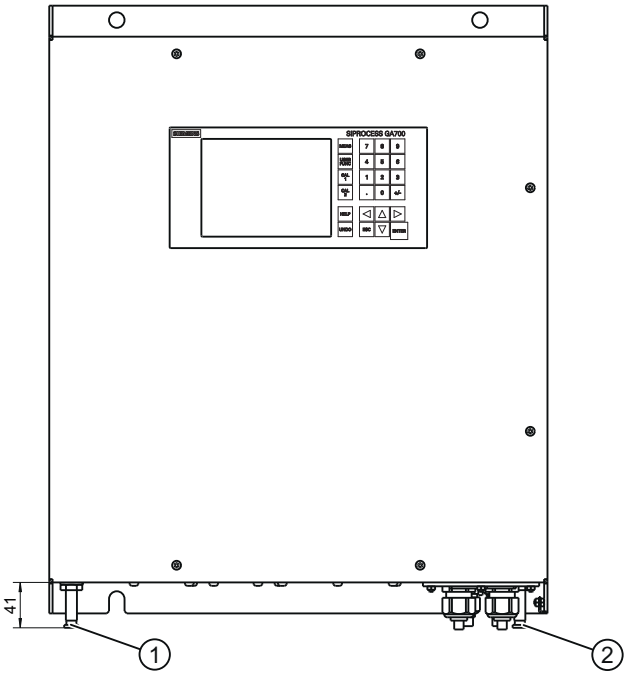
The purging gas connection is solely available for wall-mounted devices and can be ordered optionally.

Note

Open purging gas connections

If the device is not purged, close the purging gas connections with Swagelok pipe plugs (SS-12MO-C, included in scope of delivery).

Purging gas connections



① Purging gas inlet
② Purging gas outlet

Figure 4-13 Purging gas connections

Design of the gas connections

Dimensions of purging gas couplings		
Diameter	Exterior	12 mm
Length	Without sealing caps	28 mm
	With sealing caps	41 mm

4.3 Application planning

4.3.1 General safety instructions

⚠ WARNING

Introduction of combustible gases

Explosion hazard

Devices in standard version are not designed for use in hazardous areas.

- Do not use a standard version of the analyzer in hazardous areas.
- Supply gases with flammable components at concentrations above the lower explosion limit (LEL) only in devices with pipes.

⚠ WARNING

Introduction of toxic, corrosive or flammable gases

The limited release of toxic or corrosive gases during their introduction cannot be fully avoided.

- Before toxic, corrosive or flammable gases are introduced, carry out a leak test for the pipe connections.
- Flush the device with oil-free and dry purge air or inert gas.
- Collect the emerging purging gas for environmentally-friendly disposal with a suitable device.

4.3.2 Notes on applications planning

Note

Usability of the device

Before you use the device, use the technical specifications to check that your device is suitable for the measuring task.

Note

Vibrations at the installation site disturb the measured signal

When you use OXYMAT 7 and/or ULTRAMAT 7 analyzer modules, vibrations, especially in the frequency range from 6 Hz to 15 Hz, can influence the measured signal.

- Select an installation location which is vibration-free.
- If necessary, change the measuring frequency settings:
  - Make sure that the measuring frequencies do not correspond to the fundamental of the installation site nor one of its harmonic multiples.
  - You must also ensure that the measuring frequency differs from half the basic frequency of the vibration.

Note

Magnetic radiance of the OXYMAT 7

Due to its functional principles, the OXYMAT 7 emits magnetic stray fields. Therefore, do not operate magnetically sensitive devices in the immediate vicinity of the analyzer module. Depending on the sensitivity, a distance of up to 50 cm from the analyzer module is required.

4.3.3 Operation with at least one OXYMAT 7

Note

Additional clamping screws

Additionally required clamping screws are not included in the scope of delivery. Order the clamping screws separately.

Table 4-1 Mounting position of the sample gas restrictor: OXYMAT 7

Operating mode	**Sample gas restrictor/clamping screw**		
	Operation with one OXYMAT 7	**Operation with two OXYMAT 7 in series**	**Operation with two OXYMAT 7 in parallel**
Pressure operation	Install a sample gas restrictor in front of the sample gas inlet.	Install a sample gas restrictor in front of the sample gas inlet into which the sample gas is introduced first. In addition replace the sample gas restrictor in the inlet of the rear, second module with a clamping screw.	Install a sample gas restrictor in front of each sample gas inlet.
Suction operation	Install a sample gas restrictor in the sample gas outlet	Install a sample gas restrictor in the sample gas outlet from which the sample gas is first sucked out: In addition replace the sample gas restrictor in the inlet of the rear, second module with a clamping screw.	Install a sample gas restrictor at each sample gas outlet

4.3.4 Operation with at least one ULTRAMAT 7

Table 4-2 Mounting position for the sample gas restrictor: ULTRAMAT 7

Operating mode	**Sample gas restrictor/clamping screw**
	Operation with one or two ULTRAMAT 7
Pressure operation/Suction operation	No sample gas restrictor/clamping screw required Subsequent upgrading or retrofitting is not possible and not required. There are no particular mounting restrictions.

4.3.5 Operation with at least one CALOMAT 7

Table 4-3 Mounting position for the sample gas restrictor: CALOMAT 7

Operating mode	**Clamping screw**
	Operation with one or two CALOMAT 7
Pressure operation/Suction operation	Pre-assembled clamping screws. No retrofitting or dismantling required.

4.3.6 Operation with different analyzer modules

OXYMAT 7/ ULTRAMAT 7/ CALOMAT 7

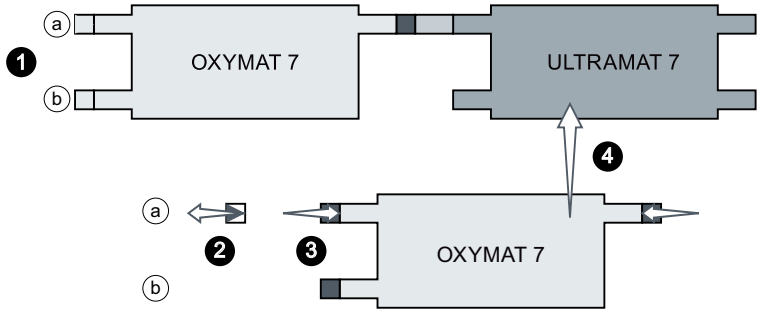
Table 4-4 Mounting conditions and positions for the sample gas restrictor

Operating mode	**Sample gas restrictor/clamping screw**		
	OXYMAT 7/ ULTRAMAT 7	**ULTRAMAT 7/ CALOMAT 7**	**OXYMAT 7/ CALOMAT 7**
Pressure operation	OXYMAT 7 must always be flowed first. Install a sample gas restrictor in front of the sample gas inlet of the OXYMAT 7.	We recommend flowing the CALOMAT 7 as the first module	No restrictions
Suction operation	ULTRAMAT 7 must always be flowed first. Install a sample gas restrictor in the sample gas outlet of the OXYMAT 7. Replace a sample gas restrictor in the sample gas inlet of the OXYMAT 7 with a clamping screw.		

4.3.7 Retrofitting sample gas restrictors

Retrofitting example: "Pressure operation, serial" for OXYMAT 7/ULTRAMAT 7

When you are replacing the ULTRAMAT 7 with an OXYMAT 7 analyzer module, you must replace the sample gas restrictor in the sample gas inlet with a clamping screw.

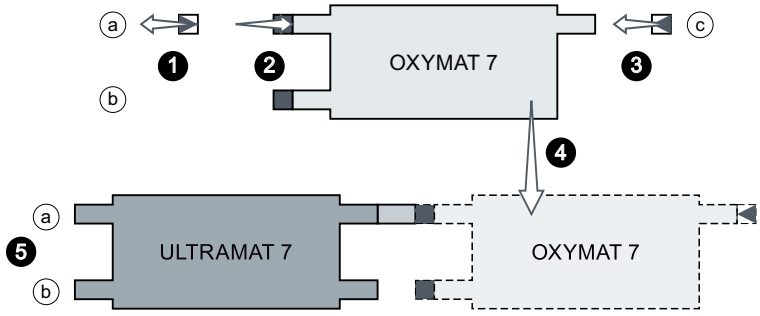


a Sample gas inlet
b Reference gas inlet
① Initial situation, serial pressure operation of OXYMAT 7 (AM1) and ULTRAMAT 7 (AM2)
② Remove sample gas restrictor in the sample gas inlet of the replacement module
③ Install clamping screw in the sample gas inlet of the replacement module
④ Replace ULTRAMAT 7 with OXYMAT 7

Figure 4-14 Retrofitting of the sample gas restrictors: Example "Pressure operation, serial"

Retrofitting example "Suction operation, serial" operating mode for OXYMAT 7/ULTRAMAT 7

When you are using the ULTRAMAT 7 and the OXYMAT 7 analyzer module in serial suction operation, you must convert the sample gas restrictor of the OXYMAT 7 analyzer module: Sample gas inlet → Sample gas outlet.



a Sample gas inlet
b Reference gas inlet
c Sample gas outlet/reference gas outlet
① Remove sample gas restrictor from the sample gas inlet of the additional OXYMAT 7 analyzer module
② Install the clamping screw into the sample gas inlet of the additional OXYMAT 7 analyzer module
③ Install the sample gas restrictor into the sample gas outlet of the additional OXYMAT 7 analyzer module
④ Install additional OXYMAT 7 analyzer module
⑤ Target configuration: ULTRAMAT 7 and OXYMAT 7 in serial suction operation

Figure 4-15 Retrofitting of the sample gas restrictors: Example "Pressure operation, serial"

4.3.8 Housing purging of the wall-mounted device

Enclosure purging

Gases can escape from the gas path on a very small scale and accumulate over a longer period of time to dangerous levels. Therefore, the enclosure must be purged with dry, dust-free air or inert gas when dealing with flammable, toxic or highly corrosive sample gases.

Purge the wall-mounted enclosure with a flow rate of approx. 1 l/min. Purging of the enclosure can only be dispensed with if non-toxic gases or gas mixtures below the lower explosive limit (LEL) are introduced into the device. Collect the gas displaced by the purging using a suitable mechanism. Dispose of the gas in an environmentally friendly way, for example, via an exhaust pipe.

4.3.9 Sample gas disposal

Thin long lines cause flow resistances in the gas paths. Therefore:

- Install the exhaust line as short as possible
- Use an exhaust gas line with a larger diameter

Install the exhaust line as vertical as possible to avoid water vapor condensation in the exhaust gas line.

4.4 Plug & measure permitted activities

4.4.1 General information

Term

"Plug & Measure" is the ability to recognize any analyzer modules and/or option modules added at a later time and to integrate them. This ability makes it easier to replace modules for maintenance purposes as well as installing devices at a later time, for example, option modules.

When you replace or retrofit a module, the processing module recognizes the change in the device configuration during a restart. The type of module as well as its parameter assignment are recognized. You can either apply the parameter assignments of the replacement/retrofit module or use those of the previous module.

Requirement

For successful module retrofitting or module replacement, the firmware of the module to be replaced must be compatible with the firmware of the processing module.

Prior to the installation of the module you have to update the firmware of the processing module:

- When installing a new module into an existing device.
- When replacing a module: When the error message 'Download firmware/configuration' appears in the display.

If an analyzer module is already present, you must update its firmware. To this purpose, please contact our Service department.

4.4.2 Notes on configuration change

NOTICE

Damage caused by inadmissible procedure/faulty operations

Inadmissible procedure and/or faulty operations can result in damage to the device or its modules/electronic equipment in connection with Plug & Measure. Therefore:

- Observe the specifications regarding installation/removal of the device hardware.
- Carefully read the following information on different Plug & Measure cases.

NOTICE

Deletion of the analyzer module parameter assignment due to faulty operation during commissioning

During commissioning after replacement of the AM electronics, a faulty operation can prevent transfer of the parameters and render the AM electronics unusable. When you commission the device once again after replacing the AM electronics, the following applies:

- First, confirm the message regarding the change of the configuration.
- Make sure to confirm the transfer of the parameters by pressing <ENTER>.
- Always carry out a normalization. To do this calibrate the analyzer module in the service menu as follows:
  "Main menu" > "2. Settings" > "20. Service" > "03. Factory calibrations" > "03. Normalization".

Note

Authorization level

To execute the actions described below, you must be logged on with at least the "Expert" authorization level. You may have to log on again with the requested PIN.

Message panel for configuration change

When you change the hardware equipment of the device by replacing or adding modules or components, the LUI alarm window "Device configuration changed" is displayed during re-commissioning.

To start the data synchronization, confirm the alarm by pressing <ENTER>.

Depending on the concrete application adapt the required parameter sets in the message panel "Transfer parameters". Information on the further procedure is available in the tables below.

4.4.3 Case differentiations

Table 4-5 Plug & Measure - Commissioning

Case		Description	Data synchronization/Action
PM	**AMx**		
New	New	Commissioning, PM without serial number	Automatic data synchronization [1].
New	New	Commissioning, each module has a serial number stored at the factory. None of the modules has been connected to another module before	Automatic data synchronization [1].

[1] Data synchronization: PM parameters are transferred to the AMx (x=1 or 2), parameters of the AMx are transferred to the PM

Table 4-6 Plug & Measure installation of an AM into an existing (configured) device / replacement of an AM in an existing (configured) device

Case		Description	Data synchronization/Action
PM	**AMx**		
Unchanged	Replaced	The AM is to be replaced by a module of the same type. The replacement AM has a different serial number than the AM connected previously.	User action. Confirm <ENTER> or reject <ESC>. The AM data is transmitted from the PM to the AM after confirmation, except the identification data and the calibration parameters.
		Replacement of the AM electronics, only permitted without own serial number stored in the AM electronics	User action. Always confirm <ENTER>. The AM data is transmitted from the PM to the AM after confirmation, including the identification data and the calibration parameters.
Unchanged	Replaced	AM electronics installed as "assigned spare part".	Normal startup without message. The default data of the AM set in the factory is applied.
Unchanged	Replaced	An AM is replaced by an AM of a different type.	Automatic data synchronization [1], no action required by user.
Unchanged	New	An additional AM of the same type is to be installed. An additional AM of a previously installed type is installed again.	User action. Confirm <ENTER> or reject <ESC>. The data is transmitted after confirmation, except the identification data and the calibration parameters.
Unchanged	New	An additional AM of a type that has not been connected before is to be installed.	Automatic data synchronization [1], no action required by user.

[1] Data synchronization: PM parameters are transferred to the AMx (x=1 or 2), parameters of the AMx are transferred to the PM

Table 4-7 Plug & Measure installation of a PM into an existing (configured) device / replacement of a PM in an existing (configured) device

Case		Description	Data synchronization/Action
PU	**AMx**		
New	Unchanged	The PM electronics is replaced. "-" is displayed instead of the serial number. At least one AM remains in the device.	Automatic data synchronization [1], no action required by user. When there are two AMs in the device, the new PM always synchronizes with AM1. The PM receives the data of the previously used PM, including its serial number [2]
New	Unchanged	PM electronics with new serial number is installed.	Automatic data synchronization [1], no action required by user. In this scenario, the replacement of the PM electronics results in a loss of data of the previously installed PM. In addition, the serial number is overwritten.

1) Data synchronization: PM parameters are transferred to the AMx (x=1 or 2), parameters of the AMx are transferred to the PM

2) Serial number stored in the PM is also the serial number of the device

Table 4-8 Plug & Measure - Replacement of a PM/Installation of a used AM

Case		Description	Data synchronization/Action
PM	**AMx**		
Replaced	Replaced	Assembly from inventory: Each module has a serial number and has been connected to another module before. AM of the same type is replaced.	User action. Confirm with <ENTER> or reject with <ESC>. When the process is confirmed, stored AM data is transmitted to the replaced AM.
Replaced	Replaced	Assembly from inventory: Each module has a serial number and has been connected to another module before. AM of a different type is replaced.	Automatic data synchronization [1], no action required by user. Each module retains its data.

1) Data synchronization: PM parameters are transferred to the AMx (x=1 or 2), parameters of the AMx are transferred to the PM

Table 4-9 Plug & Measure - AM slot change

Case		Description	Data synchronization/Action
PM	**AMx**		
Unchanged	AM1 → AM2 AM2 → AM1	Internal swapping of modules between slots is not permitted! Install the modules once again in their previous slot and restart the device.	None
Unchanged	AM1 = 0 AM2 → AM1	An AM is removed. Retrofitting: Remaining AM is inserted in the slot that has opened up	Automatic data synchronization, no action required by user.

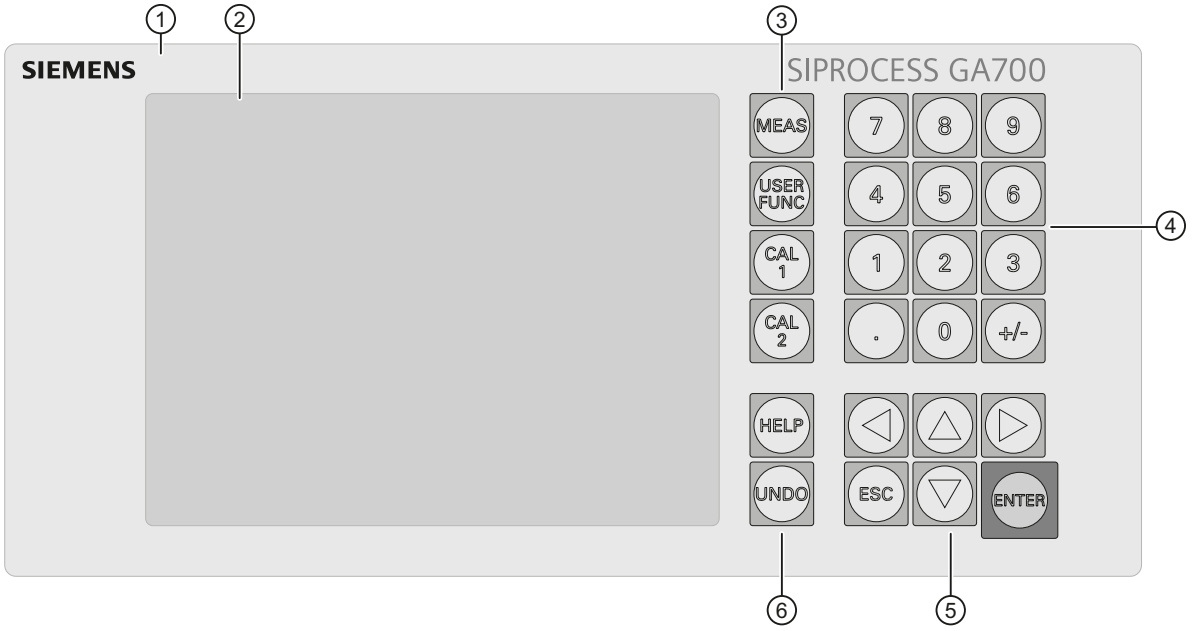
Operation

5

5.1 Local User Interface (LUI)

Operating elements

The LUI (Local User Interface) of the SIPROCESS GA700 devices has the following operating elements:

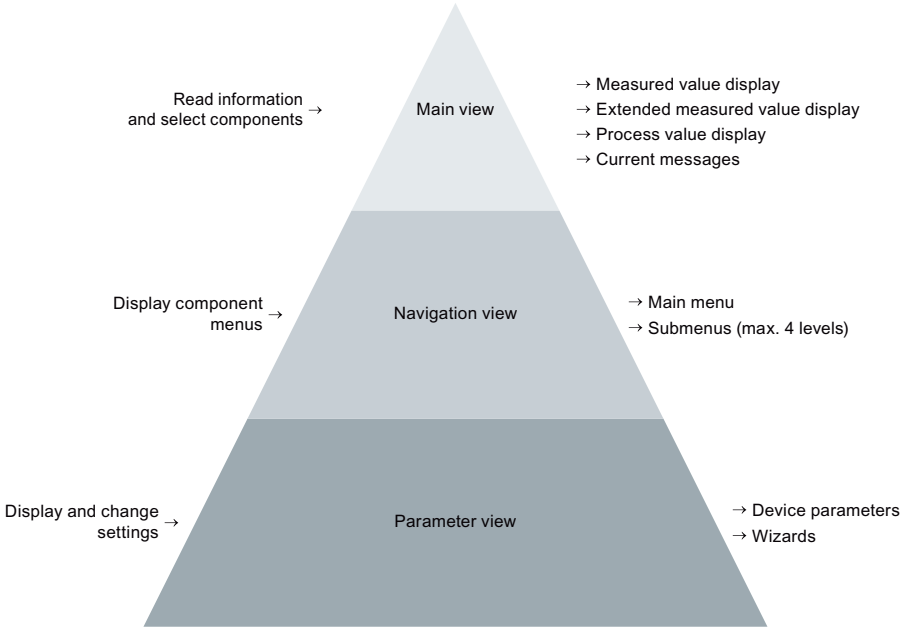


① Local user interface
② Display
③ Buttons for special functions
④ Numeric keypad
⑤ Cursor and command keys
⑥ HELP and UNDO keys

Figure 5-1 Local User Interface (LUI)

Views/displays

Views structure the access to the functions of the device or its components. Only the operator control options corresponding to the configuration of your device are output on the display.

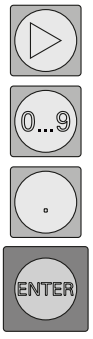


Main view	This view contains the measured value display of all components, the expanded measured value display, the process value display and the list of the current messages. The two measured value displays and the list of current messages can be switched over from read mode to selection mode. In selection mode, you can select a component or access the subordinate views. Switch between displays of the main view with the buttons <▼>/<▲>. Switch to selection mode with <ENTER>. Component selection with the buttons <▼>/<▲>.
Navigation view	Each component has an identically structured main menu with six menu entries. The parameter view is displayed after a maximum of four submenus. Select the menus with <ENTER> or <►>. Navigation with arrow key, number key, and period key.
Parameter view	Displaying windows, especially for the following purposes: Changing settings, starting wizards, displaying information. Operation with arrow keys and/or numeric keys, <ENTER> or <ESC>. Return to main view with <MEAS>.

Figure 5-2 Views of the Local User Interface

Navigation-relevant keys

Table 5-1 Functions of navigation-relevant keys

Keys	Function
	Navigate to higher-level views/menus. Use the <MEAS> key to return to the measured-value display in selection mode or to the main view.
	Navigate within a view/menu. Direct selection with the numeric keys.
	Navigate to subordinate views/menus. Direct selection with the numeric keys.

List of the current messages in the main view

This function represents a simplified operator control variant compared with the lower-level menu [3.01.1]. Here, in the main view all the current messages can be displayed without changing to the device menu.

"Current messages" are all messages still pending and all messages requiring acknowledgement that have not yet been acknowledged. The last message entered in the list is always at the top (sorted in descending order according to date and time). It is not possible to filter messages.

The list view is permanently updated. If, for example, not only the incoming message but also an outgoing message is registered, the device removes the corresponding list entry.

To display detailed information about the current messages in the main view, follow the steps below:

1. If necessary, open the main view:
   - To do this, press the <MEAS> key.
   - Follow the instructions on the display.
2. Display the list of current messages (display 4/4) in the main view:
   - To do this, use the <▼>/<▲> keys.

3. Activate the selection mode:
   – Press <ENTER>.
4. Display detailed information:
   – Select one of the displayed messages with the <▼>/<▲> keys.
   – Confirm your selection by pressing the <ENTER> key.
     Detailed information about the message is displayed.
   – If required, acknowledge the message and eliminate the causes named in the message text.

Log on/log off (PIN)

All device parameters are assigned to one of four user levels. You do not need to log on for the lowest user level. But write access to parameters always requires the corresponding authorization for security reasons:

Protected parameters are identified by the symbol . If you want to edit a protected parameter or start a wizard, you are prompted in a window to enter a PIN of the currently required user level. The PIN consists of four numbers each of which is represented by a * during input.

The PIN numbers shown in the table are factory settings. For your own safety, we recommend that you change these PIN numbers.

The currently selected user level remains set until you log off or select a higher user level. As long as you are logged on, the device is locked for other write accesses, for example, SIMATIC PDM via Ethernet.

When you log off (2 x <MEAS>), you can either accept the changes or discard all of them.

Table 5-2 Overview of the user levels

User level	Description
Basic	No PIN required. Generally read-only access. Exceptions: Basic settings, for example, display brightness or setting of filters without PIN input.
Standard '1111'	In addition to Basic: Write access with Standard PIN to parameters that influence the current operation of the device, for example, basic calibration.
Expert '2222'	In addition to Standard: Write access with Expert PIN to parameters that influence the configuration of the device. Setting of higher device function and PIN assignment for Standard and Expert user levels.
Service	In addition to Expert: Write access with Service PIN to parameters with diagnostic and restoring effect that serve to maintain the functionality of the device.

Logbook

The device has a logbook for logging abnormal events, for example, error messages that require acknowledgment. Module-specific messages are always stored permanently on the module itself. With the LUI, the device provides a uniform user interface that logically combines all the individual logbooks. When a module is replaced, these logbook entries disappear from the logbook of the device.

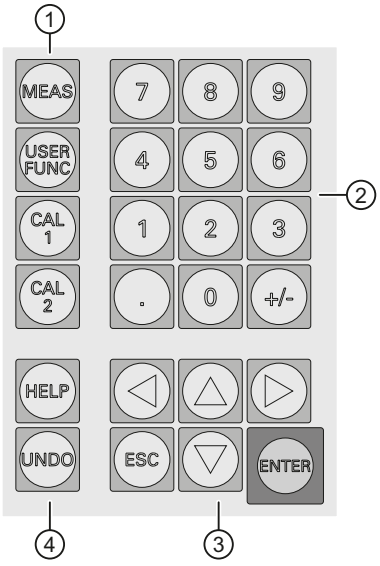
Logbooks are structured as a circular buffer. When the buffer is full, the oldest entries are overwritten by new ones. This means the logbook entries are displayed in chronological order. By setting filter functions you can limit the display range to meet your requirements.

5.2 Keyboard

5.2.1 Structure

Overview

The following schematic shows the structure and elements of the keyboard:



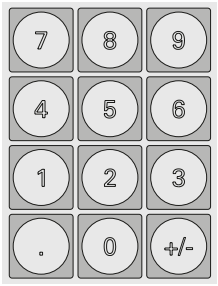
① Keys with special functions
② Numeric keypad
③ Cursor and command keys
④ HELP and UNDO keys

Figure 5-3 Overview of the keyboard

5.2.2 Key functions

Keys of the numeric pad

Table 5-3 Functions of the numeric keys

Keys	Function
	<0> ... <9> You use the numeric keys to enter numerical values, e.g., in editing windows. In addition, subordinate menu entries can be selected directly by entering the menu number. Example: In the main menu, the key combination <2> + < ▪ > + <0> + <8> + < ▪ > + <1> + < ▪ > opens the menu [2.08.1]. See: [2.08.1] Setpoints, tolerances, purging time (Page 123).
	< ▪ > Use this key to enter values with decimal places. If you select menu entries with the numeric keys, pressing the < ▪ > key opens the selected submenu or a selected menu entry.
	<+/-> You can use this key to change the sign of a parameter value.

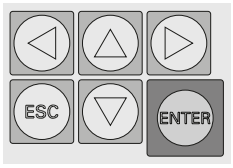
Keys with special functions

Table 5-4 Functions of the keys with special functions

Keys	Function
	<MEAS> If you press the <MEAS> key a single time, the display always changes to the measured-value display. You log off when you press it again. You are prompted to accept the changes or to discard them.
	<USER FUNC> Pressing this key calls a user-assigned function.
	<CAL1> Pressing this key triggers the automatic calibration function "AutoCal1". This function is protected by a password.
	<CAL2> Pressing this key triggers the automatic calibration function "AutoCal2". The setting options correspond to those of "AutoCal1" (<CAL1> key). This yields the following additional application options: • Operation of two process tags using one device. • If different calibrations are necessary in each case, you can set two automatic calibration functions for one process tag.

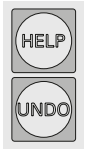
Cursor and command keys

Table 5-5 Functions of the cursor and command keys

Keys	Function
	<▲><▼><◄><►> Use these keys to move the cursor in the respective arrow direction. You can also navigate between and within menu levels.
	<ESC> Pressing this key results in cancellation of the current operation. You exit the current operation level, for example, a menu of the navigational view or an editing window of the parameter view.
	<ENTER> Press this key to confirm your input or selection. You open the currently selected menu entry in the navigational view.

HELP and UNDO keys

Table 5-6 Functions of the HELP and UNDO keys

Keys	Function
	<HELP> Press this key to open or close the help window which displays help for selected parameters.
	<UNDO> Press this key to undo up to ten user actions one after the other. User actions are either individual parameter changes or input sequences when running a wizard. • When editing windows are open: The original parameter assignment is restored by pressing this key. • The first time you press this key you open the window of the last action. • Press the key again to restore the original parameter value. You can repeat this procedure until you reach the maximum number of actions. For further information go to → UNDO function (Page 66).

See also

Keyboard (Page 63)

[2.01] Settings >Display/USER FUNC key (Page 102)

5.2.3 UNDO function

5.2.3.1 UNDO overview

The <UNDO> button gives you the option to undo up to ten user actions that have already taken place. User actions are individual operator inputs or input sequences.

Individual operator inputs include, for example, changing an individual parameter value in an editing window. Input sequences are actions that consist of related inputs. Individual steps of these input sequences may be executed by the device hidden from the user. Examples:

- Wizards combine consecutive operator inputs into one action while keeping the user informed about its components at any time.
- Some inputs cause automatic changes of additional parameters in a parameter structure. The input sequence is hidden from the user.

When you trigger the UNDO function, the complete action (individual input or input sequence) is undone. The settings are reset to the values of the original parameter assignment.

5.2.3.2 Undo actions with the <UNDO> key

Procedure

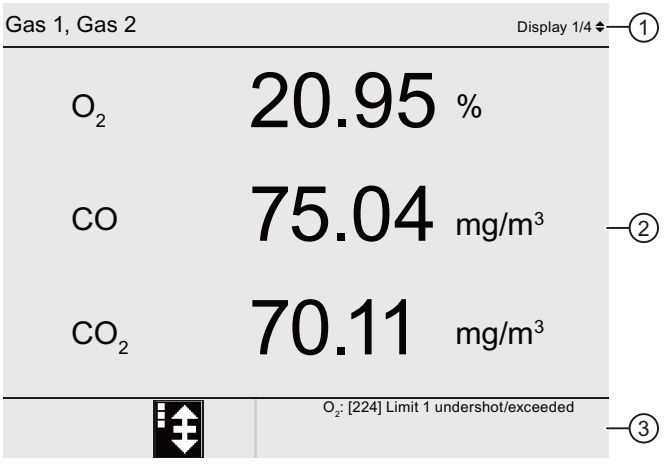
1. Starting the action to be restored: Press the <UNDO> key once. The display shows the window in which the action has taken place.
   - For individual inputs:
     The corresponding parameter field is selected and an editing window is highlighted in which the original parameter value is displayed.
   - For input sequences:
     The button for triggering a wizard is displayed.

   If it is not possible to undo the action, the device shows a corresponding message on the display.
   If the action can be undone:
   - For individual inputs, the parameter field is highlighted and an editing window with the original parameter value is displayed.
   - For wizards, the box that triggered the action is highlighted. A corresponding description is also visible on the display.
2. Undo change or cancel undo action:
   - Cancel: Press <ESC>. The current values are retained.
   - Undo: Press <UNDO> again. The original values are restored.
     If the original values cannot be restored, the current settings are retained.
3. Undoing actions further back in time: Repeat steps 1 and 2. You can undo a maximum of ten operator inputs.

5.3 Display

5.3.1 Structure

The figure below shows the structure of the display using a measured-value display of all components in read mode as an example.



① Header
② Display area
③ Status bar

Figure 5-4 Display structure, example: Measured-value display in read mode with three components

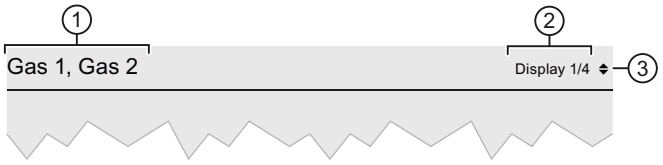
See also

Setting the symbol sets (Page 105)

[2.01] Settings >Display/USER FUNC key (Page 102)

5.3.2 Header

Header (main view)



① Display of the gas path or the active process tag
② Number of displays included in the main view
③ Symbol: Switch displays with the keys <▲> and <▼>

Figure 5-5 Example: Header of measured-value display (main view)

The header of the measured-value display of all components includes the following device-specific information:

Table 5-7 Gas path/process tag display of the header (main view)

Display	Description
Name of gas path	1 analyzer module, process tag switchover "OFF"
Name of gas path	2 analyzer modules, shared gas path, process tag switchover "OFF"
Name of gas path 1, name of gas path 2	2 analyzer modules, separate gas path, process tag switchover "OFF" (see: ①)
Name of currently selected process tag [1)]	1 analyzer module, process tag switchover "ON"
Name of currently selected process tag [1)]	2 analyzer modules, shared gas path, process tag switchover "ON"
Name of currently selected process tag [1)], name of gas path 2	2 analyzer modules, separate gas path, process tag switchover "ON"

[1)] The process tag switchover always refers to the first gas path (gas path feeding analyzer module 1).

Header (parameter view)

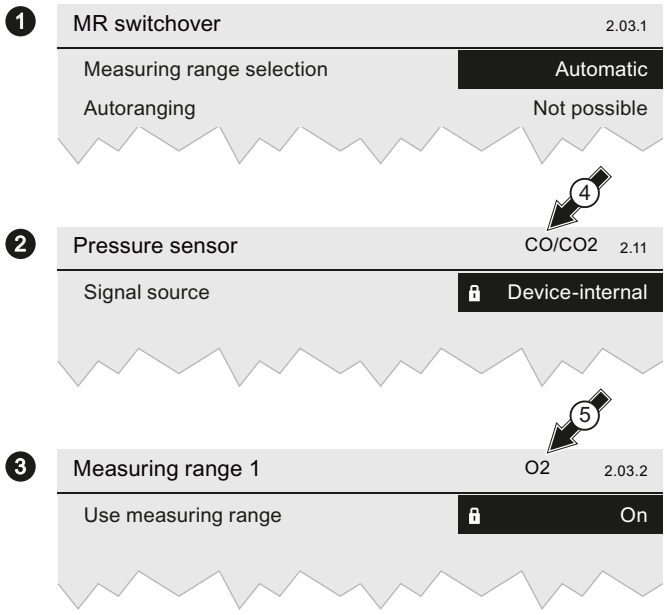


Figure 5-6 Example of headers in parameter view

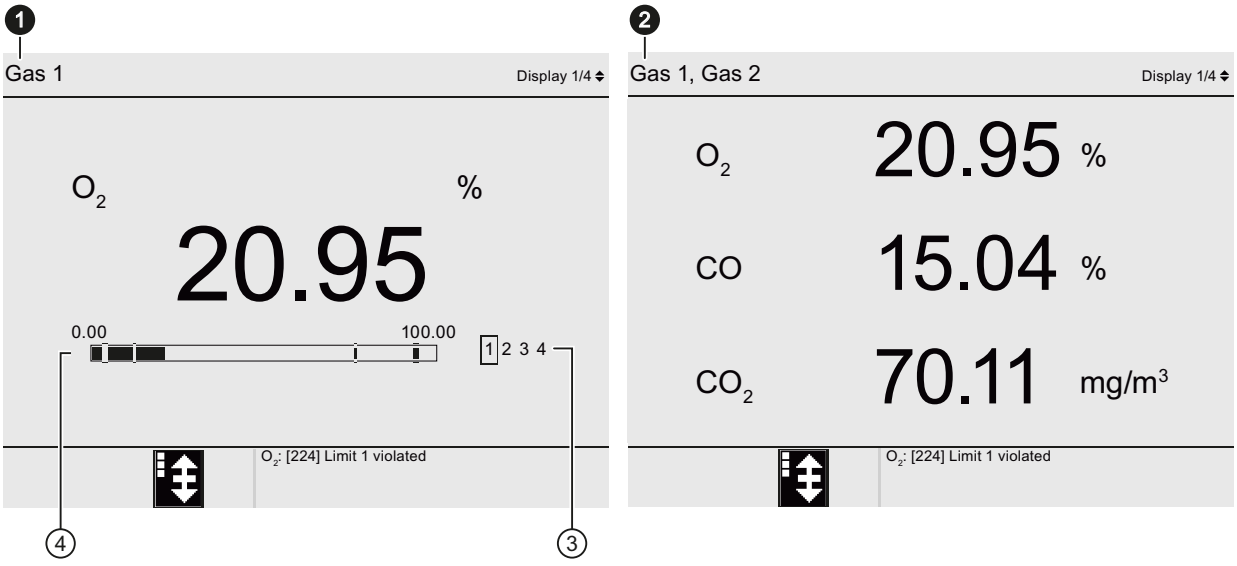
The header in the parameter view always includes the menu name and the corresponding menu or order number. You can also read out the scope of the menu:

- ① Menu/parameter with effect on entire device:
  The header only includes the menu name/parameter name as well as the corresponding order number. Any changed settings also apply to all other components.
- ② Menu/parameter with module-specific effect:
  In addition to the menu name/parameter name and the order number, the component identification ④ (here: CO/CO_2) is displayed. Any changed settings also apply to all components of a module.
- ③ Menu/parameter with component-specific effect:
  Changes only have an effect on the component ⑤ (here: O_2) whose parameters you are currently assigning. Corresponding function(s) for further components must therefore always be set separately.

5.3.3 Display area

5.3.3.1 Main view (read mode)

Measured-value display of all components in read mode



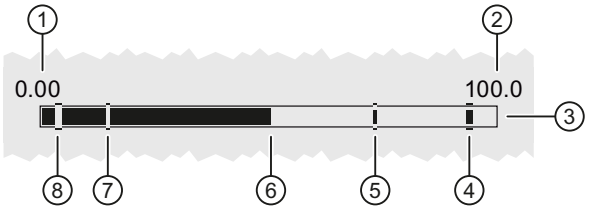
① Measured-value display for a measured component
② Measured-value display for three measured components
③ Display of active measuring range
④ Bar graph for measured-value display with display of measuring range limits

Figure 5-7 Example: Measured value displays with one/three measured components

The measured-value display is factory preset and shows the current measured values of all device components. Depending on the device version, you can display up to five measured values simultaneously. As of three displayed components, the active measuring range ③ and the bar graph ④ are no longer displayed.

Bar graph

The bar graph includes the following information:

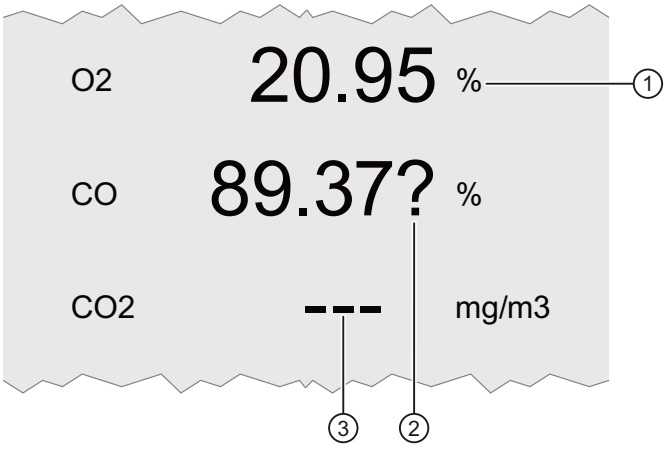


① Start of scale
② End of scale
③ Measuring range
④ High alarm limit
⑤ High warning limit
⑥ Current measured value
⑦ Low warning limit
⑧ Low alarm limit

Figure 5-8 Example: Bar graph for measured-value display with display of measuring range limits

If not more than two components are displayed, the device displays measuring range limits including high and low warning and alarm limits as bar graphs. In this example, the current measured value is 50%.

Measured value status



① Numerical value with unit, no qualifier displayed ⇒ Measured value status: "Good"
② Numerical value with qualifier "?" and unit ⇒ Measured value status "Uncertain"
③ No numerical value displayed any longer, qualifier "- - -" ⇒ Measured value status "Bad"

Figure 5-9 Example: Display of measured value status

If a measured value reaches the measured value status "Uncertain" or "Bad", a "?" is displayed behind the measured value. Measured values that can no longer be displayed are displayed as "- - -".

Extended measured-value display

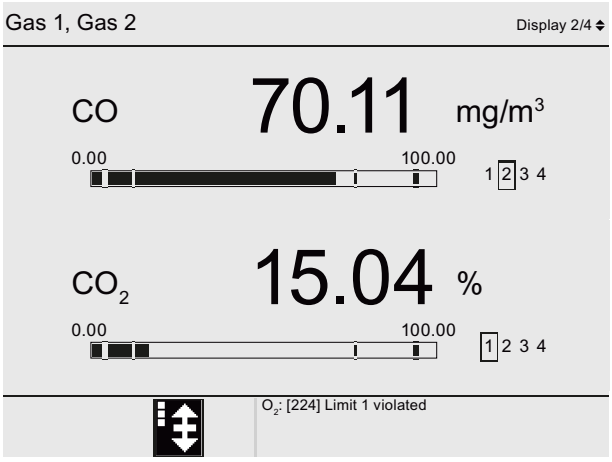


Figure 5-10 Example: Extended measured-value display with two components

If you are measuring more than two components with your device, information is hidden in the measured-value display of all components for reasons of space. You can display the information for one or two components again with the extended measured-value display.

The operator control options are the same as for the measured-value display of all components.

Process value display

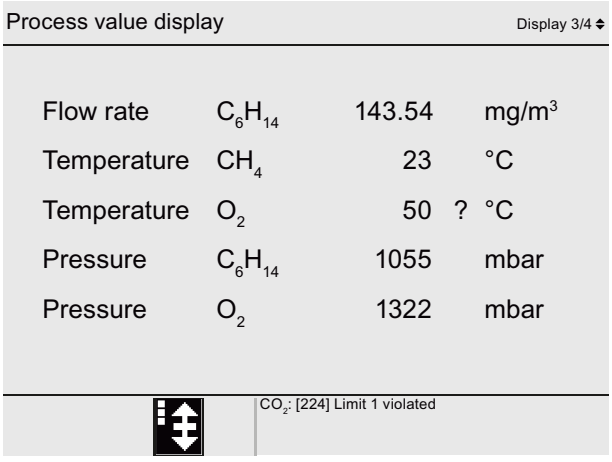
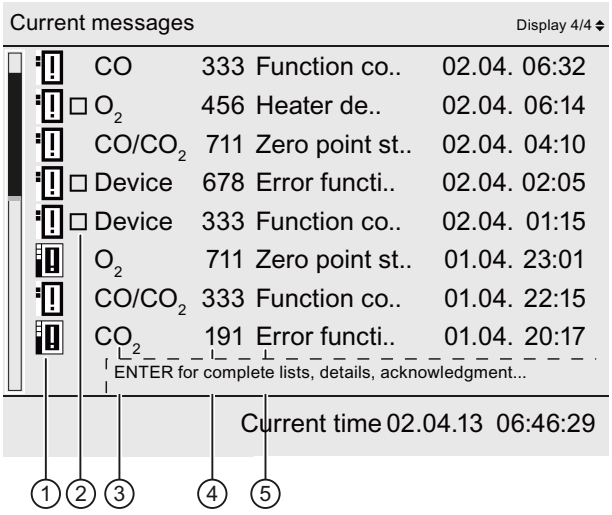


Figure 5-11 Example: Process value display

Additional process values can be called in this display. In contrast to the measured value displays, this display is only available in read-only mode: → Main view (selection mode) (Page 73).

Display of current messages



① Message symbol
② Identification that message requires acknowledgment
③ Module sending message/component sending message
④ Message number
⑤ Message group
Date/time information: "Incoming" time of message

Figure 5-12 Example: Current messages

This display of the TLV includes all pending messages and all messages that require acknowledgment but have not been acknowledged yet. The display is constantly updated: If a pending message "goes out", for example, the corresponding "Incoming" message is automatically removed from the list. Messages already acknowledged by the user are also removed from the list.

The list is always sorted in descending order by date and time so that the newest message is always displayed on top.

5.3.3.2 Main view (selection mode)

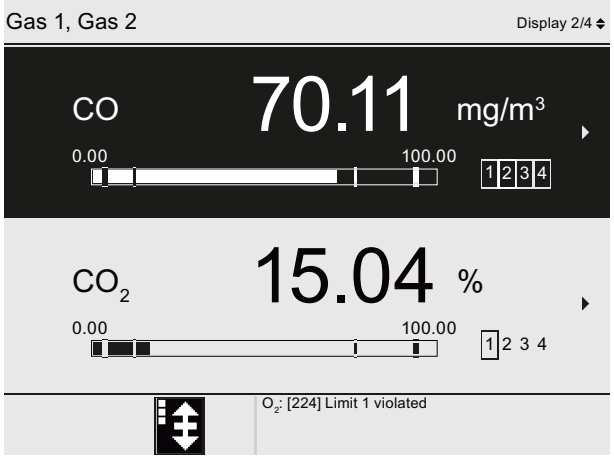


Figure 5-13 Example: Main view with two components in selection mode

If you press <ENTER> in one of the two measured-value displays, the display switches from read mode to selection mode. The first displayed component is highlighted with a black background.

Use the <▲> and <▼> keys to select between displayed components. Use the <►> or <ENTER> key to change to the menus of the selected component. You can find information about views in the read mode under: → Main view (read mode) (Page 70),

5.3.3.3 Navigational view

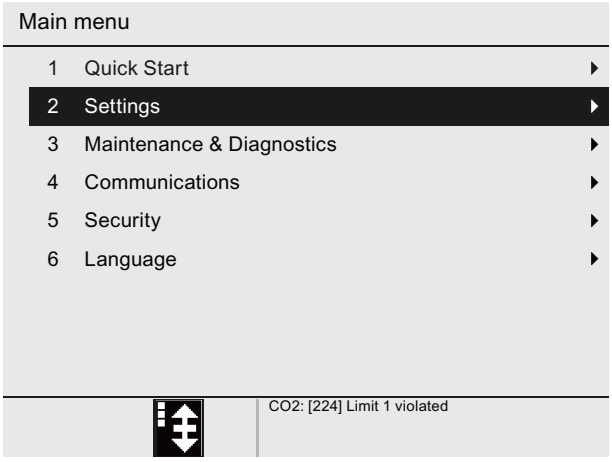


Figure 5-14 Example: Main menu

The navigational display comprises all levels of the menu structure in which you open device-, module-, or component-specific menus, and select their menu entries. The currently selected menu entry is always highlighted with a black background.

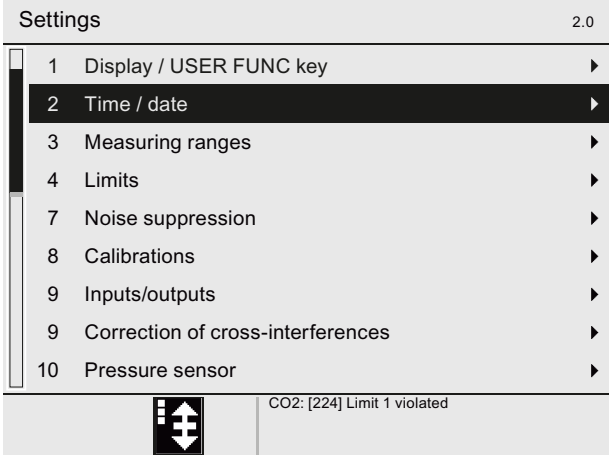


Figure 5-15 Example: Menu [2.0] Settings

Menu entries for functions that are not available in your device are not displayed. However, the numbering within the menu is not adapted, for example, with menus [2.4] Limits to [2.7] Noise suppression:.

This simplifies the operation of the device: All menus can be accessed directly by entering the same menu number.

See also

Key functions (Page 64)

5.3.3.4 Parameter view

Overview

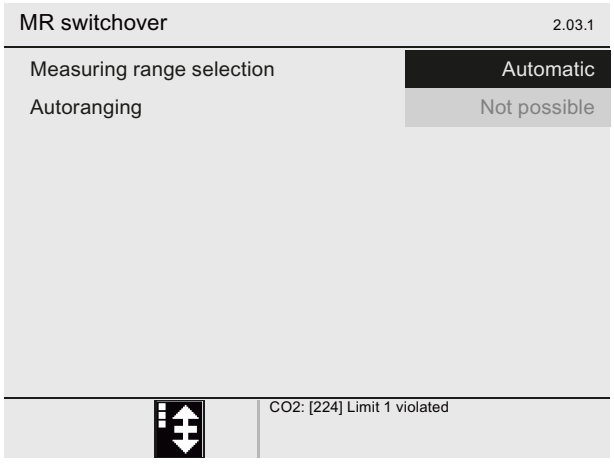


Figure 5-16 Example: Parameter view

In parameter view you can display device parameters, set device parameters, and start wizards.

When you open the parameter view, the first editable parameter is always selected. Editable parameters are highlighted with a black background when you select them.

The values of output parameters, for example, "Autoranging" are only framed.

The label of the parameter is indented to indicate that the parameter belongs to another parameter or to a parameter group.

A parameter that cannot currently be edited due to a missing access authorization is identified with a lock symbol ① within the parameter field:

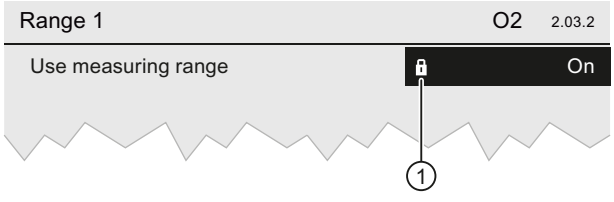
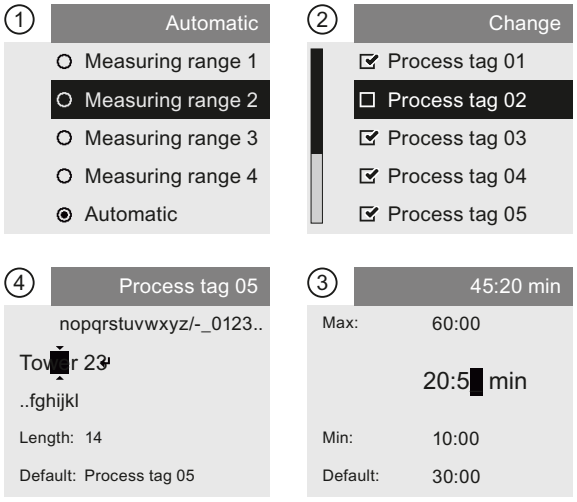


Figure 5-17 Example: Write-protected parameter

Window

Windows open to display progress, for messaging, and especially for editing of parameters. The figure below shows examples of frequently displayed editing windows:



① Editing window for list selection (1 of N, single selection)
② Editing window for list selection (M of N, multiple selection)
③ Editing window for input of numerical parameters
④ Editing window for text parameters

Figure 5-18 Examples: Editing window

Editing window for list selection (① and ②)

- Editing window for 1 of N selection:
  You can only select and enable one list entry.
- Editing window for M of N selection:
  - Several check boxes can be activated at the same time.
  - A scroll bar is displayed when you select more than five list elements.
- Both windows:
  - Use the <▲> and <▼> keys to select the list entries.
  - When you press the <►> key, a deselected check box or radio button is selected and vice versa.
  - Press <Enter> to apply the change and close the window.

Editing window for input of numerical parameters (③)

- Use the <0 ... 9> and <▲> or <▼> keys to change the value of the numeric keypad.
- Use the <◄> and <►> keys to shift the focus to the previous or next numeric keypad.
- Press <ESC> to discard the changes. The originally set value is retained.
- When you press <ENTER>, the currently set value is checked. An error message is displayed in the editing window if the input is incorrect. Otherwise the window is closed.

Editing window for text input (④)

- The first character of the text is selected when you open the window.
- Use the <◄> and <►> keys to move the cursor position within the text.
- Use the <▲> and <▼> keys to select the character you want to use.

Restoring the original setting in editing windows

Note

Function of <UNDO> key

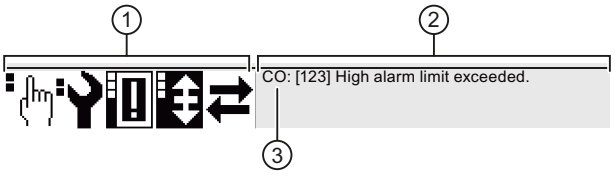
If you have already changed a value in an editing window and then press the <UNDO> key, the changed parameter is reset to the factory-set default value.

Additional information on the <UNDO> key is also available at → UNDO function (Page 66).

5.3.4 Status bar

Design

Status symbols can be displayed either with the PCS 7 or NAMUR NE107 set of symbols. The following descriptions refer to the PCS 7 symbol set as an example.

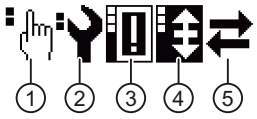


① Symbol area PCS7 symbols
② Message area
③ Message text

Figure 5-19 Example: Status bar with status symbols of the PCS 7 symbol set

Status symbols

The PCS 7 symbol set includes five message groups. The message groups are arranged in the symbol area with decreasing importance from left to right. The message with the highest priority within an active message group is displayed in the symbol area.

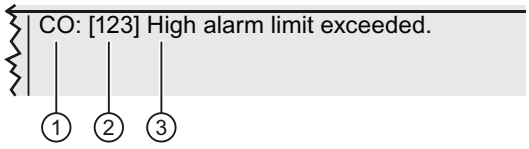


① Function check indicator, here: Simulation or test mode
② Maintenance indicator, here: Maintenance required
③ Configuration indicator, here: Configuration error
④ Limit indicator, here: Limit alarm
⑤ Access indicator, here: Data exchange

Figure 5-20 Message groups/status bar symbols in the status bar

Message texts

In addition to the status symbols, the text of the most important message of all message groups is output as well. The message structure is based on the following pattern:



① Component name
② Error number
③ Message text

Figure 5-21 Example: Output of text messages in the status bar

If the device is measuring two identical components, the component name is appended in the message text, e.g., "O_2(1): ...".

If module errors occur, the names of the affected components are displayed separated by a comma, e.g., "CO, CO_2: ...".

A component name is not appended in case of device errors.

5.4 Menu structure

5.4.1 Main menu

Structure

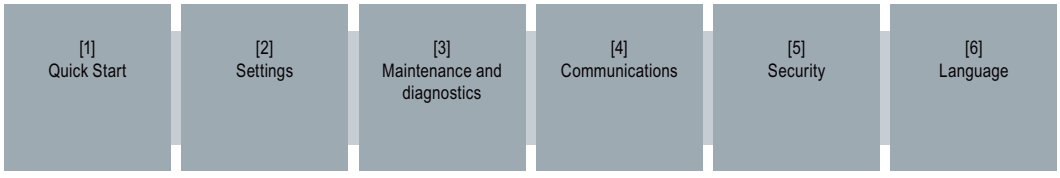


Figure 5-22 Menu entries of the main menu

The main menu represents the highest level of the navigational view and comprises the six menu entries shown for each component: The main menu and the submenus form the menu structure.

5.4.2 Subordinate menus

[1] Quick Start menu

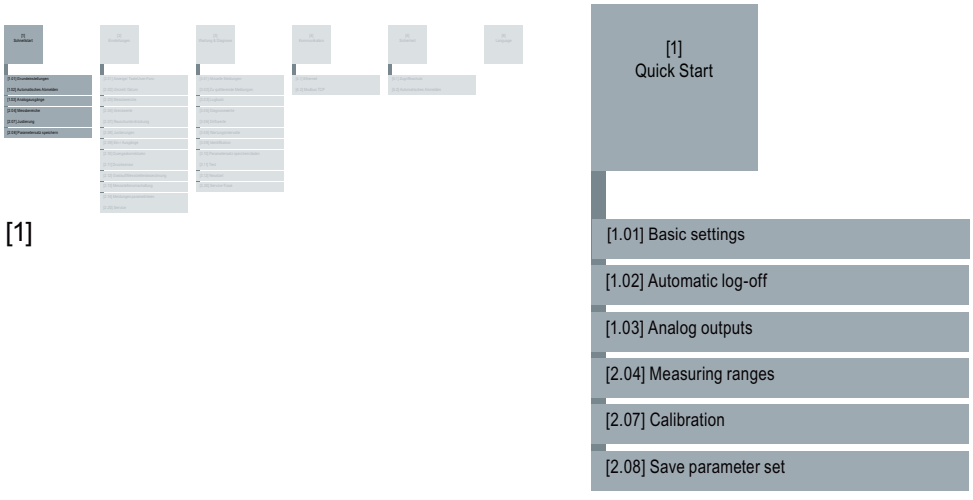


Figure 5-23 Overview of menu [1] Quick start

In this menu, you can perform a simplified start procedure.

Start up the device in as described in the section Commissioning (Page 83).

[2] Settings menu

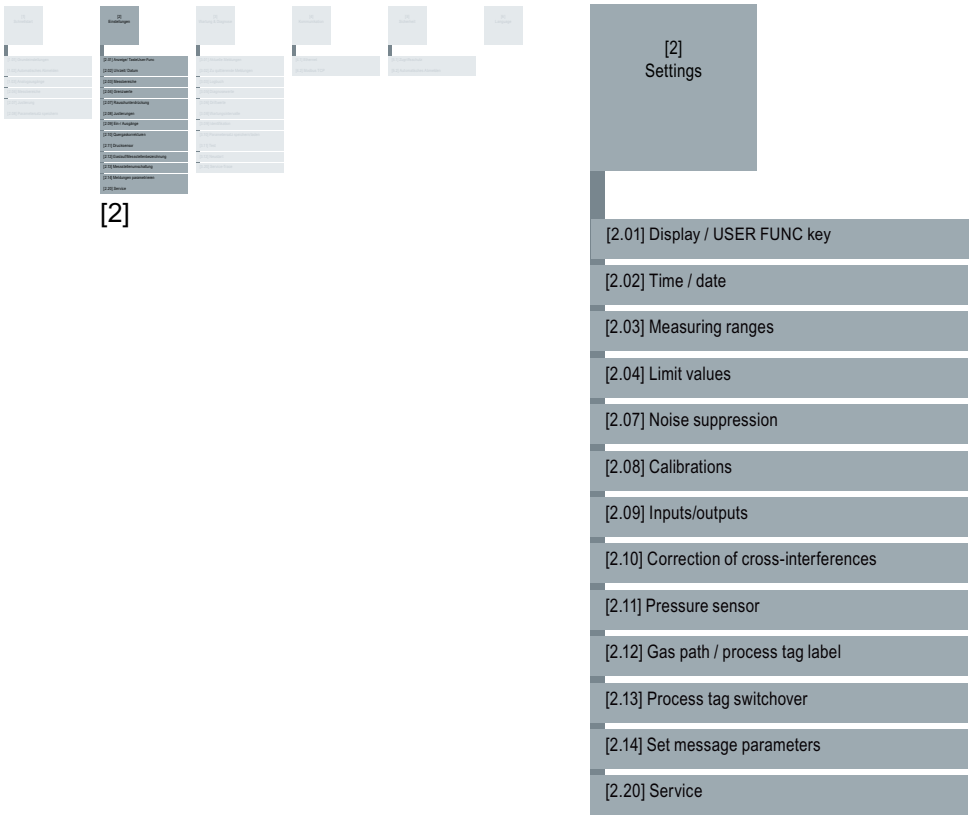


Figure 5-24 Overview of menu [2] Settings

You use this menu and its submenus to adjust the selected component to the specific conditions of use.
The contents of the [2.20] Service menu are only displayed in read mode. Settings are only possible by Service personnel.

[3] Maintenance and diagnostics menu

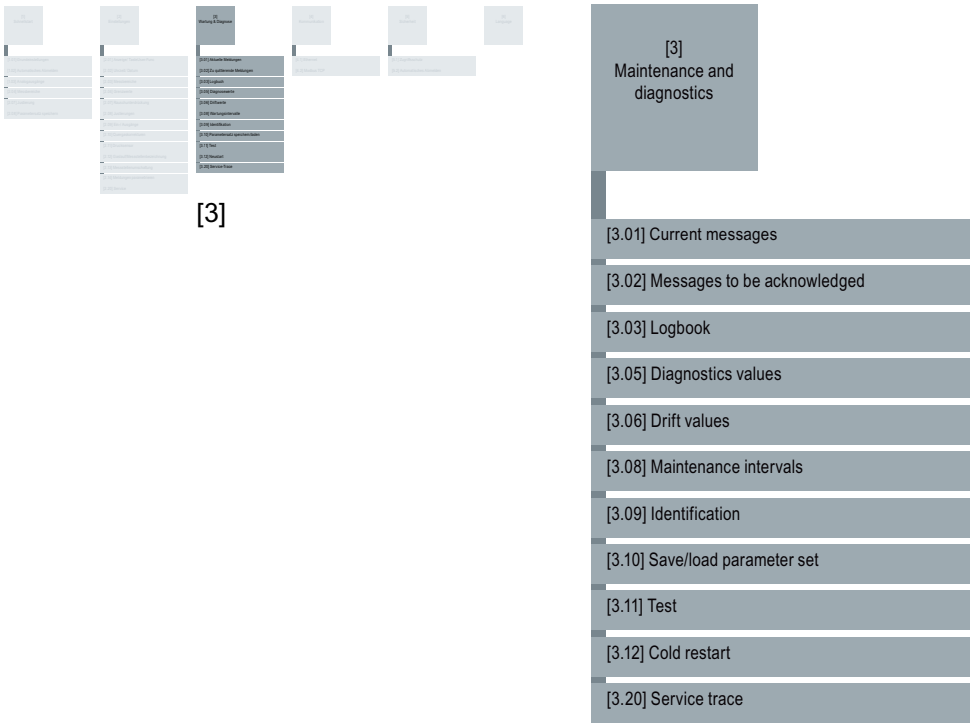


Figure 5-25 Overview of menu [3] Maintenance & diagnostics

In this menu, you call up the submenus relevant to maintenance and diagnostics. The contents of the [3.20] Service trace menu are visible, but can only be set with the appropriate permission level (service personnel).

[4] Communications menu

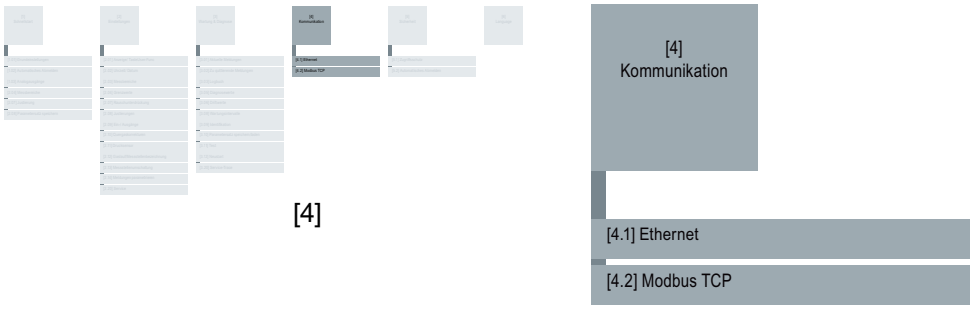


Figure 5-26 Overview of menu [4] Communication

In this menu you can make network and communication settings.

[5] Security menu

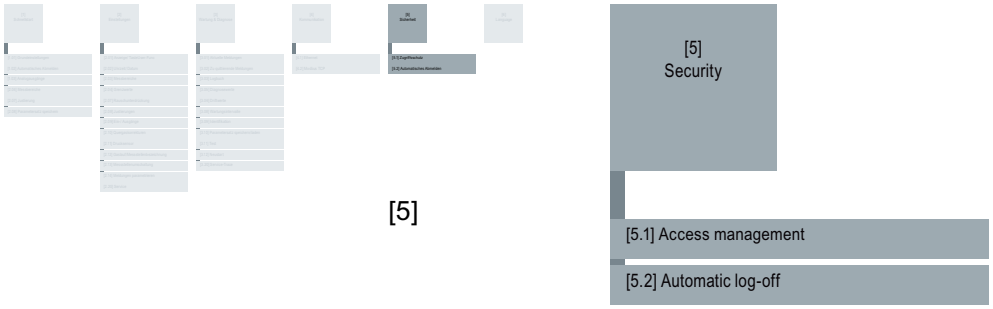


Figure 5-27 Overview of the [5] Security menu

In this menu you can make settings relevant for security.
PINs of higher permission levels always give you the right to make changes at lower permission levels also.

[6] Language menu

Figure 5-28 Overview of menu [6] Language

In this menu you can select the display language.

Commissioning

6

6.1 Requirements for startup

You have ensured that

- The device has at least one analyzer module,
- All required gas lines and facilities are connected to the device and are checked for leaks and tightness with an overpressure,
- No gas has been introduced into the device yet.

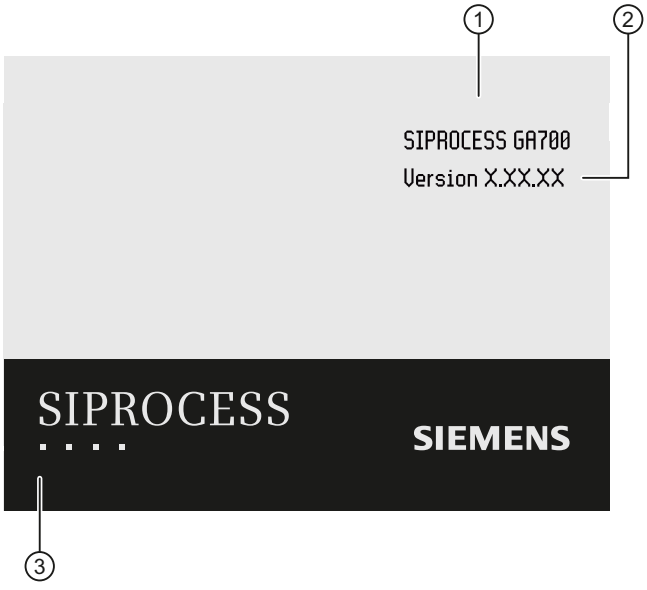
Information on how to connect the gas lines correctly is available

- in section "Combined operation (Page 31)" and
- in the device-specific operating instructions (Page 271).

6.2 Commissioning the SIPROCESS GA700

Procedure

Startup



① Product designation
② Version of the device firmware
③ Progress bar

Figure 6-1 Splash screen

1. Supply the device with power. Information on the power supply of the device is available in the device-specific documentation → Table A-3 References 3 - Operating Instructions (Page 271).
   The boot process starts. The splash screen is initially visible on the device display.
2. Scan of basic settings:
   The boot process is interrupted momentarily. Two successively displayed editing windows prompt you to select the display language and to enter the date and time.
   – Select one of the offered language options in the first editing window.
   – Then set the date and time of day.

   Note
   Date / time settings

   When the power is off, these settings for the date and time are stored on the device for a period of approximately 14 days.

   After putting the device back into operation, you will need to reset the date and time.

   Once you have entered the requested information, the boot process continues.
3. Wait for transition to warming-up phase:
   When the splash screen disappears, the device is in the warming-up phase. The current temperature status is displayed as a bar graph in the warming-up window.
4. Call the measured-value display during the warming-up phase
   – Close the warming-up window by pressing <ENTER>.
   The display shows the measured-value display in read mode.
   For the duration of the warming-up phase, the device is in "Function check" mode. The following symbol is displayed in the status bar:

Setting up

Note
Operator control options

When commissioning for the first time, two methods can be used. You can commission the device for the first time with the procedure described below or you can use a simplified procedure. All the setting options required for this are in the "[1] Quick Start" menu: → [1] Quick Start (Page 87).

If you do not use the quick start procedure, commission the device with the steps described below:

1. Call the main menu:
   – Switch the measured-value display to selection mode. To do so, press <ENTER>.
   – Press <Enter> again to open the main menu.
2. Identify device: → [3.09] Maintenance & Diagnostics > Identification (Page 225)

3. Specify the PIN for the user levels: → Assigning / changing personal identification numbers (PIN) (Page 245).
   In the factory settings, the PIN 1111 is the default for the "Standard" user level and PIN 2222 for the "Expert" user level.
4. Disable automatic logoff temporarily:
   The factory setting is a logoff time of 5 min. When this time elapses, changes that were not stored retentively are lost. We recommend that you temporarily deactivate the automatic logoff during commissioning. For additional information, see → Automatic log-off (Page 246).
5. Define measuring ranges: → [2.03] Settings > Measuring ranges (Page 107) > Setting the measuring ranges (Page 109)

   Note

   Putting back into operation with disabled measuring ranges

   The measuring ranges are activated in the factory. If you disable the measuring ranges (setting: "Off"), all the setting options in other menus related to the measuring range are also hidden. The measuring ranges can no longer be used.

   If you put the device back into operation with fully deactivated measuring ranges, the status bar of the display shows message 150 "Parameter value invalid". Before you continue to put the device back into operation:

   - Activate at least one measuring range
   - Disable the autoranging function if it is enabled To use the automatic measuring range switching, at least two measuring ranges must be active.

6. Set inputs/outputs:
   - Setting digital inputs: → [2.09.3] Digital inputs (Page 142).
   - Setting digital outputs: → [2.09.5] Digital outputs (Page 151)

   If you have the appropriate optional modules:
   - Setting analog inputs: → [2.09.1] Analog inputs (Page 136)
   - Setting analog outputs: → [2.09.2] Analog output (Page 140)
7. Check setting of the gas path and change, if necessary: [2.12] Settings > Gas path/process tag label (Page 183).
8. Calibrate the device: → [2.08] Settings > Calibrations (Page 116).
   - Familiarize yourself with the basics of calibration. Device-internal characteristics are changed during calibration: → Basics (Page 116)
   - Prepare for the calibration. Set the setpoints, calibration tolerances, and the sample gas purging time: → [2.08.1] Setpoints, tolerances, purging time (Page 123).
   - Assigning parameters for a calibration process: → [2.08.3.2] Free calibration (Page 129).
9. Save the parameter set: → [3.10] Maintenance & Diagnostics > Save/load parameter set (Page 230)

Approach in case of an incomplete/faulty boot process

If the device detects a serious error during booting, the boot process is aborted. The start screen is no longer updated. In this case, contact the service technician responsible.

See also

Set analog inputs (Page 137)

Setting the analog outputs (Page 141)

Functions 7

7.1 [1] Quick Start

7.1.1 Quick Start Overview

This menu includes the basic settings that can be used as part of a quick commissioning. The commands in this menu correspond to the steps described in section → Commissioning (Page 83).

7.1.2 Requirements for startup

You have ensured that

- The device has at least one analyzer module,
- All required gas lines and facilities are connected to the device and are checked for leaks and tightness with an overpressure,
- No gas has been introduced into the device yet.

Information on how to connect the gas lines correctly is available

- in section "Combined operation (Page 31)" and
- in the device-specific operating instructions.

See also

References (Page 271)

7.1.3 [1.1] Input of basic settings

Procedure

1. "1 Quick Start" > "01 Basic settings" main menu
2. Call the parameter display:
   Press <Enter>.

3. Set the display language.
   If the language of the Quick Start Manual was also set as operating language, this is set at the factory; otherwise the operating language is English.
   Use the "Language" parameter field to select your preferred display language.
4. Setting parameters for date and time:

   Note

   Effects of changes

   Changing the time has a direct effect on the sequence of logbook entries and all other time-based device services.

   - Check the logbook entries following changes to this setting. If necessary, reset the parameters of the logbook filter function.

   – Specify display format of the date: "Date format" parameter field.
   This parameter field can be edited without PIN input. The following settings are possible: DD.MM.YYYY, MM/DD/YYYY or YYYY-MM-DD.

   – Enter the current date: "Date" parameter field. Authorize access with Standard PIN, if necessary.

   – Enter the current time: "Time" parameter field.

   – Enable/disable automatic switching to daylight saving time: "Daylight saving time" parameter field.
   Select one of the options:

Setting	Description
Off	Automatic switching is disabled.
Autom. EU	Automatic switching to CEST ("Central European Summer Time") on the last Sunday in March. The CEST ends on the last Sunday in October.
Autom. US	Switching to U.S. DST ("Daylight Saving Time") on the second Sunday in March. DST ends on the first Sunday in November.

   Each change results in a logbook entry that has to be acknowledged or confirmed.

   – Enter the date of commissioning: "Commissioning date" parameter field.

7.1.4 [1.2] Set automatic log-off

Setting notes

Note

Function of automatic logoff

When this function is activated and the logoff time expires, the device logs you off automatically. All changes that are not saved permanently will be discarded. The measured value display of all components is displayed again.

Before logoff time expires, a warning window will make you aware of the pending logoff process. You can stop automatic logoff by pressing <ESC>.

Confirm the changes of the parameter assignment by pressing <MEAS> twice.

Note

Permanently saved data

The following data are saved in non-volatile memory immediately after a change and are retained even in case of an automatic logoff:

- Date & time
- IP address
- Display contrast and brightness

Procedure

1. Call up submenu "01 Automatic log-off":
   Main menu > "1. Quick Start" > "01 Automatic log-off"
2. Set the logoff time:
   - Open the "Duration" parameter field.
     You are prompted to enter the Expert PIN.
   - Enter time in format hh:mm:ss:.
3. Enable/disable function:
   - Open "Automatic logoff" parameter field.
   - Select and accept "active" or "inactive" value.

7.1.5 [1.3] Set analog outputs

Overview

Note

Availability of the menu

This menu is only available if your device has at least one of the option modules (2.1 and/ or 2.2) installed. If the option modules are not installed in the device, the "Quick Start" menu has a corresponding menu entry.

The settings of the analog outputs are component-specific and depend on the currently set measuring range.

You can define current ranges for valid measured values or set inverted current ranges. If you use inverted current ranges, the assignment changes, for example: 0 ... 10 % CO ≡ 0 ... 20 mA → 0 ... 10 % CO ≡ 20 ... 0 mA.

To ensure that negative measured values do not influence the further processing of measured values, negative analog output values can be suppressed. The unchanged value is output on the device display.

In addition, you can define responses to specific device statuses. The following outputs are available as alternatives in case of faults or with enabled function check:

- Display of the current measured value
- Display of the last measured value determined
- Display of the low or high limit of the analog output. The corresponding values are listed in the table below in the section "Analog output range".

Setting analog output ranges

1. Call up submenu "04 Analog outputs":
   Main menu > "1. Quick Start" > "04 Analog outputs"
   The menu includes one navigation line for each of the five analog output ranges that can be set:

Structure of the navigation line for each analog output range	
Component name	Analog output range

2. Set the output current range of an analog output:
   - Open the parameter field you wish to edit: Press <ENTER>.
   - Authorize access with Standard PIN, if necessary.
   - Set the analog output range according to the table below:

Specified analog output range [mA]	**Measuring range limit**			
	Normal operation [mA]		**Fault/CTRL [1] [mA]**	
	Low limit	**High limit**	**Low limit**	**High limit**
4 to 20 (NAMUR)	3.8	20.5	3	21.5
4 ... 20	2	21	2	21
0 ... 20	0	21	0	21
20 to 0 [2]	0	21	0	21
20 to 4 [2]	2	21	2	21

[1] CTRL = Function check

[2] Inversion

3. Repeat step 2 for all additional analog output current ranges.

7.1.6 [1.4] Measuring ranges

7.1.6.1 Overview of measuring ranges

Note

Putting back into operation with disabled measuring ranges

The measuring ranges are activated in the factory. If you disable the measuring ranges (setting: "Off"), all the setting options in other menus related to the measuring range are also hidden. The measuring ranges can no longer be used.

If you put the device back into operation with fully deactivated measuring ranges, the status bar of the display shows message 150 "Parameter value invalid". Before you continue to put the device back into operation:

- Activate at least one measuring range
- Disable the autoranging function if it is enabled To use the automatic measuring range switching, at least two measuring ranges must be active.

The device lets you set measuring ranges permanently or switch them over automatically. Contrary to the permanent setting, the measuring range follows the current measured value with automatic switchover. You can define up to four measuring ranges for each component. The start-of-scale values and the end-of-scale values are assigned to the low or high value of the analog output (scaling of the analog output). The following settings are available:

- NAMUR
  - Current range as per NAMUR NE043: 4 to 20 mA
  - Alarm at <3.6 mA and >21 mA
- 4 to 20 mA or 20 to 4 mA
- 0 to 20 mA or 20 to 0 mA

Autoranging

Setting requirements

To activate the autoranging, note the following:

- At least two measuring ranges are set and activated for a component.
- The measuring ranges border on each other or overlap.
- The spans of the set measuring ranges must increase ($ms_i > ms_{(i+1)}$)

Based on these requirements, the following two measuring range types described below are derived for autoranging.

Measuring range type 1 (mr i < mr (i+1))

The full-scale value of measuring range (i) must be lower than the full-scale value of the subsequent measuring range (i+1). The following switchover points are used:

$$Um_O = mbe - 0{,}1 * (mbe - mba)$$

$$Um_U = mbe - 0{,}2 * (mbe - mba)$$

So_H	High switchover point (= full-scale value minus 10 % of the span)	So_L	Low switchover point (= full-scale value minus 20 % of the span)
FSV	Full-scale value	SSV	Start-of-scale value

When the high switchover point of a measuring range is exceeded, there will be a switch to the next-higher measuring range. If the measured value is lower than the low switchover point of the next-lower measuring range, the device switches to the lower measuring range.

Measuring range type 2 (mr i ≥ mr (i+1))

The full-scale value of measuring range (i) must be greater than or equal to the full-scale value of the following measuring range (i+1). Because the spans get bigger, the corresponding start-of-scale values get smaller. The following switchover points are used:

$$Um_O = mba$$

$$Um_U = mba + 0{,}1 * (mbe - mba)$$

So_H	High switchover point (= start value of measuring range)	So_L	Low switchover point (= start value plus 10% of the span)
FSV	Full-scale value	SSV	Start-of-scale value

When the high switchover point is violated, there will be a switch to the next-higher measuring range. If the measured value violates the low switchover point of the next-lower measuring range, the device switches to the lower measuring range.

7.1.6.2 Setting the measuring ranges

Note

Component-specific setup

Measuring ranges are component-specific.
Repeat the procedure described below for all the components, if necessary.

Procedure

1. Call up submenu "n component":
   Main menu > "1. Quick Start" > "4. Measuring ranges" > "n component"
   The menu includes a navigation line for setting of autoranging.
   One navigation line is reserved for each of the four measuring ranges that can be set:

Structure of the navigation line for each measuring range		
Measuring range 1 to 4	Measuring range start - measuring range end	Activation status [1)] Edit

[1)] On/Off: signals if the measuring range is currently active and in use.

2. Open selected measuring range:
   Press <Enter>.
   The parameter display of the measuring range is opened.
3. Set up the measuring range:
   Refer to the specifications under → Overview of measuring ranges (Page 92).
   - Enter start of measuring range: "Start-of-scale value" parameter field
     Authorize access with Standard PIN, if necessary.
   - Enter end of measuring range: "Full-scale value" parameter field.

Note

Adjustment aid: Distance between the start of scale value and full-scale value

When setting the measuring range, the maximum or minimum values you can enter are displayed in the corresponding editing window. But changing the start value and the end value of a measuring range can violate the smallest measuring range span. The changes are rejected in this case.

- You may have to change the setting sequence (full-scale value before start-of-scale value)
- Make sure that the smallest measuring range span is not violated. The smallest measuring range span that can be set is 20% of the smallest measuring span. Refer to the following example:
  Smallest measuring span = 5000 ppm
  ⇒ at least 1000 ppm must lie between the start-of-scale value and full-scale value (5000 ppm x 20% = 1000 ppm).

Note

Setpoints for zero/span gas beyond the min./max. limits

After changing the start-of-scale value and/or the end-of-scale value, the setpoints for zero/span gas may be outside the configured limits. The "[150] - Parameter value invalid" message appears:

- Make sure that the measuring range is active.
- Adjust the setpoints to the changed measuring range.

4. Enable/disable measuring range:
   "Use measuring range" parameter field.

   Note

   Using measuring ranges in other device functions/menus

   Other device functions or menus can only access measuring ranges activated in this menu. Inactive measuring ranges are not displayed for selection in other device functions/menus. This means they can no longer be used, for example, in autoranging or in calibrations.

5. Set additional measuring ranges/parameters, e.g., → Setting Autoranging (Page 95).

See also

Setting the setpoints (Page 123)

Displaying current messages (Page 201)

7.1.6.3 Setting Autoranging

Note

Autoranging

Autoranging is not possible if the measuring ranges were set incorrectly. In this case measuring range 1 is selected as active measuring range.

Note

Component-specific setup

Measuring ranges are component-specific. Repeat the procedure described below for all the components, if necessary.

Procedure

1. Call up submenu "n component":
   Main menu > "1. Quick Start" > "4. Measuring ranges" > "n component"
   The menu includes four navigation lines for setting the measuring ranges and one navigation line for setting autoranging.
2. Call autoranging: Navigation line "Autoranging".
   The parameter display of autoranging has a parameter field and a display field.
3. Specify measuring range: "Measuring range selection" parameter field.
   - Authorize access with Standard PIN, if necessary.
   - Select one of the offered measuring ranges or autoranging:
     If the message "Active" is displayed in the "Autoranging" line, autoranging is activated.
     If "Not possible" is displayed, adjust the start and end values for the individual measuring ranges: Setting the measuring ranges (Page 93).

Note

Component-specific setup

Measuring ranges are component-specific. Repeat the procedure described below for all components, if necessary.

1. "1 Quick Start" > "4. Measuring ranges" > "n component" main menu
   The menu includes four navigation lines for setting the measuring ranges and one navigation line for setting autoranging.
2. Call autoranging: Navigation line "Autoranging".
   The parameter display of autoranging has a parameter field and a display box.
3. Specify measuring range: "Measuring range selection" parameter field.
   - Authorize access with Standard PIN, if necessary.
   - Select one of the offered measuring ranges or autoranging:
     If the message "Active" is displayed in the "Autoranging" line, autoranging is activated.
     If "Not possible" is displayed, adjust the start and end values for the individual measuring ranges: Setting the measuring ranges (Page 93).

7.1.7 [1.5] Calibration

7.1.7.1 Calibration/validation overview

Introduction

This menu enables you to make simple calibrations or validations, for example, as part of initial commissioning. This means the offered range of functions is very limited. Automation functions, such as the use of the calibration pool, cannot be activated using this menu. "Factory calibrations" also are not part of the functions included in the Quick Start menu.

You can find detailed information on how to fully access all possibilities of the calibration/validation functions of the device in the section → [2.08] Settings > Calibrations.

Difference between calibration/validation

Calibration

In a calibration, the device is adapted to its measurement task(s). For the actual value to be equal to the setpoint, the device changes one or more calibration factors during calibration.

Calibration parameters are assigned manually. Calibrations are distinguished by the following features:

- Person group:
  - "Customer calibrations" (zero point and/or span gas calibrations)
  - "Factory calibrations" (normalization and phase calibration).

  The section below only covers the area of "Customer calibrations". Information on factory calibrations is available under → [2.20.03] Factory calibrations. Contact you Siemens sales rep for more information.
- Single/total: Calibration of only one or all measuring ranges
- Measuring range
- Component

After the start of a calibration, a wizard in the display supports you with preset calibration steps.

Validation

You use a validation to check whether the deviation from the last calibration is still within the validation tolerance. If the deviation is outside the validation tolerance, a new calibration is necessary.

Validation uses the same process steps as calibration. But the validation operation checks whether the deviation between the actual value and setpoint is still within an assignable tolerance band. No calibration factors are changed in the process.

If a validation detects a tolerance violation, a corresponding message is output. The message disappears after a successful calibration.

Types of calibration

You can set the following types of calibration:

Table 7-1 Types of calibration ("Customer calibrations")

Calibration	Description
1-point zero gas calibration	This calibration eliminates drifts in the zero point. The setpoint corresponds to the actual value in the zero point.
1-point span gas calibration	This calibration eliminates drifts in the span point by adjusting a sensitivity factor accordingly. The setpoint corresponds to the actual value in the span point.

Calibration	Description
2-point calibration	In this type of calibration, zero gas validation and span gas calibration take place successively.
1-point calibration with substitute gas to shift the characteristic offset	Because the thermal conductivity sensor of the CALOMAT 7 shows a stable characteristics gradient after an operating time of about 3 months, regular 2-point calibration is no longer necessary. A monthly 1-point offset calibration is sufficient in this case; it essentially corresponds to a 1-point zero gas calibration. Keep in mind during the calibration that the measurement effect of the span gas used must be within the characteristic of the gas pair. Nitrogen can be used as substitute gas in most cases. The calibration setpoint must be determined in advance by introducing the intended substitute gas and writing down the associated measured value as future setpoint. This type of calibration always has the character of a zero point calibration (offset shift of the characteristic). We recommend a 2-point calibration after running a 1-point calibration with substitute gas twice. This is, however, done at the discretion of the device operator.

Scope/reference

Single calibration

Calibrations can be run as single or total calibrations. Only the selected measuring range is calibrated in a single calibration, while the calibration parameters of all other measuring ranges are not affected.

Total calibration

In a total calibration, at first the selected measuring range is calibrated as with single calibration. But the newly calculated calibration parameters of this leading measuring range are converted for all other measuring ranges. This means all measuring ranges can be calibrated with the same calibration parameters.

Sequence

When you start the calibration, a wizard is started that guides you through calibration. Depending on the type of calibration selected, the wizard includes the following steps:

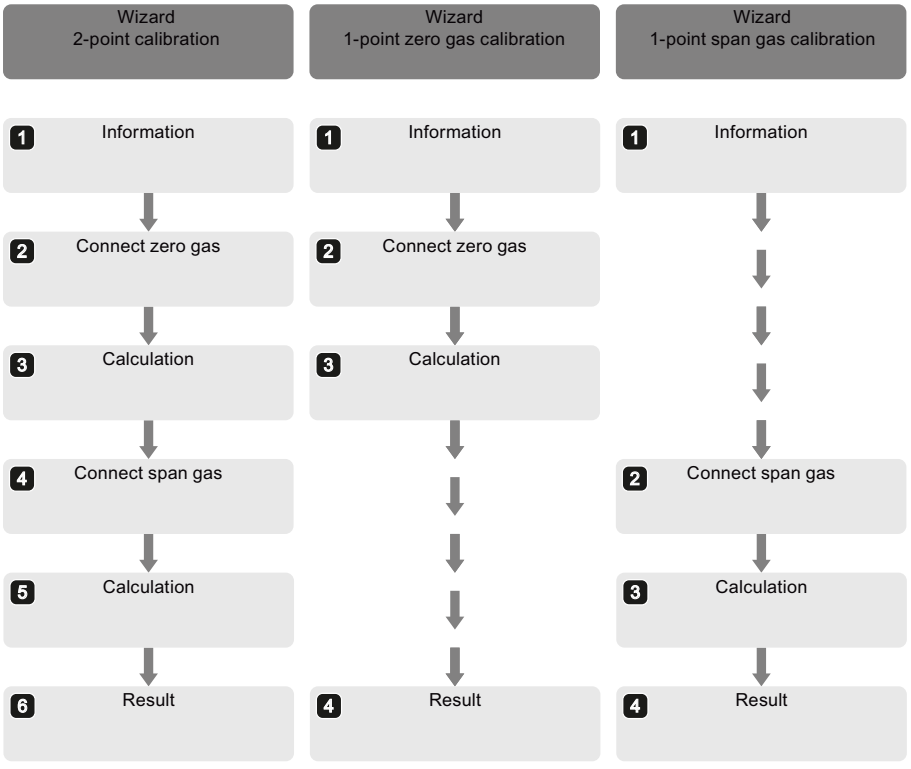


Figure 7-1 Steps during calibration

See also

[2.20.03] Factory calibrations OXYMAT 7 (Page 191)

[2.08] Settings > Calibrations (Page 116)

Note

Component-specific setup

Measuring ranges are component-specific. Repeat the procedure described below for all components, if necessary.

1. "1 Quick Start" > "4. Measuring ranges" > "n component" main menu
   The menu includes four navigation lines for setting the measuring ranges and one navigation line for setting autoranging.
2. Call autoranging: Navigation line "Autoranging".
   The parameter display of autoranging has a parameter field and a display box.
3. Specify measuring range: "Measuring range selection" parameter field.
   - Authorize access with Standard PIN, if necessary.
   - Select one of the offered measuring ranges or autoranging:
     If the message "Active" is displayed in the "Autoranging" line, autoranging is activated.
     If "Not possible" is displayed, adjust the start and end values for the individual measuring ranges: [2.08] Settings > Calibrations (Page 116).

7.1.7.2 Carrying out calibration/validation

Procedure

1. Call up submenu "5. Calibrations":
   Component > Main menu > "1. Quick Start" > "5. Calibrations"
   Depending on the wizard you enable, you either execute a calibration or validation. The parameter assignment of this menu is used for both processes.
2. Select components to be calibrated/validated: "Components" parameter field.
   - Authorize access with Standard PIN, if necessary.
   - Enable/disable one or more component-related check boxes in the displayed editing window.
3. Specify calibration type: "Calibration type" parameter field.
   - If you select "2-pt.", zero gas calibration and span gas calibration are executed one after the other. Otherwise you set either a zero gas calibration or a span gas calibration.
4. Specify the scope of the calibration: "Single/total" parameter field.
   By setting this parameter you define the scope of the calibration - one or all measuring ranges. The measuring range set in the calibration is always calibrated:
   - If you set "Single", calibration is only applied for the set measuring range. Calibrations of the other measuring ranges remain unchanged.
   - If you set "Total", the calibrations of the other measuring ranges are overwritten by the calibration of this "leading" measuring range.

   In validation, only the set "leading" measuring range is considered.

5. Assign measuring range(s): "Measuring range" parameter field.

   Note

   Setting the measuring ranges

   Check the settings of the measuring ranges before you assign a range to a calibration. Make sure that the measuring ranges are set appropriately for the respective application.

   Adjust the settings of the measuring ranges again, if necessary: [1.4] Measuring ranges (Page 92) menu.

   If you have set "Total" for the scope in step 4, the selected measuring range acts as the "leading measuring range".

6. Enter setpoint(s):
   Define suitable setpoints for each available component:
   - At zero and span gas calibrations, enter one setpoint per component.
   - For 2-point calibrations, enter one setpoint per component for zero gas and span gas. To do so, use the parameter fields "Zero gas setpoint component" and/ or "Span gas setpoint component".
7. Start the wizard for a calibration or validation:
   - "Start validation" parameter field
     A validation evaluates the current device status with respect to the last calibration. The need for a new calibration can be derived from the validation results.
   - "Start calibration" parameter field

   Follow the instructions on the display. The success of the calibration/validation is displayed in the result window once the process is complete.

Rectifying errors

If the device aborts a calibration due to errors, an error code, e.g. "F0123", and a text error message are displayed in the result window.

1. Write down the error code.
2. If you cannot rectify the cause of the error yourself, forward the error code to the service technician in charge.

7.1.8 [1.6] Save parameter set

7.1.8.1 Parameter sets overview

You can use this menu to save your latest settings in a parameter set. You can use it to restore any unintentional changes to the parameter assignment. SIPROCESS GA700 devices use two types of parameter sets:

- Factory data: This parameter set is the factory default and is used to restore the original parameter assignment.
  For this reason, factory data can only be loaded.
- User data: This parameter set maps a current, application-specific parameter assignment. You can save and reload user data at any time.

7.1.8.2 Save parameter set

Procedure

1. Call up submenu "6. Save parameter set":
   Main menu > "1. Quick Start" > "6. Save parameter set"
   Use this function to save the current parameter assignment in the device. The data is saved as "user data".
2. Start save process: "Save parameter set" parameter field.
   – Authorize access with Standard PIN, if necessary.
   – Follow the instructions in the displayed window.

7.2 [2.01] Settings >Display/USER FUNC key

7.2.1 Setting the measured-value format

Procedure

The settings for the measured-value format refer to the displays in the main view. The measured-value format can be set separately for each component.

1. Main menu > "2 Settings" > "01. Display/USER FUNC key" > "1. Measured-value format"
2. Call the parameter display: Press <Enter>.

3. Allow/suppress display of negative gas measured values in the main view: "Negative values" parameter field.
   - Authorize access with Standard PIN.
   - Select "Allow" or "Suppress".
     If you select the "Suppress" setting, a value which is actually negative is displayed in the main view as "0".
     This behavior can also be mapped by means of an analog output. You can find more information on this topic under: [2.09.2] Analog output (Page 140).
4. Specify the number of displayed measured-value decimal places: "Decimal places" parameter field.
   The setting has an effect on the measured-value display and the extended measured-value display in the main view.
   - Select 0, 1, 2 or 3 decimal places.
   - If the measured value gets so big that the full display of the set decimal places is no longer possible, the decimal point is shifted by one position to the right.
5. Set additional parameters or log off manually.

7.2.2 Setting the extended measured-value display

Procedure

You can use this function to display additional information for individual components that cannot be displayed in the measured-value display.

1. Main menu > "2 Settings" > "01. Display/USER FUNC key" > "2. Extended measured-value display"
2. Call the parameter display: Press <Enter>.
   The parameter display lists all components in the device.
3. Set the display:
   - Select and open the parameter field of a component.
   - Authorize access with Standard PIN, if necessary.
   - Select settings "Hide" or "Show".
     If you select the "Hide" setting, the measured value is not listed in the extended measured-value display.
     However, the measured value is retained in the measured-value display of all components.
4. Set the extended measured-value display of additional components.

7.2.3 Displaying additional process values

Procedure

Note

Possible settings

With this parameter display you influence the additional process value display in the main view. The offered settings depend on the following conditions:

- Hardware installed in device
- Parameter assignment of the analog input
- Active MODBUS communication

1. Main menu > "2 Settings" > "01. Display/USER FUNC key" > "3. Additional process values"
2. Call the parameter display: Press <Enter>.
   The parameter display includes one editable parameter field for the six display lines that can be set.
3. Open "Line n" parameter field. Authorize access with Standard PIN, if necessary.
4. Select offered process values. The following external process values can be selected:
   - No display
   - All measured pressures
   - All sample gas flows
   - All reference gas flows (O7)
   - Humidity
   - All MODBUS TCP components: → MODBUS TCP node (Page 220).
   - All analog inputs (number of the analog input and name): → [1] Analog inputs (Page 218).

   You can find information about the concentration values of external correction of cross-interference sources under → Setting the correction of cross-interference (Page 167).
5. Repeat steps 3 and 4 for required additional displays.

7.2.4 Customizing the display settings

Procedure

1. Main menu > "2 Settings" > "01. Display/USER FUNC key" > "4. Display settings"
2. Call the parameter display: Press <Enter>.
3. Make the display settings:
   - Set contrast brighter or darker: "Contrast" parameter field.
   - Set the backlighting brighter or darker: "Backlighting" parameter field.

   Increase/lower values by pressing the displayed arrow keys.

7.2.5 Setting the symbol sets

Procedure

Note

Symbol sets

The device offers two symbol sets that the device uses to signal status messages. You can find information on symbol sets for NAMUR or SIMATIC PCS 7 under → LUI symbol sets (Page 249).

1. Main menu > "2 Settings" > "01 Display/USER FUNC key" > "5 Symbols"
2. Call the parameter display: Press <Enter>.
3. Select the symbol set: "Show symbols" parameter field.
   - Authorize access with Standard PIN, if necessary.
   - Set symbol set "NAMUR" or "PCS7".
     The PCS7 symbol set is more comprehensive and gives you a more detailed image of the device status.

7.2.6 Assigning USER FUNC key

Procedure

You can assign two functions to the <USER FUNC> key:

1. Main menu > "2 Settings" > "01 Display/USER FUNC key" > "6 USER FUNC key"
2. Call the parameter display: Press <Enter>.
3. Assign the key: "Assign function" parameter field. Authorize access with Standard PIN, if necessary.
   The following functions can be set:
   – Acknowledge current messages:
     All pending messages get the status "acknowledged".
     With this function you do not have to call the message list in the main view and follow the menu-guided acknowledgment procedure. If you have not yet remedied the reason for the message at the time of acknowledgment, the corresponding message is still pending after acknowledgment.

7.3 [2.02] Settings > Time/Date

7.3.1 Setting the time and date

Procedure

Note

Effects of changes

Changing the time has a direct effect on the sequence of logbook entries and all other time-based device services.

Check the logbook entries following changes to this setting. If necessary, reset the parameters of the logbook filter function.

1. Main menu > "2 Settings" > "02 Time/Date"
2. Specify display format of the date: "Date format" parameter field.
   This parameter field can be edited without PIN input.
3. Enter the current date: "Date" parameter field.
   Authorize access with Standard PIN, if necessary.

4. Enter the current time: "Time" parameter field.
5. Enable/disable automatic switching to daylight saving time: "Daylight saving time" parameter field.
   Select one of the alternatives:

Setting	Description
Off	Automatic switching is disabled.
Autom. EU	Automatic switching to CEST ("Central European Summer Time") on the last Sunday in March. The CEST ends on the last Sunday in October.
Autom. US	Switching to U.S. DST ("Daylight Saving Time") on the second Sunday in March. DST ends on the first Sunday in November.

7.4 [2.03] Settings > Measuring ranges

7.4.1 Overview of measuring ranges

Note

Putting back into operation with disabled measuring ranges

The measuring ranges are activated in the factory. If you disable the measuring ranges (setting: "Off"), all the setting options in other menus related to the measuring range are also hidden. The measuring ranges can no longer be used.

If you put the device back into operation with fully deactivated measuring ranges, the status bar of the display shows message 150 "Parameter value invalid". Before you continue to put the device back into operation:

- Activate at least one measuring range
- Disable the autoranging function if it is enabled To use the automatic measuring range switching, at least two measuring ranges must be active.

The device lets you set measuring ranges permanently or switch them over automatically. Contrary to the permanent setting, the measuring range follows the current measured value with automatic switchover. You can define up to four measuring ranges for each component. The start-of-scale values and the end-of-scale values are assigned to the low or high value of the analog output (scaling of the analog output). The following settings are available:

- NAMUR
  - Current range as per NAMUR NE043: 4 to 20 mA
  - Alarm at <3.6 mA and >21 mA
- 4 to 20 mA or 20 to 4 mA
- 0 to 20 mA or 20 to 0 mA

Autoranging

Setting requirements

To activate the autoranging, note the following:

- At least two measuring ranges are set and activated for a component.
- The measuring ranges border on each other or overlap.
- The spans of the set measuring ranges must increase ($ms_i > ms_{(i+1)}$)

Based on these requirements, the following two measuring range types described below are derived for autoranging.

Measuring range type 1 (mr i < mr (i+1))

The full-scale value of measuring range (i) must be lower than the full-scale value of the subsequent measuring range (i+1). The following switchover points are used:

$$Um_O = mbe - 0{,}1 * (mbe - mba)$$

$$Um_U = mbe - 0{,}2 * (mbe - mba)$$

So_H	High switchover point (= full-scale value minus 10 % of the span)	So_L	Low switchover point (= full-scale value minus 20 % of the span)
FSV	Full-scale value	SSV	Start-of-scale value

When the high switchover point of a measuring range is exceeded, there will be a switch to the next-higher measuring range. If the measured value is lower than the low switchover point of the next-lower measuring range, the device switches to the lower measuring range.

Measuring range type 2 (mr i ≥ mr (i+1))

The full-scale value of measuring range (i) must be greater than or equal to the full-scale value of the following measuring range (i+1). Because the spans get bigger, the corresponding start-of-scale values get smaller. The following switchover points are used:

$$Um_O = mba$$

$$Um_U = mba + 0{,}1 * (mbe - mba)$$

So_H	High switchover point (= start value of measuring range)	So_L	Low switchover point (= start value plus 10% of the span)
FSV	Full-scale value	SSV	Start-of-scale value

When the high switchover point is violated, there will be a switch to the next-higher measuring range. If the measured value violates the low switchover point of the next-lower measuring range, the device switches to the lower measuring range.

7.4.2 Setting the measuring ranges

Procedure

Note

Component-specific setting

Measuring ranges are component-specific. Repeat the procedure described below for all components, if necessary.

1. Component > Main menu > "2 Settings" > "03 Measuring ranges"
   The menu includes a navigation line for setting of autoranging.
   One navigation line is reserved for each of the four measuring ranges that can be set:

Structure of the navigation line for each measuring range		
Measuring range 1 to 4	Measuring range start - measuring range end	Activation status [1] Edit

[1] On/Off: signals if the measuring range is currently active and in use.

2. Open selected measuring range: Press <ENTER>.
   The parameter display of the measuring range is opened.
3. Set up the measuring range:
   Refer to the specifications under Overview of measuring ranges (Page 107).
   - Enter start of measuring range: "Start-of-scale value" parameter box
     Authorize access with Standard PIN, if necessary.
   - Enter end of measuring range: "Full-scale value" parameter box.

Note

Adjustment aids: Distance between the start-of-scale value and full-scale value

When you set the measuring ranges, the maximum and minimum selectable values are displayed in the relevant editing window. Changing the start-of-scale or full-scale value of a measuring range can nevertheless lead to a violation of the smallest measuring range span. The changes are then rejected.

- If necessary, change the order in which you make the settings (full-scale value before start-of-scale value)
- Make sure that the smallest measuring range span is not violated. The smallest selectable measuring range span is 20% of the smallest measuring range. Use the following example as a basis:
  Smallest measuring span = 5000 ppm ⇒ between the measuring range start value and measuring range end value there must be at least 1000 ppm (5000 ppm x 20 % = 1000 ppm).

4. Enable/disable measuring range: "Use measuring range" parameter box.

Note

Using measuring ranges in other device functions / menus

Other device functions or menus can only access measuring ranges activated in this menu. Inactive measuring ranges are no longer displayed in other device functions / menus. Using them, for example for autoranging or in calibrations is then no longer possible.

5. Set additional measuring ranges/parameters, e.g., Setting Autoranging (Page 110).

7.4.3 Setting Autoranging

Procedure

Note

Autoranging

Autoranging is not possible if the measuring ranges were set incorrectly. In this case measuring range 1 is selected as active measuring range.

Note

Component-specific setting

Measuring ranges are component-specific. Repeat the procedure described below for all components, if necessary.

1. Main menu > "2. Settings" > "03 Measuring ranges"
   The menu includes four navigation lines for setting the measuring ranges and one navigation line for setting autoranging.
2. Call autoranging: Navigation bar "Autoranging".
   The parameter display of autoranging has a parameter box and a display box.
3. Specify measuring range: "Measuring range selection" parameter box.
   - Authorize access with Standard PIN, if necessary.
   - Select one of the offered measuring ranges or autoranging:
     If the message "Active" is displayed in the "Autoranging" line, autoranging is activated.
     If "Not possible" is displayed, correct the start and end values of the individual measuring ranges: Setting the measuring ranges (Page 109).

7.5 [2.04] Settings > Limits

7.5.1 Overview of limits

Limits

You can define a limit range with the message level "Warning" and/or a limit range of the message level "Alarm" for each component.

A limit range combines several parameters but also includes an adjustable low and high limit. Both limits can be activated independent of each other.

The limit monitoring of the device is not active during the warming-up and calibration phases.

You can configure digital outputs as limit relays in the "Digital outputs" parameter group. Limit violations and the response of limit relays are entered in the logbook. Whether or not a digital output is reset after a limit violation is eliminated depends on whether this limit message has to be acknowledged or not.

Monitoring options

The following monitoring options can be used:

Table 7-2 Monitoring options using limits

Monitoring	Setting
None	The low and high limits are inactive: Setting "Off" for both.
Low limit violated	Only the low limit is activated.
High limit exceeded	Only the high limit is activated.
LImit violated at "Value outside"	The low and high limits are activated. Limit violation: The measured value is located outside the interval.
LImit violated at "Value within"	The low and high limits are activated. Limit violation: The measured value is located within the interval.

See also

Setting limits (Page 112)

7.5.2 Setting limits

Procedure

Note

Effects

Changing the parameter setting has a direct effect on the following functions:

- Status bar: Display of system messages
- Logbook: entries in the device logbook
- Digital measured value status

Note

Component-specific setup

Limit ranges are component-specific. Repeat the procedure described below for all components, if necessary.

1. Component > Main menu > "2. Settings" > "04 Limits"
   The menu has two navigation lines for setting alarm limits and/or warning limits. Each limit range has a minimum and maximum limit that can be activated separately:

Structure of the navigation line for each limit						
Limit number.	Message level [1]	< > [2]	Minimum value [3]	< > [2]	Maximum value [3]	Unit Edit

[1] Limit triggers an alarm or warning.

[2] Monitoring indicator: Activation status of the minimum or maximum value or monitoring range (monitoring inside/outside). Display in measuring mode only!

[3] Display of minimum/maximum value with activation only, otherwise "-"

2. Open selected limit range: Press <ENTER>.
3. Set values:
   - Enable/disable values: "Min active" and/or "Max active" parameter fields.
   - Authorize access with Standard PIN, if necessary.
   - Enter values: "Minimum value" and/or "Maximum value" parameter fields
4. Set the monitoring range: "Limits violated at" parameter field.
   Select a range in which there is a limit violation (limit violation caused by measured values outside or within a band): → Table 7-2 Monitoring options using limits (Page 111).

5. Set hysteresis: "Hysteresis" parameter field.
   The input refers to the value of the current measuring range:
   – If the measured value is exactly above or below the limit, a message is activated:

Message	Cause/description (activation)
Violation	*Measured value* ≥ $Limit_{Max}$
Undershoot	*Measured value* ≤ $Limit_{Min}$
Value outside	*Measured value* ≥ $Limit_{Max}$ or *Measured value* ≤ $Limit_{Min}$
Value within	*Measured value* ≤ $Limit_{Max}$ and *Measured value* ≥ $Limit_{Min}$

   – The set hysteresis is relevant when you deactivate the message:

Message	Cause/description (deactivation)
Violation	*Measured value* < $Limit_{Max}$ - *hysteresis*
Undershoot	*Measured value* > $Limit_{Min}$ + *hysteresis*
Value outside	*Measured value* < $Limit_{Max}$ - *hysteresis* and *Measured value* > $Limit_{Min}$ + *hysteresis*
Value within [1)]	*Measured value* > $Limit_{Max}$ + *hysteresis* or *Measured value* < $Limit_{Min}$ - *hysteresis*

6. Check link with digital outputs:
   The link with digital outputs is displayed in the "Limit combined with" display field.
   If necessary, change the link settings: Setting digital outputs (Page 155).
7. Assign process tags: "Active process tags" parameter field.
   Requirement: The process tag switchover is activated: [2.13] Setting > Process tag switchover (Page 185).
   – Scroll down to the lower margin of the display.
   – Enable/disable the assigned process tags in the displayed selection window.
   The limits are only effective for the enabled process tags.
8. Specify message behavior:
   – Set the message level: "Message level" parameter field
   – Authorize access with Expert PIN, if necessary.
   – Enable/disable acknowledgment requirement: "Requires acknowledgment" parameter field.
9. Change the delay times, if necessary:
   Service PIN required. If necessary, contact the authorized service partner.
10. Additional settings:
    Repeat steps 1 to 10 for the second limit as well as for additional components of your device.

See also

Overview of limits (Page 111)
[2.09.5] Digital outputs (Page 151)

7.6 [2.07] Settings > Noise suppression

7.6.1 Overview of noise suppression

Low pass filter

Noise suppression

Switch on the low pass filter to enable noise suppression that can be used to dampen the noise of the measured signal. You can also set an effective interval and two time constants for damping.

Despite a high noise suppression, a low display delay (T90 time) is reached by setting the three damping parameters. The effect of the damping parameters can be recognized immediately from the current measured value in the menu (LUI) and in the corresponding offline dialog (PDM).

Effective interval

The effective interval is defined as a percentage of the smallest physical measuring range span. To ensure that the noise of the measured value remains within the effective interval, the effective interval must be slightly larger than the signal to noise ratio.

Display delay

- If the distance from the previously dampened measured value to the currently undampened measured value is less than the effective interval, the time constant "T90 within" becomes effective.
- If the distance of the currently undampened measured value to the previously dampened measured value exceeds the effective interval, damping takes place with the second time constant "T90 outside".

Suppression of noise

This function suppresses so-called spikes. Spikes are created by electromagnetic interference or sometimes by mechanical shocks. If an adjustable threshold of the smallest physical span ([%]) is exceeded, the suppression function intervenes. The threshold must be greater than the effective interval of the low pass filter.

By setting the suppression time, the last measured value before the spike occurred will be output for the duration of the suppression time. This means the measurement result is no longer affected.

A change in concentration that follows a spike may be displayed delayed.

7.6.2 Setting noise suppression

Procedure

Note

Component-specific setup

Noise suppression is component-specific. Repeat the procedure described below for all components, if necessary.

1. Component > Main menu > "2. Settings" > "07 Noise suppression"
   The parameter display is opened. In addition to the assignable parameters, the displayed values "Current measured value" and "Smallest span" can be used as setting aids.
2. Activate low pass filter: "Low pass" parameter field.
   Authorize access with Standard PIN, if necessary.
3. Specify the effective interval for the time constant: "Time constant" parameter field.
   Assign a value from 1 to 500% of the smallest span.
4. Specify time constants:

   Note

   Effectiveness of time constants

   The first time constant "T90 within" acts within the effective interval and dampens small changes in measured value. If the change of the measured value exceeds the effective interval, the time constant becomes ineffective. The measured value is then dampened by the second time constant "T90 outside".

   – "Time constant within" parameter field:
     Enter the time in which the signal has reached 90% following application of a jump signal.
   – "Time constant outside" parameter field:
     Enter the time after which the signal exceeds 90% following application of a jump signal.
5. Activate suppression of brief noise signals: "Noise signal suppression" parameter field
   If you activate this parameter, undesirable spikes can be suppressed.
6. Assign noise threshold: "Threshold" parameter field.
   – If the signal value exceeds the set value, an undesirable spike is present.
   – Enter the parameter value as a percentage of the smallest physical span in the "Threshold" text box.

   Make sure that the entered value is greater than the interval of the low pass filter.
7. Enter the suppression time: "Duration" parameter field.
   – By setting the suppression time, you define how long the signal value of a spike is suppressed.
   – In addition, the last measured value prior to the occurrence of a spike is output. This way the measurement result remains constant for the set duration.

   The resolution of the setting range is 0.1 s. The minimum duration that can be set is 0.2 s.

7.7 [2.08] Settings > Calibrations

7.7.1 Basics

7.7.1.1 Calibration/validation

Difference between calibration/validation

Calibration

In a calibration, the device is adapted to its measurement task(s). For the actual value to be equal to the setpoint, the device changes one or more calibration factors during calibration.

Calibration parameters are assigned manually. Calibrations are distinguished by the following features:

- Person groups
  - "Customer calibrations" (zero point and/or span gas calibrations)
  - "Factory calibrations" (normalization and phase calibration).

  The following section only deals with "customer calibrations". Factory calibrations:" → [2.20] Settings > Service (Page 190) If necessary contact your Siemens sales contact.
- Single/total: Calibration of only one or all measuring ranges
- Measuring range
- Component

After the start of a calibration, a wizard in the display supports you with preset calibration steps.

Validation

You use a validation to check whether the deviation from the last calibration is still within the validation tolerance. If the deviation is outside the validation tolerance, a new calibration is necessary.

Validation uses the same process steps as calibration. But the validation operation checks whether the deviation between the actual value and setpoint is still within an assignable tolerance band. No calibration factors are changed in the process.

If a validation detects a tolerance violation, a corresponding message is output. The message disappears after a successful calibration.

Types of calibration

You can set the following types of calibration:

Table 7-3 Types of calibration

Calibration	Description
1-point zero gas calibration	This calibration eliminates drifts in the zero point. The setpoint corresponds to the actual value in the zero point.
1-point span gas calibration	This calibration eliminates drifts in the span point by adjusting a sensitivity factor accordingly. The setpoint corresponds to the actual value in the span point.
2-point calibration	In this type of calibration, zero gas validation and span gas calibration take place successively.

Scope/reference

Single calibration

Calibrations can be run as single or total calibrations. Only the selected measuring range is calibrated in a single calibration, while the calibration parameters of all other measuring ranges are not affected.

Total calibration

In a total calibration, at first the selected measuring range is calibrated as with single calibration. However, the newly calculated calibration parameters of this leading measuring range are transferred to all other measuring ranges. All measuring ranges can be adjusted simultaneously in this way.

Sequence

Information on the sequence of a calibration/validation is available at: → Sequence of a calibration/validation (Page 118).

7.7.1.2 Sequence of a calibration/validation

Overview

When you start the calibration, a wizard is started that guides you through calibration. Depending on the type of calibration selected, the wizard includes the following steps:

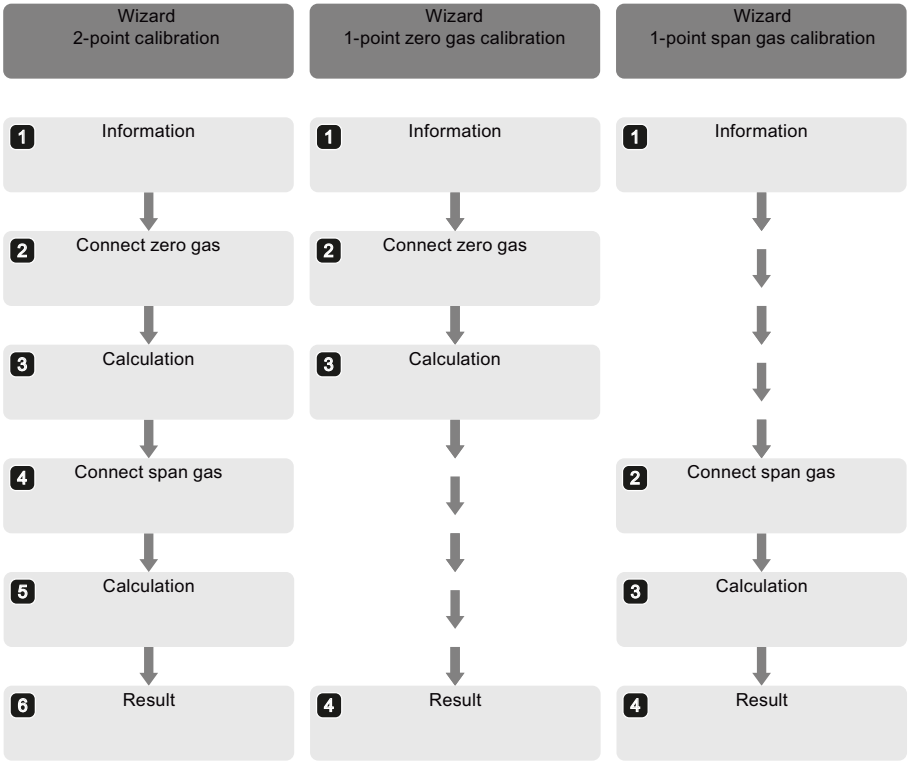


Figure 7-2 Steps during calibration

Step 1: Information about the current calibration ("Info")

Once the wizard has started, an information window is displayed.
With all types of calibration, the wizard gives an overview about the settings of the current calibration in step 1 "Info". If you need to change your settings, you can abort the sequence of the wizard at this point.

The device remains in "Measurement" operating state until you continue the wizard.

Steps 2, 4: Connect zero gas / Connect span gas

When the gas is connected, the device changes to the "Calibration" operating state.

Any assigned external solenoid valves for the zero gas or span gas are switched according to the parameter assignment of the digital outputs.
If you do not use a gas connection controlled by external solenoid valves, the wizard prompts you to connect the respective gas manually.

In addition to the setpoint and actual value (measured value) the currently set master measuring range is displayed. As soon as the actual value shows a stable behavior, apply this value. The wizard continues the process.

Steps 3, 5: Calculation

During steps 3 or 5, the current measured value is filtered first and then the calibration factors are calculated. The actual value (measured value) then corresponds to the assigned setpoint.

The processing progress is signaled by a bar graph. The remaining time until the end of the calculation is output as well. The device at the LUI automatically switches to the result window at the end of the calculation. In contrast, with SIMATIC PDM you have to continue manually ("Next" button).

Steps 4, 6: Information about the success of the calibration ("Result")

The wizard lists the results of the calibration in the result window and makes a logbook entry in the background. This logbook entry captures the calibration data as well as the corresponding result status (successful / not successful).

Exiting the wizard

When you exit the wizard after a calibration, any configured external solenoid valve for sample gas is connected and the measuring chamber is once again filled with sample gas. The following applies with appropriate parameter assignment: The device stays in "Calibration" operating state for the assigned duration of the sample gas purging time.

The device switches back to "Measurement" operating state after expiration of the sample gas purging time.

Logoff

Note

Resetting calibration results

If you log off from the device by pressing the <MEAS> key on the device twice, you will be prompted to save or discard the current settings:

- Apply: If you press the <ENTER> key, all changes made in the current session are applied.
- If you press the <ESC> key, all changes including the calibration results are discarded. Automatic logoff also means that the calibration results are discarded.

You should therefore correct changed settings using the UNDO function before you log off. Disable the "Automatic log-off" function if it is enabled. Alternatively, change the configured logoff time.

7.7.2 Calibration requirements

7.7.2.1 Overview

The permissibility of a calibration start depends on which message(s) are currently active in the device.

- An overview of the messages whose presence permits the start of a calibration is available in section → Permissibility of calibrations (Page 120).
- The execution of a calibration is generally not permitted in the following cases:
  - The device is in "Warming-up" mode.
  - Active messages exist that are not covered by specific exceptions or will be canceled:

  The device checks if execution of a calibration is permitted. If the calibration is not permitted, a corresponding message is displayed and the process is canceled.
  An overview of the messages whose presence makes the start of a calibration impermissible is available in section → Non-permissibility of calibrations (Page 121).

7.7.2.2 Permissibility of calibrations

Overview

The tables below provide an overview of cases in which the execution of a calibration is permitted or may be necessary to remove a message. Information on additional messages and the corresponding remedial measures is available at:

- → OXYMAT 7 message list (Page 251)
- → ULTRAMAT 7 message list (Page 256)
- → CALOMAT 7 message list (Page 261)

Permitted calibration

Table 7-4 Permissibility of calibrations as part of the interference gas measurement

Message	
No.	**Text**
- [1)]	An active message affects another component that is not calibrated.
- [1)]	Active messages created by the device are available.

[1)] Diverse, comparable message list.

Table 7-5 Permissibility of calibrations with the following calibration drift messages

Message	
No.	**Text**
[22]	Calibration tolerance exceeded at zero point.
[23]	Validation tolerance exceeded at zero point.
[24]	Calibration tolerance exceeded at span point.
[25]	Validation tolerance exceeded at span point.
[29] to [32]	Zero drift MR1 to MR4 outside tolerance.

Table 7-6 Permissibility of calibrations with the following messages for measured values

Message	
No.	**Text**
[33]	Measured value greater than full-scale value.
[238]	Cross-interference measured value uncertain or faulty.

Table 7-7 Permissibility of calibrations with the following message for phase calibration or normalization calibration

Message	
No.	**Text**
[27]	Signal frequency changed. Normalization required!

See also

Non-permissibility of calibrations (Page 121)

7.7.2.3 Non-permissibility of calibrations

Overview

The tables below provide an overview of cases in which the execution of a calibration is not permitted. Information on additional messages and the corresponding remedial measures is available at:

- → OXYMAT 7 message list (Page 251)
- → ULTRAMAT 7 message list (Page 256)
- → CALOMAT 7 message list (Page 261)

Non-permissible calibration

Table 7-8 Non-permissibility of calibrations with the following messages for pressure sensors

Message	
No.	**Text**
[15]	Sample gas pressure outside tolerance.
[16]	Sample gas pressure uncertain.
[17]	Reference gas flow measurement uncertain.
[18]	Reference gas pressure too low.

Table 7-9 Non-permissibility of calibrations with the following voltage messages

Message	
No.	**Text**
[64]	Power supply 3.3 V outside tolerance.
[65]	Operating voltage 24 V outside tolerance.
[66]	Power supply +5 V outside tolerance.
[67]	Power supply -5 V outside tolerance.
[69]	Power supply +22 V outside tolerance.
[70]	Reference voltage 2.5 V outside tolerance.

Table 7-10 Non-permissibility of calibrations with the following additional messages

Message	
No.	**Text**
[2]	Maximum warming-up time exceeded.
[87]	AM parameter memory faulty.
[89]	ADC faulty.
[128]	SPI communication faulty.
[144]	System error
[145]	Watchdog reset
[146]	Configuration faulty.
[150]	Parameter value invalid.
[153]	Factory synchronization of the electronics faulty.

See also

Permissibility of calibrations (Page 120)

7.7.3 [2.08.1] Setpoints, tolerances, purging time

7.7.3.1 Overview

This menu gives you access to the settings you need for preparation of a calibration/validation. The menu contains the following submenus:

Table 7-11 Setpoints, Tolerances, Purging Time

Structure of the navigation lines		
1.	Setpoints	Edit ►
2.	Validation tolerance	►
3.	Calibration tolerance	►
4.	Sample gas purging time	►

7.7.3.2 Setting the setpoints

Procedure

Note

Measuring ranges

Setpoints can only be set for the activated measuring ranges. If necessary, check the parameter assignment of the setpoints, for example in → [1.4] Measuring ranges (Page 92).

1. Main menu > "2. Settings" > "08. Calibrations" > "1. Setpoints, tolerances, purge time" > "1. Setpoints"
   In this component-specific menu you can enter the setpoints for zero gas and span gas calibrations for each measuring range.
   The unit and format of the input correspond to the default settings of the respective component.

Structure of the navigation bars	
Zero gas measuring range 1 to 4 [1]	Setpoint [2]
Span gas measuring range 1 to 4 [1]	Setpoint [2]

[1] Reduced display. One line or input of a setpoint is possible for each measuring range.

[2] Entry in the preset unit.

Note

Setting ranges

The setting ranges of the setpoints (possible minimum/maximum values) are limited by the assigned start-of-scale values and full-scale values. Example:

- Changes to a measuring range can result in the setpoints assigned to the measuring range being outside the measuring range.
- The device displays the message "[150] - Parameter value invalid".

Adapt the setpoints. Make sure that the setpoints are within the valid measuring range.

2. Enter zero gas setpoints: .
   "Zero gas range 1" to "Zero gas range 4" parameter boxes.
   – Authorize access with Expert PIN, if necessary.
   – The assignment of one setpoint is sufficient for a total calibration.
   – Zero gas setpoint < span gas setpoint
3. Enter span gas setpoints:
   "Span gas range 1" to "Span gas range 4" parameter boxes.
   – The assignment of one setpoint is sufficient for a total calibration.
   – Span gas setpoint > zero gas setpoint
   Recommendation: Span gas setpoint at 70 to 100% of the current measuring range.

7.7.3.3 Setting validation tolerances

Procedure

1. Main menu > "2. Settings" > "08. Calibrations" > "1. Setpoints, tolerances, purge time" > "2. Validation tolerances"
   The settings of this menu cause the device to monitor the deviations of the zero point or span point compared to the last calibration.
   If the set values are exceeded, the device outputs a maintenance demanded. In this case, you must calibrate the device again.
2. Set the validation tolerance at zero point: "Zero point" parameter box.
   – Authorize access with Expert PIN, if necessary.
   – Enter the validation tolerance at the zero point as a percentage. The percentage refers to the value of the smallest span.
3. Set the validation tolerance at the span point: "Span point" parameter box.
   Enter the validation tolerance at the span point as a percentage. The tolerance at the span point refers to the span or the full-scale value of the selected measuring range.

7.7.3.4 Setting the calibration tolerances

Procedure

1. Main menu > "2. Settings" > "08. Calibrations" > "1. Setpoints, tolerances, purge time" > "3. Calibration tolerances"
   The settings of this menu cause the device to monitor the deviations of the zero point or span point compared to the last calibration. The reaction to a tolerance violation is different for validation tolerance and calibration tolerance.

   Note

   Tolerance violation

   If the factory-set tolerance value is exceeded, the device outputs a maintenance alarm. The indicated measured values are no longer valid:
   - Evaluate the message text of the maintenance alarm. Remedy the causes of errors mentioned in it, for example, incorrectly set setpoints.
   - If the cause of a tolerance violation cannot be traced back to incorrect operator inputs, contact the service department and take the device out of service.

2. Enter the calibration tolerance at the zero point: "Zero point" parameter box.
   – Authorize access with Expert PIN, if necessary.
   – Enter the calibration tolerance at the zero point as a percentage. The percentage refers to the value of the smallest span.
3. Enter the calibration tolerance at the span point: "Span point" parameter box.
   Enter the calibration tolerance at the span point as a percentage. The tolerance at the span point refers to the span or the full-scale value of the selected measuring range.

See also

Alarm, error, and system messages (Page 249)

7.7.3.5 Setting the sample gas purging time

Requirement

The sample gas purge time is the time that elapses from after a solenoid valve switches (end of the calibration) until measurement of the sample gas resumes. If the solenoid valve switches at the end of the calibration, the device is still in the "Calibration" operating state. The device switches back to the "Measurement" operating state when the sample gas purge time ends.

The sample gas purge time can be set to adapt to the local conditions, for example with sample gas lines of different lengths and/or different purge speeds.

Depending on the hardware of the device, the sample gas purging time can be set device-specific or module-specific:

Table 7-12 Effect of the sample gas purging time

Device-specific	Module-specific
If only one analyzer module is installed or if a common gas path exists for two analyzer modules (series connection).	If two analyzer modules with separate gas paths are installed, set the parameters separately for each analyzer module.

Check the setup of the gas path as well as the parameter assignment of the process tags before you set the sample gas purging time: [2.12] Settings > Gas path/process tag label (Page 183).

Procedure

1. Main menu > "2. Settings" > "08. Calibrations" > "1. Setpoints, tolerances, purge time" > "4. Sample gas purging time"
2. Specify duration: "Sample gas purging time" parameter box.
   - Authorize access with Expert PIN, if necessary.
   - Increase/reduce preset value.
   - During the selected time, the "Function check" remains set. After the purge time has elapsed, the device automatically changes to the "Measurement" operating state.

7.7.4 [2.08.2] Calibration pool

7.7.4.1 Overview

The calibration pool allows you to define up to 36 memory locations for individual calibrations. The calibration pool entries are arranged numerically, remain permanently saved, and can be triggered immediately or at a later point in time.

Table 7-13 Calibration pool (Example)

Structure of the navigation lines				
01.	O2, CO, CO2 [1]	2-pt. [2]	Total [3]	MR1 [4] Edit ►
02.	CO, CO2	1-pt. zero gas	Single	MR2
03.	O2	1-pt. span gas	Single	MR4

[1] Components to be calibrated/validated simultaneously

[2] Type of calibration

[3] Total/single: Calibration or validation of all measuring ranges/of only one measuring range

[4] Measuring range to be calibrated/validated

With appropriate parameter assignment, calibration pool entries can also be controlled by means of digital inputs. In addition, predefined calibration pool entries can be combined and triggered cyclically in the context of the automatic calibration function "AutoCal". The calibration pool entries then constitute the individual steps of the AutoCal function.

See also

Assigning parameters for calibration pool entries (Page 127)

7.7.4.2 Assigning parameters for calibration pool entries

Procedure

1. Main menu > "2. Settings" > "08. Calibrations" > "2. Calibration pool" > " ... "
   Start with the parameter assignment of the selected calibration (01. to 36.):
2. Select components to be calibrated: "Components" parameter field.
   - Authorize access with Standard PIN, if necessary.
   - Enable/disable one or more component-related check boxes in the displayed editing window.
3. Specify calibration type: "Calibration type" parameter field.
   - If you select "2-pt.", zero gas calibration and span gas calibration are executed one after the other. Otherwise you set either a zero gas calibration or a span gas calibration.

4. Specify the scope of the calibration: "Single/total" parameter field.
   This function is used to define the scope of the calibration - one or all measuring ranges. The measuring range set in the calibration is always calibrated.
   - If you set "Single", calibration is only applied for the set measuring range. Calibrations of the other measuring ranges remain unchanged.
   - If you set "Total", the calibrations parameters of the other measuring ranges are overwritten by the calibration parameters of this "leading" measuring range.

   In validation, only the set, "leading" measuring range is considered.
5. Assign measuring range(s): "Measuring range" parameter field.

   Note

   Setting the measuring ranges

   Check the settings of the measuring ranges before you assign a range to a calibration. Make sure that the ranges set are useful and activated for the respective application.

   Adjust the settings of the measuring ranges again, if necessary: [2.03] Settings > Measuring ranges (Page 107) menu.

   If you have set "Total" for the scope in step 4, the selected measuring range acts as the "leading measuring range".
6. Check use of calibration:
   - "Digital input" display field:
     If a digital input is using the calibration, the name of the digital input is displayed. Not used: "-".
     Change the parameter assignment of the digital inputs, if necessary. [2.09.3] Digital inputs (Page 142) menu.
   - AutoCal/AutoVal 1 or AutoCal/AutoVal 2:
     "Yes" will be displayed if one or both automatic calibrations/validations are already using this calibration pool entry as a sequence step. Not used: "No".

See also

Executing calibrations/validations by means of a calibration pool entry (Page 129)

7.7.5 [2.08.3] Execute calibrations

7.7.5.1 [2.08.3.1] Use calibration pool

Overview

If you want to execute a calibration/validation with a specifically selected calibration pool entry, you can use this menu. The wizard-driven calibration/validation can be used any number of times. In contrast to a calibration, calibration parameters are not changed during a validation.

For additional information, see also:

→ Overview (Page 129)

→ Executing calibrations/validations by means of a calibration pool entry (Page 129)

Executing calibrations/validations by means of a calibration pool entry

Requirements

The calibration pool has one or more entries: Assigning parameters for calibration pool entries (Page 127).

Procedure

1. Main menu > "2. Settings" > "08. Calibrations" > "3. Execute calibrations" > "1. Use calibration pool"
   In this menu you start a previously-assigned calibration or validation from the calibration pool.
2. Select calibration pool entry: "Selected calibration" parameter field
   - Authorize access with Standard PIN, if necessary.
   - Select one of the offered calibration pool entries in the displayed editing window.
   - After the selection, the parameter assignment of the calibration pool entry is displayed.
3. Start the wizard for a calibration or validation.
   - "Start validation" parameter field
     A validation evaluates the current device status with respect to the last calibration. The need for a new calibration can be derived from the validation results.
   - "Start calibration" parameter field

   Follow the instructions on the display.

See also

Overview (Page 128)

7.7.5.2 [2.08.3.2] Free calibration

Overview

You can use this menu if you do not require the calibration pool or if you wish to carry out a trial calibration/validation.

Parameter settings of free calibrations/validations are not saved in the calibration pool. The wizard-driven processes can be used any number of times. In contrast to a calibration, calibration parameters are not changed during a validation.

Information on the currently selected components is displayed in the right-hand area of the online mode:

- Measuring range values
- Calibration setpoints for the selected measuring range
- Absolute values for deviation from the calibration/validation tolerance (if the calibration/zero gas deviates from the setpoint by this value, successful calibration will not be possible)

See also

Executing a free calibration/validation (Page 130)

Overview (Page 128)

Executing a free calibration/validation

Procedure

Note

Setting the measuring ranges

Check the settings of the measuring ranges before you assign a calibration to a range. Make sure that the set measuring ranges are suitable for the application.

Adjust the settings of the measuring ranges again, if necessary: [2.03] Settings > Measuring ranges (Page 107) menu.

1. Main menu > "2. Settings" > "08. Calibrations" > "3. Execute calibrations" > "2. Free calibration"
   Depending on the wizard you enable, you either execute a calibration or validation. The parameter assignment of this menu is used for both processes.
2. Select components to be calibrated/validated: "Components" parameter box.
   - Authorize access with Standard PIN, if necessary.
   - Enable/disable one or more component-related check boxes in the displayed editing window.
3. Specify calibration type: "Calibration type" parameter box.
   - If you select "2-pt.", the zero gas calibration and span gas calibration are executed successively. Otherwise you set either a zero gas calibration or a span gas calibration.
4. Specify the scope of the calibration: "Single/total" parameter box.
   By setting this function, you define the scope of the calibration to one or all measuring ranges. The measuring range which was set in the calibration is always calibrated.
   - If you set "Single", the calibration is only made in the set measuring rage. Calibrations of the other measuring ranges remain unchanged.
   - If you set "Total", the calibrations of the other measuring ranges are overwritten by the calibration of this "leading" measuring range.

   In validation, only the set, "leading" measuring range is considered.

5. Assign measuring range(s): "Measuring range" parameter box.
   If you have set "Total" for the scope in step 4, the selected measuring range acts as the "leading measuring range".
6. Start the wizard for a calibration or validation.
   - "Start validation" parameter box
     A validation evaluates the current device status with respect to the last calibration. The need for a new calibration can be derived from the validation results.
   - "Start calibration" parameter box

   Follow the instructions on the display. The success of the calibration/validation is displayed in the result window once the process is complete.

Rectifying errors

If the device aborts a calibration due to errors, an error code, e.g., "F0123", and a plain text error message are displayed in the result window.

1. Write down the error code.
2. If you cannot rectify the cause of the error yourself, forward the error code to the service technician in charge.

See also

Overview (Page 129)

Alarm, error, and system messages (Page 249)

7.7.6 [2.08.4] AutoCal/AutoVal 1 and [2.08.5] AutoCal/AutoVal 2

7.7.6.1 Overview of AutoCal/AutoVal

Application options

An AutoCal or AutoVal sequence is a process that is executed manually or cyclically with steps that consist of up to 18 calibration pool entries. AutoCal sequences are combined from calibrations, and AutoVal sequences from validations. Parameters can be assigned for these steps according to the user's requirements.

SIPROCESS GA700 devices give you the option to set up two AutoCal-/AutoVal sequences. This yields many possible combinations, which you can set up independent of the application:

Table 7-14 Examples of AutoCal/AutoVal sequences

Configuration	Examples/description
1 AutoCal and 1 AutoVal [1)]	Two sequences are set up. The calibration pool entries of one sequence are either for calibration or validation.
2 AutoCal [1)]	Two sequences are set up. The calibration pool entries of one sequence are for the calibration of the component(s) of a module.
	Two sequences are set up. The calibration pool entries of one sequence are for the calibration of components of both modules. AutoCal 1 is used for zero gas calibration and AutoCal 2 for span gas calibration.
1 AutoCal or 1 AutoVal	Only one sequence is set up. The user assigns the calibration pool entries.

[1)] An AutoCal 2 sequence process can also be assigned as a sequence step of AutoCal 1. This is the only way in which you can combine up to 36 calibration pool entries with each other.

Sequence

Note

Differences between LUI and PDM

With SIMATIC PDM, you can start an AutoCal sequence manually and display its progress. However, it is not possible to cancel the sequence. You have to use the Local User Interface (LUI) of the analyzer for this purpose.

An AutoCal/AutoVal can be configured completely in SIMATIC PDM. You can also read out the time remaining until the execution of a cyclic AutoCal process.

An AutoCal can be started in one of three ways: manually, based on a time trigger, or via a digital input. When an AutoCal is started, the device first interprets the assigned steps.

If an analyzer module aborts a single calibration due to an error, the AutoCal process is aborted for the entire device and a corresponding error message is output.

If the analyzer module determines a tolerance violation during calibration of a gas component, the corresponding sequence step is ended and the AutoCal process is continued as planned. But the tolerance violation is entered into the logbook of the device.

If you cancel an AutoCal, the currently executed sequence step is canceled and the entire sequence is aborted. Any single calibrations that were successfully conducted up to this point are retained.

See also

Sequence of a calibration/validation (Page 118)

7.7.6.2 Setting the AutoCal/AutoVal sequence

Requirement

The following requirements must be met before you can specify the operating mode or start an AutoCal/AutoVal:

- Calibration pool entries are available.
- Starting the sequence using the digital inputs: The digital inputs have been configured accordingly.

Procedure

1. Main menu > "2. Settings" > "08. Calibrations" > "4. AutoCal/AutoVal 1" > "2. Sequence" or Main menu > "2. Settings" > "08. Calibrations" > "5. AutoCal/AutoVal 2" > "2. Sequence"
   Both menus have the same structure and show the sequence within one of the two possible AutoCal/AutoVal procedures.
   Each process can comprise up to 18 calibration pool entries, which serve as sequence steps.
   The menu entries are structured as follows:

Structure of the navigation lines			
01.	Calibration 10 [1]	CO, CO2 [2]	Purge time [3] Edit
02.	Sample gas purging	- [4]	Purging time [3]
03.	AutoCal 2	- [4]	- [4]
18.	Free [5]	- [4]	- [4]

   [1] Calibration pool entry

   [2] Component(s) to be calibrated

   [3] Time in format "hh:mm:ss"

   [4] Free if no component is specifically affected, for example, the entire module is purged with sample gas or a signaling contact is executed by means of a digital output.

   [5] Unassigned sequence step

2. Specify order of sequence step in entire process: "Move step to" parameter field
   Moving the step allows you, for example, to group active and inactive sequence steps.
   Authorize access with Standard PIN, if necessary.
3. Specify sequence step: "Operation" parameter field.
   - If you select the "Free" setting, the sequence step within an AutoCal is skipped.
   - "Only passive CAL": This setting is only practical for synchronizing the AutoCAL of several devices with a shared gas path. Also refer to the settings in → Table 7-21 Function assignment at function (pre-selection): "AutoCal" (Page 144).

   The menu is adapted depending on the selected process.

4. Make any additional settings, if necessary:

Process	Parameter fields to be set
Calibration 01 to 36	Enter purge time per calibration point. Purge time, here: Time for which the device remains at the calibration point. The purge time must be at least as long as the noise suppression time. Set the purge time so that the measuring chamber is completely filled with calibration gas before the start of calculations.
Sample gas purging	Purge time, here: Time during which the sample gas is introduced.
Measuring mode	Purge time, here: Time the device stays in "Measurement" operating state.
Only passive CAL	No additional settings in this menu. Sequence step is skipped.
Signaling contact	No additional settings in this menu. Time during which a digital output that is assigned as a signaling contact is set for more than one second. Signaling contact: AutoCal signaling contact, 1000 ms pulse. Assigned to digital output [1].
AutoCal 2	No additional settings in this menu.

[1] The signaling contact allows you to trigger an AutoCal/AutoVal sequence on a second device, and signal the start/end of a sequence.

5. Configure the operating mode of AutoCal/AutoVal: → Setting the AutoCal/AutoVal mode (Page 134).

See also

Overview of digital inputs (Page 142)

7.7.6.3 Setting the AutoCal/AutoVal mode

Requirement

The following requirements must be met before you specify the operating mode or start an AutoCal/AutoVal:

- Calibration pool entries are available.
- The calibration/validation sequence has been configured:→ Setting the AutoCal/AutoVal sequence (Page 133).

Procedure

Note

Setting instructions

The "countdown" for the next cycle starts each time you start a cyclic AutoCal/AutoVal.

The following applies to prevent a cycle "B" from starting immediately after a cycle "A": The configured cycle time must be longer than the execution time of the running AutoCal/AutoVal.

Note

Triggering cyclic AutoCal/AutoVal operations

- When you trigger an AutoCal/AutoVal operation with a digital input or manually, the cyclical execution remains unaffected. The operation starts after expiration of the correspondingly configured cycle time.
- If triggering an AutoCal/AutoVal when the cycle time has already elapsed is temporarily not possible, for example, due to the user currently logged on, the following applies: Once the operation can be executed, the AutoCal/AutoVal process starts. The cycle time is shortened by the delay in order to maintain the interval.

1. Main menu > "2. Settings" > "08. Calibrations" > "4. AutoCal/AutoVal 1" > "1. Operating mode"
   or
   Main menu > "2. Settings" > "08. Calibrations" > "5. AutoCal/AutoVal 2" > "1. Operating mode"
   Both menus have the same structure and contain settings that are used to have calibrations or validations run in an automated manner.
2. Specify execution type: "Cyclic AutoCal/Val" parameter field.
   - Authorize access with Standard PIN, if necessary.
   - Use the "Cal" or "Val" settings to enable the cyclic start of a calibration or validation process.
   - If you select "Off", the available settings for initial execution and cycle time are displayed but cannot be edited.
3. Enter date and time of the first cycle start: "Execute for first time" parameter field
4. Define the cycle time: "Cycle time" parameter field.

   Note

   Specifying the cycle time

   The cycle time always extends from the start time of one AutoCal/AutoVal sequence to the start time of the next. The smallest cycle time is 1 hour.

   If the set cycle time is less than the actual expiration time required, then:
   - The next AutoCal/AutoVal is held back until the end of the previous process.
   - The "Calibration" operating mode is not exited.

   This means you have to set a cycle time that is greater than the expiration time of an AutoCal/AutoVal.

   The cycle time commences immediately after the first execution of an AutoCal/AutoVal.
   If the function is triggered manually between the cycles, the cycle is retained. Missed cycles are not made up for later. The cycle starts at the next cycle time.

5. Check the time remaining until the next cycle start: "Remaining time" display field.
   The remaining time is the time between the first execution of an AutoCal/AutoVal and the cycle time. The device adjusts the remaining time following a successful AutoCal/AutoVal. If the first execution has not been carried out yet, the device indicates the remaining time up to the start of the function.
6. Starting AutoCal/AutoVal manually: "Trigger AutoCal n once" or "Trigger AutoVal n once" parameter field ("n" stands for the selected AutoCal/AutoVal 1 or 2).
   Follow the instructions on the display. Triggering of the process has no influence on the time cycle. The cycle time continues to run.

7.8 [2.09] Settings > Inputs/outputs

7.8.1 [2.09.1] Analog inputs

7.8.1.1 Overview

Note

Availability of the menu

The availability of this menu depends on the configuration of your analyzer. The menu is displayed only if you have optional module 2.2 in your SIPROCESS GA700 device.

The menu allows you to access the parameters of the four analog inputs provided by the optional module 2.2.

The measured values supplied by the analog inputs can be used to display additional process values in the main view, for pressure compensation and for correction of cross-interferences.

7.8.1.2 Set analog inputs

Setting the measured value type

1. Main menu > "2. Settings" > "09. Inputs/outputs" > "1. Analog inputs"
   A navigation bar with the following structure is assigned to each of the four analog inputs:

Structure of the navigation bar for each analog input				
Input number	Analog input name [1]	Measured value type	Name [2]	Unit Edit

[1] "AI01: ... AI04:"

[2] Default or can be set by the user

2. Open selected analog input: Press <ENTER>.
   As default, the parameter display of an analog input that has not yet had parameters assigned contains only the "Measured value type" parameter box with the setting "Free".
3. Set the measured value type.

   Note

   Effect

   By setting this parameter, you decide the type of values read in via the analog input. With your selection, you also restrict the area of application of the analog input. Values labeled "Pressure" are used for pressure compensation. Values labeled "Gas" are used for correction of cross-interference.

   The extent of the menu is adapted depending on your selection.

   Open the "Measured value type" parameter box. Select one of the following measured value types from the displayed list window.

   – "Free"
   – "Gas", "Pressure", "Flow", "Temperature"
     If you use this analog input for correction of cross-interference, the volume-specific weight of the gas is automatically taken into account.
   – "Other"
4. Set the parameters for the analog input depending on the selected measured value type.

Setting the analog input with the measured value type "Gas"

1. Main menu > "2. Settings" > "09. Inputs/outputs" > "1. Analog inputs" > "Analog input n"
   The measured value type is set to the value "Gas".
2. Select gas for correction of cross-interference: "Gas density as" parameter field.
   By selecting one of the gases shown in the list window, you can use the analog input as the source of a cross-interference correction. Here, the volume-specific weight of the gas is taken into account in the correction factor.

NOTICE
Potential malfunction of the device Changes to the "Gas density as" parameter are not forwarded to the corresponding menus via the analog input with variable correction of cross-interference→ Menus 2.10.3 to 2.10.6. If these settings differ from one another, the device may malfunction when a correction of cross-interference is performed via an analog input. Check the settings accordingly → Assigning variable correction of cross-interference (Page 169). Make sure that the same analog input and the same correction gases are set for correction of cross-interference in → menus 2.09.1. n and 2.10.3 to 2.10.6 2.10.

3. Specify the input range: "Analog input range" parameter box. Set one of the two possible current ranges:
   - 4 to 20 mA
   - 0 to 20 mA
4. Set the unit of the measured value: "Unit" parameter box. The following units can be set depending on the measured value type
   - "ppm": When changing the measured value type to the value "Gas", the "ppm" value is set first.
   - "%", "mg/m³" "mg/l", "g/m³", "g/l", vpm
   - "u": "undefined unit"
5. Specify the start-of scale and full-scale value of the analog input range: Parameter boxes "Start-of-scale value for 0/4 mA" or "Full-scale value for 20 mA".
   The start-of-scale and full-scale values must always be identical to those of the device feeding in. Check the corresponding values of the external analyzer or the sensor being used.
   For the input to be accepted, the start-of-scale value must be lower than the full-scale value.
6. Enter the user-specific name of the analog input: "Designation" parameter box.
   You can use a maximum of seven characters when entering the designation.
7. Read off the measured value: Display of the current analog input value according to the current analog input parameter assignment.

Setting an analog input with the measured value type "Pressure", "Flow" or "Temperature"

If you set this measured value type, the "Gas" parameter box is omitted.

1. Main menu > "2. Settings" > "09. Inputs/outputs" > "1. Analog inputs" > "Analog input n"
   The measured value type is set to the value "Pressure", "Flow" or "Temperature". The units assigned to the measured value type are set in the factory and these defaults cannot be changed by the user:
   - Pressure: → hPa
   - Temperature: → °C
   - Flow: → ml/min
2. Specify the input range: "Analog input range" parameter box. Set one of the two possible current ranges
   - 4 to 20 mA
   - 0 to 20 mA
3. Specify the start-of scale and full-scale value of the analog input range: Parameter boxes "Start-of-scale value for 0/4 mA" or "Full-scale value for 20 mA".
   The start-of-scale and full-scale values must always be identical to those of the device feeding in. Check the corresponding values of the external analyzer (measured value type "Gas") or the sensor being used.
   For the input to be accepted, the start-of-scale value must be lower than the full-scale value.
4. Enter the user-specific name of the analog input: "Designation" parameter box.
   You can use a maximum of seven characters when entering the designation.
5. Read off the measured value: Display of the current analog input value according to the current analog input parameter assignment.

Setting the analog input to the measured value type "Other"

If you set this measured value type, the parameter and display fields "Gas" and "Unit" are omitted.

1. Main menu > "2. Settings" > "09. Inputs/outputs" > "1. Analog inputs" > "Analog input n"
   The measured value type is set to the value "Other". All measured values are output in the unit "u" (undefined unit).
2. Specify the input range: "Analog input range" parameter box. Set one of the two possible current ranges
   - 4 to 20 mA
   - 0 to 20 mA
3. Specify the start-of scale and full-scale value of the analog input range: Parameter boxes "Start-of-scale value for 0/4 mA" or "Full-scale value for 20 mA".
   The start-of-scale and full-scale values must always be identical to those of the device feeding in. Check the corresponding values of the sensor being used.
   For the input to be accepted, the start-of-scale value must be lower than the full-scale value.
4. Enter the user-specific name of the analog input: "Designation" parameter box.
   You can use a maximum of seven characters when entering the designation.
5. Read off the measured value: Display of the current analog input value according to the current analog input parameter assignment.

7.8.2 [2.09.2] Analog output

7.8.2.1 Overview

Note

Availability of the menu

This menu is only available if your device has at least one of the optional modules (2.1 and/or 2.2).

Behavior of analog outputs

The settings of the analog outputs are component-specific and depend on the currently set measuring range.

You can define current ranges for valid measured values or set inverted current ranges. If you use inverted current ranges, the assignment changes, for example: 0 ... 10 % CO ≡ 0 ... 20 mA → 0 ... 10 % CO ≡ 20 ... 0 mA.

To ensure that negative measured values do not influence the further processing of measured values, such negative measured values can be suppressed at the analog output. The unchanged value is output on the device display.

In addition, you can define responses to specific device statuses. The following outputs are available as alternatives in case of faults or with enabled function check:

- Display of the current measured value
- Display of the last measured value determined
- Display of the low or high limit of the analog output. The corresponding values are listed in the table below in the section "Analog output range".

Analog output range

Table 7-15 Analog output range and measuring range limit

Specified analog output range [mA]	Measuring range limit			
	Normal operation [mA]		Fault/CTRL [1] [mA]	
	Low limit	High limit	Low limit	High limit
4 to 20 (NAMUR)	3.8	20.5	3	21.5
4 ... 20	2	21	2	21
0 ... 20	0	21	0	21
20 ... 0 [2]	0	21	0	21
20 ... 4 [2]	2	21	2	21

[1] CTRL = Function check

[2] Inversion

7.8.2.2 Setting the analog outputs

Procedure

Note

Component-specific setting

An analog output is available for each component. Repeat the procedure described below for all components, if necessary.

1. Component > Main menu > "2. Settings" > "09. Inputs/outputs" > "2. Analog output"
   The parameter display is opened.
2. Set the analog output range: "Analog output range" parameter box.
   - Authorize access with Standard PIN, if necessary.
   - Select one of the available list entries according to Table 7-15 Analog output range and measuring range limit (Page 140).
3. Permit or suppress negative values: "Negative values" parameter box.
   If negative measured values have a negative impact on the measured value processing, select "Suppress".
   Negative measured values are then set to 0 or 4 mA at the analog output while the display still shows the negative measured value.
4. Set the behavior of the analog output with enabled function check: "At function check" parameter box.
   By setting this parameter you determine which value is output by the analog output on a change to "Function check" operating state. The following values can be output as an alternative:

Setting	Description
Min	Low limit of the analog output range
Max	High limit of the analog output range
Measured value	Current measured value
Retain	Last measured value before entering function check

5. Set the behavior of the analog output in case of a maintenance alarm or fault: "At main.alarm/fault" parameter box:
   Setting range and setting options correspond to step 4.

See also

Overview (Page 140)

Setting the measured-value format (Page 102)

7.8.3 [2.09.3] Digital inputs

7.8.3.1 Overview of digital inputs

Functions

The device functions can be controlled using digital inputs. A function can only be controlled by one digital input or one result of logic operation.

Note

Function suppression dependent on the operating mode

If the device is in the "Function check" or "Measuring protection" mode, certain functions are suppressed and cannot be controlled via digital inputs.

- Function check:
  - The function check is set automatically as soon as the user logs on to the device. The digital inputs only have access to the device functions again after the user has logged off.
  - During validation or calibration, the device is also in the "Function check" status.
- Measuring protection:
  Measuring protection is set via an active digital input. The suppressed functions retain this status prior to the start of the "Measuring protection" operating mode.

The table below shows an overview of the functions suppressed depending on the operating state.

Table 7-16 Digital inputs suppressed during function check / measuring protection

Function of the digital inputs	Suppression by	
	Function check[1)]	Measuring protection
AutoCal 1/2	X	X
AutoVal 1/2	X	X
AutoCal 1/2 Sync.	X	X
Measuring range 1 to 4	X	X
Control calibration	X	X
Calibration 01 ... 36	X	X
Measuring protection	X	-
Pump on/off	X	X
Acknowledge messages	X	X
Software reset	X	X

1) Triggered by a user logging on or by calibration/validation.

Assignments of function (pre-selection) - function

Note

Assignment rule

To assign a function, you first make a pre-selection and then set a function that is included in the pre-selection: → Setting digital inputs (Page 147).

The device excludes the multiple assignment of functions. When you assign a function, this function is no longer available for other digital inputs. Although the already assigned function continues to be listed, it can no longer be adopted. Instead the device outputs an error message.

The list below includes all functions that you can control digitally. The information in the "Trigger" column applies to the "High" setting. The signals or signal edges are inverted at "Low".

Table 7-17 Function assignment at function (pre-selection): "Free"

Function	Trigger	Remark / effect
Free	-	Digital input is free: no function assignment.

Table 7-18 Function assignment at function (pre-selection): " Ext. fault", "Ext. maint. alarm", "Ext. maint. demand" or "Ext. maint. required"

Function	Trigger	Remark / effect
Fault 1 to 8	 Negative/positive edge [1)]	External fault 1 to 8
Maint. alarm 1 to 8	 Negative/positive edge	External maintenance alarm 1 to 8
Maint. demand. 1 ... 8	 Negative/positive edge	External maintenance demand 1 to 8
Maint. required 1 to 8	 Negative/positive edge	External maintenance required 1 to 8: user-defined signal

[1)] "Level-triggered": With the parameter assignment digital input active when "High" ⇒ activation by a rising edge (level = HIGH / deactivation by a falling edge (level = LOW). Active at signal level "High".

Table 7-19 Function assignment at function (pre-selection): "Ext. funct. check"

Function	Trigger	Remark / effect
Function check 1 to 8	 Negative/positive edge	External function check 1 ... 8: A different device signals "Function check".

[1] "Level-triggered": activation by negative signal edge, deactivation by positive signal edge. Active at signal level "Low".

Table 7-20 Function assignment at function (pre-selection): "Calibration"

Function	Trigger	Remark / effect
Calibration 01 to 36	 Positive edge [1]	Calibration 01 to 36 Start single calibration. The calibrations must be assigned in the calibration pool.
Control calibration	 Positive edge [1]	Control of a calibration started via a digital input (Calibration 01 to 36) / start of the next calibration: This causes the switch to the next intermediate steps during calibration. Execution of the next step in the sequence is then time related. • Time 1 after the start of a calibration: There is calibration gas in the device, the calculation is being made, the signal filter is active. • Time 2: – 1-point calibration is completed (zero gas or span gas calibration) – 2-point calibration: Injection of span gas necessary • Time 3 (only with 2-point calibration): There is calibration gas in the device, the calculation is being made, the signal filter is active. • Time 4: 2-point calibration is completed.

[1] "Edge triggered": Activation by rising signal edge.

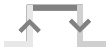
Table 7-21 Function assignment at function (pre-selection): "AutoCal"

Function	Trigger	Remark / effect
AutoCal1/ AutoCal2	 Positive edge [1]	Start AutoCal 1 or AutoCal 2.
AutoVal1/ AutoVal2	 Positive edge [1]	Start AutoVal 1 or AutoVal 2.

Function	Trigger	Remark / effect
AutoCal1 Sync./ AutoCal2 Sync. (Function cannot currently be executed)	 Positive edge [1]	Start AutoCal n/AutoVal n in sync. Starting an AutoCal/AutoVal that is used on several networked devices (chain) synchronously. To do so, one sync input and one sync output must be assigned per device.
AutoVal1 Sync./ AutoVal2 Sync. (Function cannot currently be executed)	 Positive edge [1]	The sync. indicates the start/end of a gas purge. With a 2-point calibration, two sync sequences determine one single AutoCal sequence step. If such a 2-point calibration does not apply to one device in the chain, assign a passive calibration for the corresponding steps.

[1] "Edge triggered": Activation by rising signal edge.

Table 7-22 Function assignment at function (pre-selection): "Measuring range"

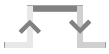
Function	Trigger	Remark / effect
Measuring range 1 to 4 [1]	 Positive/negative edge [3]	If the measuring range is not controlled according to the parameter assignment but by means of a digital input: the measuring rang signaled as active by the digital input is used ("Measuring range 1 to 4" or autoranging). If no digital input is active, the measuring ranges of the parameter assignment are used accordingly. If several digital inputs are active, the following prioritization applies: Measuring range 4 → measuring range 3 → measuring range 2 → measuring range 1 → autoranging.
Autoranging [2]	 Positive/negative edge [3]	

[1] Switch measuring range 1 to 4.

[2] Activate autoranging.

[3] "Level-triggered": Activation by rising signal edge, deactivation by falling signal edge. Active at signal level "High".

Table 7-23 Function assignment at function (pre-selection): "Other functions"

Function	Trigger	Remark / effect
Switch pump	 Positive/negative edge [1]	Switch sample gas pump [3]. The pump is switched on at a positive edge and switched off at a negative edge.
Measuring protection	 Positive/negative edge [1]	Activate measuring protection. As long as the measuring protection is active, no other user actions on the device are possible. This especially includes changes to the configuration as well as initialization of calibration via a digital input or via a bus interface. A cyclical AutoCal that has already been configured is still executed, however because no user actions are necessary for this.
		The measuring protection is only set if the following requirements are met: • The device is in the "Measurement" operating mode. • The inputs/outputs are not currently tested, for example, during the commissioning/checking of communication with the control system: → Menu [3.11] Maintenance and diagnostics > Test • The device is not in the "Function check" operating mode. • No user is logged on.
		The measuring protection is set with a delay under the following conditions: • As long as function check is active • As long as the operating mode is not "Measurement" • As long as an already started calibration is still running (including expiration of the sample gas purging time) • If a calibration was triggered by a digital input, until the end of the calibration or until the trigger is discarded. • If an AutoCal/AutoVal is pending and its execution is delayed • As long as an AutoCal/AutoVal is running, including sample gas intermediate operation
Ack. curr. mess.	 Positive edge [2]	Acknowledge current messages. As long as the cause of a fault, a maintenance alarm, or a maintenance demand has not been remedied, the corresponding message is still pending. Messages are not acknowledged in the logbook but in the message list.
Software reset	 Positive edge [2]	Software reset

[1] "Level-triggered": Activation by rising signal edge, deactivation by falling signal edge. Active at signal level "High".

[2] "Edge triggered": Activation by rising signal edge.

[3] Requirement: optional gas management module is installed.

7.8.3.2 Setting digital inputs

Procedure

1. Main menu > "2 Settings" > "09 Inputs/outputs" > "3 Digital inputs"
   Up to 20 digital inputs can be assigned, depending on the hardware of your device. A navigation line with the following structure is assigned to each digital input:

Structure of the navigation line for each digital input				
Navigation no. [1]	DI name	Function	Component [2]	Additional text [3] Edit

   [1] Standard: Digital inputs 01 ... 08
   With option module 1.1 additionally: Digital inputs 09 ... 16.
   With option module 2.2 additionally: Digital inputs 17 to 20.

   [2] Display for function "Measuring range n" only

   [3] Display for externally controlled functions only

2. Open selected digital input: Press <ENTER>.
   The factory-set parameter display of a digital input whose parameters have not yet been assigned has two parameter boxes:
   - "DI active for" parameter box, setting "High"
   - "Function (pre-selection)" parameter box, setting "Free"
3. Set the trigger: "DI active for" parameter box.
   Use the information in → Overview of digital inputs (Page 142) when setting the activation level.

4. Select function (pre-selection) and functions of the digital input: "Function (pre-selection)" and "Function" parameter boxess.
   Use the information in the tables below when setting the pre-selection:
   → Table 7-17 Function assignment at function (pre-selection): "Free" (Page 143).
   → Table 7-18 Function assignment at function (pre-selection): " Ext. fault", "Ext. maint. alarm", "Ext. maint. demand" or "Ext. maint. required" (Page 143).
   → Table 7-19 Function assignment at function (pre-selection): "Ext. funct. check" (Page 144).
   → Table 7-20 Function assignment at function (pre-selection): "Calibration" (Page 144).
   → Table 7-21 Function assignment at function (pre-selection): "AutoCal" (Page 144).
   → Table 7-22 Function assignment at function (pre-selection): "Measuring range" (Page 145).
   → Table 7-23 Function assignment at function (pre-selection): "Other functions" (Page 146).
   Additional parameter boxes are displayed, depending on the set pre-selection or function.
5. Set additional parameter boxes or check displayed values:

Function (pre-selection)	Additional parameter boxes	Activity
Ext. ...	Text	Enter free text.
Measuring range	Component	Select component.
Calibration pool [1]	Diverse [1)]	Check the parameter assignment of the calibration pool entry.

[1)] The display refers to a specific calibration pool entry and includes: component(s), calibration type, single/total calibration as well as the assigned measuring range.

Note

Effects of modified message texts

If you modify an existing message text, all the existing logbook entries will be overwritten with the newly created text.

See also

Setting MODBUS digital inputs (Page 244)

Linking digital inputs (Page 149)

7.8.4 [2.09.4] DI links

7.8.4.1 Overview of DI links

Note

Linking digital inputs

You can logically combine up to eight digital inputs using "AND" and "OR" logic operations. The results of the logic operations, as virtual digital inputs, can also be part of a link and serve to control functions.

- Only use a link as an input of additional links on the condition that the inputs to be linked do not already contain results of logical operations.
- A maximum of two linking levels are permitted in a hierarchical structure of links.
- Links in which the result is used as input in links again are not permitted.

As soon as a link is set, the device checks whether a ring closure is present. If a ring closure is detected, the device outputs a corresponding error message.

7.8.4.2 Linking digital inputs

Requirements

Before you link several digital inputs in a digital input link, the following requirements must be met:

- MODBUS communication is established (for MODBUS digital inputs only)
- The digital inputs have been configured:
  - Setting digital inputs (Page 147)
  - Only for transmission of the digital inputs using MODBUS TCP:
    Setting MODBUS digital inputs (Page 244)

Procedure

1. Main menu > "2. Settings" > "09. Inputs/outputs" > "4 DI links"
   The menu includes eight navigation lines for digital input links. Each of these links can access up to eight digital inputs or digital input links.

Structure of the navigation line for each DI link		
Navigation no. [1]DI name:	Function [2] [3] [4]	Activation ID [5] Edit

[1] Standard: Digital inputs 01 to 08. With option module 1 also: Digital inputs 17 to 20. With option module 2 also: Digital inputs 09 to 16.

[2] Function triggered by the DI link. Depending on setting 3) or 4)

[3] If the DI link switches a measuring range, the component name is displayed.

[4] Message text of function at DI link = external fault, maintenance required, maintenance demanded, maintenance alarm, function check.

[5] Logical operation "AND" / "OR" or with deactivated link off.

2. Open selected DI link: Press <ENTER>.
   The parameter display of a digital input whose parameters have not yet been assigned includes parameter fields that you can use to define the type of link, the function assignment as well as the objects to be linked.
3. Set the logic operation: "Type of logic operation" parameter field.
   – Authorize access with Standard PIN, if necessary.
   – Specify when the logic operation is activated:

Operator	**Effect**
OR	Only one of the linked digital inputs must be enabled.
AND	All linked digital inputs must be active.
OFF	Deactivates the logic operation.

4. Set up logic operations: parameter fields "1 to 8" of the "Inputs to be combined" group.
   Select one of the digital inputs whose parameters are already assigned, or an existing link.

5. Select function (pre-selection) and functions of the logic operation: "Function (pre-selection)" and "Function" parameter fields.

Note

Assignment rule

The device excludes the multiple assignment of functions. When you assign a function, this function is no longer available for other digital inputs or for links to such inputs.

   – Also use the information in Table 7-16 Digital inputs suppressed during function check / measuring protection (Page 142) when setting the function (pre-selection).
   – By selecting a function (pre-selection) you also specify which functions can be assigned to the logic operation.
   Additional parameter fields are displayed according to the function (pre-selection) or function.

6. Set additional parameter fields or check displayed values:

Function (pre-selection)	Additional parameter fields	Activity
Ext. ...	Text	Enter free text.
Measuring range	Component	Select component.
Calibration pool [1]	Diverse [1)]	Check the parameter assignment of the calibration pool entry.

[1)] The display refers to a specific calibration pool entry and includes: component(s), calibration type, single/total calibration as well as the assigned measuring range.

See also

Overview of digital inputs (Page 142)

7.8.5 [2.09.5] Digital outputs

7.8.5.1 Overview

Digital outputs on the basic device and optional module 1

Each basic device comes equipped with eight user-assignable digital outputs (relays) whose output contacts can be switched. Optional module 1 makes 12 further digital outputs available for which parameters can be set. The numbering of these digital outputs begins again at 1.

The digital outputs can be used for different tasks, for example, signaling or control of valves. The corresponding functions can be assigned to several digital outputs. These digital outputs can perform the following tasks:

- Status message (function check, operating states)
- Output of maintenance-related messages, for example: maintenance demanded, maintenance required, maintenance alarm

- Output of fault messages
- Output of the current measuring range and/or the current process tag
- Switchover of the process tag
- Output of limit violations
- Output of status of a result of logic operation
- Switching of solenoid valves
- Synchronization of AutoCal/AutoVal sequences of several devices ("Sync.", function cannot currently be executed.)
- Signaling of specific errors
- Signaling of different diagnostic states

You can find additional information on the functions that can be used under → Functions (Page 152).

Information on the terminal assignment of the individual digital outputs in de-energized state is available in the operating instructions of the device: → Table A-1 References 1 - Operating Manuals LUI (Page 271).

Digital outputs on analyzer modules

In addition to the eight digital outputs of the basic device, each analyzer module also has three digital outputs whose parameters cannot be assigned. These digital outputs are also numbered through from "1" to "3" per analyzer module.

These digital outputs are responsible for transmitting the status information of the analyzer module to specific applications. The assignment of the functions cannot be changed.

You can find additional information under → Table 7-25 Analyzer module: permanently assigned digital outputs (Page 154).

7.8.5.2 Functions

Basic device and optional module 1

The following functions can be assigned to digital outputs:

Table 7-24 Basic device / optional module 1: Functions of the digital outputs

Function	Remark/cause	Active level
Span gas MR1, ..., MR4	Switching on span gas to calibrate a measuring range	High
DI logic 1 ... 8	Output of logical state of a digital input link	High
Fct. check	Total function check: signaling of function check at device level	Low
Fct. check <AM1 component name>/ <AM2 component name>	Function check at module level: signaling of function check for analyzer modules 1 or 2	Low
Free	No function assignment	-

Function	Remark/cause	Active level
Limit 1/2	Signaling of limit violation of limit 1 or 2. The measured value violates the corresponding limit	Low
Calib. <AM1 component name>/ <AM2 component name>	Signaling of "Calibration" operating state at module level	High
Calibration	Total function check: signaling of "Calibration" operating state at device level	High
Signaling contact	Signaling contact: AutoCal signal contact, pulse 1000 ms	High
Measuring range 1 to 4	Signaling of active measuring range	High
Sample gas	Total signaling of sample gas	High
Sample gas 1 <AM1 component name>	AM1 requests sample gas (only visible with separate gas path)	High
Sample gas 2 <AM2 component name>	AM2 requests sample gas (only visible with separate gas path)	High
Process tag 01 to 12	Switchover of the process tag	High
Zero gas MR1 to MR4	Switching on zero gas for calibration	High
Switch pump	Switch external sample gas pump (on/off)	High
Fault	Signaling of overall device status "Fault"	Low
Fault <AM1 component name>/ <AM2 component name>/PU	Signaling of device status "Fault" at module level for analyzer module 1 or analyzer module 2 or processing unit (PU), depending on selection	Low
Sync. (Function cannot currently be executed)	Synchronization of AutoCal sequences between several devices	High
Maint.alarm	Signaling of overall device status "Maintenance alarm"	Low
Maint.alarm <AM1 component name>/ <AM2 component name>/PU	Signaling of device status "Maintenance alarm" at module level for analyzer module 1 or analyzer module 2 or processing unit (PU), depending on selection	Low
Maint.demand.	Signaling of overall device status "Maintenance demanded"	Low
Maint.demand. <AM1 component name>/ <AM2 component name>/PU	Signaling of device status "Maintenance demanded" at module level for analyzer module 1 or analyzer module 2 or processing unit (PU), depending on selection	Low
Maint. required	Signaling of overall device status "Maintenance required"	Low
Maint.required <AM1 component name>/ <AM2 component name>/PU	Signaling of device status "Maintenance required" at module level for analyzer module 1 or analyzer module 2 or processing unit (PU), depending on selection	Low
Zero gas	Total signaling of zero gas, independent of the measuring range	High
Zero gas <AM1 component name>	AM1 requests zero gas, independent of the measuring range	High
Zero gas <AM2 component name>	AM2 requests zero gas, independent of the measuring range	High
Span gas	Total signaling of span gas, independent of the measuring range	High
Span gas <AM1 component name>	AM1 requests span gas, independent of the measuring range	High
Span gas <AM2 component name>	AM2 requests span gas, independent of the measuring range	High
Individual messages	Signaling of an individual message	Low

Function	Remark/cause	Active level
Error status	Combined signaling of the status "Fault" and "Maint.alarm" in relation to the overall device	Low
Error status <AM1 component name>/ <AM2 component name>/PU	Combined signaling of the status "Fault" and "Maint.alarm" at module level for AM1, AM2 or processing unit (PU), depending on the selection	Low

Analyzer module

These functions are permanently assigned (no parameter assignment is possible):

Table 7-25 Analyzer module: permanently assigned digital outputs

Relay	Functions [1]	Active level	Remark/cause
1	Safe measurement	Enabled	Digital outputs 21 or 24.
	Unsafe measurement	Passive	The relay serves as status relay that signals an exit from safe measurement.
	Fault	Passive	
2	Function check "On"	Passive	Digital outputs 22 or 25.
	Function check "Off"	Enabled	The relay signals whether the module is in "Function check" mode.
3	Fault	Passive	Digital outputs 23 or 26.
	No alarm	Enabled	The relay is used in analyzer modules to signal the fault status.
	Maintenance alarm	Enabled	
	Maintenance demanded	Enabled	
	Maintenance required	Enabled	

1) Cannot be set

See also

Setting functions/components of a digital output (Page 156)

7.8.5.3 Setting digital outputs

Procedure

1. Main menu > "2. Settings" > "09. Inputs/outputs" > "5 digital outputs"
   The menu includes navigation lines for access to all available digital outputs. The number of available digital outputs depends on the hardware of your device.

Structure of the navigation line for each digital output				
Navigation no. [1] [2] [3]	DO name	Function	Component [4]	Edit

[1] Standard: Digital outputs 01 to 08.

[2] Only with optional module 1: Digital outputs 09 to 20.

[3] Cannot be configured: Digital outputs 21 to 23 (analyzer module 1), digital outputs 24 to 26 (analyzer module 2).

[4] Display only for function (pre-selection) "Limit", "Solenoid valve", "Measuring range"

2. Open selected digital output: press <ENTER>.
   The parameter display of a digital output whose parameters have not yet been assigned contains the "Function (pre-selection)" and "Function" parameters boxes, each with the setting "Free".
3. Define function group: "Function (pre-selection)" parameter box.
   The selection of the function group determines additional setting or display options.
4. Set function or component: "Component" or "Function" parameter box.
   Set component and function:
   - Table 7-31 Function (pre-selection) "Measuring ranges" (Page 157)
   - Table 7-33 Function (pre-selection) "Solenoid valves" (Page 158)
   - Table 7-29 Function (pre-selection) "Limit" (Page 157)

   Set function only:
   - Table 7-26 Function (pre-selection) "Free" (Page 156)
   - Table 7-27 Function (pre-selection) "Fault" (Page 156)
   - Table 7-28 Function (pre-selection) "Maintenance alarm", "Maintenance demanded", and "Maintenance required" (Page 156)
   - Table 7-30 Function (pre-selection) "Ext. warning limit" (Page 157)
   - Table 7-32 Function (pre-selection) "Process tags" (Page 157)
   - Table 7-34 Function (pre-selection) "DI links" (Page 158)
   - Table 7-35 Function (pre-selection) "Other functions" (Page 159)

   Set component only
   - With preselection "Maintenance alarm" and function "DO_FUNCTION_FAILURE_FLOW_VG_TOO_LOW", the component is set.
5. Set additional digital outputs. Repeat steps 2 to 5.

See also

Setting functions/components of a digital output (Page 156)

7.8.5.4 Setting functions/components of a digital output

Procedures

Table 7-26 Function (pre-selection) "Free"

Function (pre-selection)	Purpose/resulting settings
Free	No function. Set one of the following pre-selections or cancel the process.

Table 7-27 Function (pre-selection) "Fault"

Function (pre-selection)	Purpose/resulting settings
Fault	Report fault or error status. 1. "Function" parameter box: Authorize access with corresponding PIN, if necessary. 2. Set "Fault" value.

Table 7-28 Function (pre-selection) "Maintenance alarm", "Maintenance demanded", and "Maintenance required"

Function (pre-selection)	Purpose/resulting settings
Maintenance...	Signal maintenance alarm, maintenance demanded or maintenance required: 1. "Function" parameter box: Authorize access with corresponding PIN, if necessary. 2. Set the required message level.

Table 7-29 Function (pre-selection) "Limit"

Function (pre-selection)	Purpose/resulting settings
Limits	Signal limit violation 1. "Component" parameter box: – Authorize access with corresponding PIN, if necessary. – Select available component. 2. "Function" parameter box: Select one of the two assigned limits.

Table 7-30 Function (pre-selection) "Ext. warning limit"

Function (pre-selection)	Purpose/resulting settings
Ext. warning limit	Monitor with an external warning limit. 1. "Function" parameter box: Authorize access with corresponding PIN, if necessary. 2. Set one of the eight assigned external warning limits.

Table 7-31 Function (pre-selection) "Measuring ranges"

Function (pre-selection)	Purpose/resulting settings
Measuring ranges	Specify measuring range to be displayed. 1. "Component" parameter box: – Authorize access with corresponding PIN, if necessary. – Select available component. 2. "Function" parameter box: Select one of the four available measuring ranges.

Table 7-32 Function (pre-selection) "Process tags"

Function (pre-selection)	Purpose/resulting settings
Process tags	Output measured value of the used process tag. 1. "Function" parameter box: Authorize access with corresponding PIN, if necessary. 2. Select one of the offered process tags.

Table 7-33 Function (pre-selection) "Solenoid valves"

Function (pre-selection)	**Purpose/resulting settings**
Solenoid valves	Switch gas paths. 1. "Component" parameter box: – Authorize access with corresponding PIN, if necessary. – Select available component. 2. "Function" parameter box: Set the following alternative gas paths: – Sample gas – Switch sample gas at module level – Zero gas measuring ranges 1 to 4 (MR1 to MR4) – Switch zero gas at device level – Switch zero gas at module level (AM1/AM2) – Span gas measuring ranges 1 to 4 (MR1 to MR4) – Switch span gas at device level – Switch span gas at module level (AM1/AM2)

Table 7-34 Function (pre-selection) "DI links"

Function (pre-selection)	**Purpose/resulting settings**
DI link	Switch linked digital inputs. 1. "Function" parameter box: Authorize access with corresponding PIN, if necessary. 2. Select one of the displayed links. Additional linking properties are: – Type of logical operation (AND/OR) – Combining inputs

Table 7-35 Function (pre-selection) "Other functions"

Function (pre-selection)	Purpose/resulting settings
Other functions	Set additional functions. 1. "Function" parameter box: Authorize access with corresponding PIN, if necessary. 2. Select one of the offered functions: – Sync. (Function cannot currently be executed): Synchronization of AutoCal sequences between several devices. – Calibration: signaling of "Calibration" operating state at device level. – Calib. AM1/AM2: Signaling of "Calibration" operating state at module level. – Pump on/off: Switch external sample gas pump on/off. – Funct. check: Signal function check at device level. – Fct.check AM1/AM2: Signal function check at module level. – Signaling contact: Signaling contact: AutoCal signal contact, pulse 1000 ms. – Signaling of individual messages: The following can be entered after this function is selected: a. Module/component: Selection of the module/component to which the individual message is to apply b. Message: Selection of the message for the module/component selected above which is to be signaled

See also

Functions (Page 152)

7.8.5.5 NE107 signaling

The NE107 status can be formed via the digital outputs of the SIPROCESS GA700.

Table 7-36 Digital output function NE107

Status	Description
Error status	Failure
Fct. check	Function check
Maint. demanded	Maintenance demanded

7.9 [2.10] Settings > Correction of cross-interferences

7.9.1 Overview

Sample gases may also contain other gases to which devices may have cross-sensitivity. These so-called interference gases can distort the sample gas measured values. The measured value distortions can be mathematically corrected with a constant or with a correction of cross-interferences related to the measured value.

The interference gas concentration values required for the correction are either determined within the device or are provided by external analyzers, e.g., via MODBUS TCP.

The device lets you configure up to five corrections of cross-interferences for each component. The interference gas influence is corrected either with a constant or with up to four measured-value related corrections of cross-interferences, which means with four interference gases.

- If the correction of cross-interference takes place with a constant, the amount of interference gas in the sample gas (interference gas) is constant. The interference gas influence is corrected with a constant.
- Measured-value related interference gas correction:
  - With a linear correction of cross-interference, the interference gas influence is linear to the sample gas concentration of the interference gas and is corrected with a linear coefficient.
  - With a quadratic correction of cross-interference, a linear correction coefficient and a quadratic correction coefficient are used for the correction.

7.9.2 Correction coefficients

The correction of cross-interference coefficients can be entered on the LUI or in SIMATIC PDM, taken from a device-internal interference gas reference table (OXYMAT 7), or calculated by running a wizard.
Exception: With CALOMAT 7 analyzer modules, the linear correction coefficient for all components described in Correction of cross-interference in the application "H2 in N2 (Q)" for furnace gas, converter gas and wood distillation (Page 174) is factory set based on the application. Display of this coefficient is not possible.

A wizard first calculates the influence of interference gas for the calculation of cross-interference correction coefficient. The deviation in concentration of the component to be corrected (actual value) is measured, while a defined interference gas concentration (setpoint) is entered.

With the quadratic correction of cross-interference (ULTRAMAT 7), two correction coefficients are determined for two distinctly different interference gas concentrations. One correction coefficient operates linearly, the other as a square of the interference gas concentration.

Table 7-37 Correction of cross-interference characteristics

Feature	OXYMAT 7	ULTRAMAT 7	CALOMAT 7
Linear correction coefficient	Yes [1)]	Yes	Yes [3)]
Quadratic temperature coefficient	No	Yes	No

Feature		OXYMAT 7	ULTRAMAT 7	CALOMAT 7
Determination of correction coefficient(s)	Direct input	Yes	Yes	Yes [3]
	Measurement (wizard)	Yes	Yes	Yes [3]
	Reference table (firmware) [2]	Yes	No	No

[1] With OXYMAT 7 always with regard to 100% interference gas

[2] Correction of cross-interference coefficients which are component-specific and defined in the firmware.

[3] Except Q components

7.9.3 Application scenarios

7.9.3.1 Applications of OXYMAT 7

Table 7-38 OXYMAT 7: Application 1

Description	
Conditions	• The interference gas concentration is known and is assumed to be constant. • The influence of interference gas is stored in the interference gas reference table.
Sequence	• Input of the interference-gas component. • Input of interference gas concentration in the selected unit.
Result	The interference gas constant is determined from the entered concentration and a correction table stored in the device.

Table 7-39 OXYMAT 7: Application 2

Description of application 2	
Conditions	• The interference gas concentration is known and is assumed to be constant. • The influence of interference gas is not stored in the interference gas reference table.
Sequence	• Input of interference gas concentration in the selected unit. • Input of linear correction coefficient k1 in % always based on 100 % of the interference gas.
Result	The interference gas constant is determined from the input concentration and the input coefficient.

Table 7-40 OXYMAT 7: Application 3

Description of application 3	
Conditions	• The actual interference gas concentration is variable. • The influence of interference gas is known and stored in the interference gas reference table.
Sequence	• Manual setting of the interference gas component for selection in the interference gas reference table. • Selection of measured value source for the interference gas. The interference gas is measured in the selected unit. • Enter substitute value: If the measured value of the interference gas concentration is invalid or not available, the device works with the concentration of the substitute value. • Linear correction coefficient k1 from device-internal interference gas reference table.
Result	The influence of the interference gas is determined from the measured interference gas and the interference gas reference table stored in the device. • Case 1: The interference gas concentration is measured and is valid. • Case 2: The interference gas concentration cannot be measured or is invalid. A substitute value is used instead of the measured interference gas value.

Table 7-41 OXYMAT 7: Application 4

Description of application 4	
Conditions	• The interference gas concentration is variable. • The influence of interference gas is known but not stored in the interference gas reference table.
Sequence	• Selection of measured value source for the interference gas. • The interference gas is measured in the selected unit here. Enter substitute value in the selected unit: If the measured value of the interference gas concentration is invalid or not available, the device works with the concentration of the substitute value. • Input of correction coefficient k1 in % always based on 100 % of the interference gas.
Result	The influence of the interference gas is determined from the measured interference gas and the input coefficient. • Case 1: The interference gas concentration is measured and is valid. • Case 2: The interference gas concentration cannot be measured or is invalid. A substitute value is used instead of the measured interference gas value.

Table 7-42 OXYMAT 7: Application 5

Description of application 5	
Conditions	• The interference gas concentration is variable. • The influence of the interference gas is not known and will be determined by the wizard.
Sequence	• Selection of measured value source for the interference gas. The interference gas is measured in the selected unit. • Enter substitute value in the selected interference gas unit: If the measured value of the interference gas concentration is invalid or not available, the device works with the concentration of the substitute value. • Determine the correction coefficient k1 by means of a measuring sequence. Enter the setpoint required in the measurement procedure in the unit of the sample gas.
Result	The influence of the interference gas is determined from the measured sample gas concentration and the applied interference gas with the specified setpoint. • Case 1: The interference gas concentration is measured and is valid. • Case 2: The interference gas concentration cannot be measured or is invalid.

7.9.3.2 ULTRAMAT 7 application scenarios

Table 7-43 ULTRAMAT 7: Application scenario 1

Description of application scenario 1 [1)]	
Conditions	• The interference gas concentration is known and is assumed to be constant. • The influence of the interference gas is known
Consequences	• Enter the constants in the unit of the measured value.
Result	The specified constant is subtracted from the measured value.

[1)] Corresponds to application scenario 2 with OXYMAT 7

Table 7-44 ULTRAMAT 7: Application scenario 2

Description of application scenario 2 [1)]	
Conditions	• The interference gas concentration is variable • The influence of interference gas is known and can be entered.
Consequence	• Selection of measured value source for the interference gas. • The interference gas is measured in the selected unit here. Enter substitute value in the selected unit: If the measured value of the interference gas concentration is invalid or not available, the device works with the concentration of the substitute value. • Input of correction coefficient k1 in % [measured value unit / interference gas unit]
Result	The influence of the interference gas is determined from the measured interference gas and the input coefficient: • Scenario 1: The interference gas concentration is measured and is valid. • Scenario 2: The interference gas concentration cannot be measured or is invalid.

[1)] Corresponds to application scenario 4 with OXYMAT 7

Table 7-45 ULTRAMAT 7: Application scenario 3

Description of application scenario 3 [1]	
Conditions	• The interference gas concentration is variable. • The influence of the interference gas is not known and can be determined by the wizard.
Consequence	• Selection of measured value source for the interference gas. The interference gas always needs to be measured in %. • Enter substitute value in the selected unit: If the measured value of the interference gas concentration is invalid or not available, the device works with the concentration of the substitute value. • Determine coefficient k1 with linear dependence and additionally k2 with quadratic dependence (setpoint/actual value comparison). Selection in wizards. Always enter the setpoint in the unit of the measured value.
Result	The influence of the interference gas is determined from the measured interference gas and the calculated coefficient: • Scenario 1: The interference gas concentration is measured and is valid. • Scenario 2: The interference gas concentration cannot be measured or is invalid. A substitute value is used instead of the measured interference gas value.

[1] Corresponds to application scenario 5 with OXYMAT 7

7.9.3.3 CALOMAT 7 application scenarios

With CALOMAT, the linear correction of cross-interference can be configured via LUI. You can enter the coefficient or start the wizard (exception: Q components).

Note

Applications for Q components

CALOMAT 7 analyzer modules can correct the effects of up to four interference gases in the sample gas. For this purpose, the analyzer modules need to be prepared for specific applications. This results in the following application scenarios:

- Scenario 1: The operating conditions are known and taken into account when ordering.
- Scenario 2: The operating conditions are not known when ordering or need to be changed. In this case, contact your Siemens partner → Technical support (Page 269).

Table 7-46 CALOMAT 7: Application scenario 1

Description of application scenario 1	
Conditions	• The interference gas concentration is known and is assumed to be constant. • The influence of the interference gas is known
Consequences	Enter the constants in the unit of the measured value.
Result	The specified constant is subtracted from the measured value.

Table 7-47 CALOMAT 7: Application scenario 2

Description of application scenario 1	
Conditions	The following applies for the specific application: • The additional interference gases in the sample gas are known at the time of ordering. Up to four interference gases can be corrected. • The interference gas influence of up to four interference gases is determined based on the application during the ordering process.
Consequences	• The measurement of the interference gases defined at the time of ordering is approved by the factory. • Reference values for correction of cross-interference or correction coefficients are generated at the factory based on the application and stored in the CALOMAT 7 analyzer module.
Result	The interference gas influence is determined from the measured interference gas and the application-specific reference values stored in the device. • Scenario 1: The interference gas concentration is measured and is valid. • Scenario 2: The interference gas concentration cannot be measured or is invalid. A substitute value is used instead of the measured interference gas value.

Table 7-48 CALOMAT 7: Application scenario 23

Description of application scenario 2	
Conditions	The following applies for the specific application: • The additional interference gases contained in the sample gas are only known after ordering. Up to four interference gases can be corrected. • You have contacted your Siemens partner.
Consequences	Select one of the following alternatives subject to charge: • Exchange: Order of a new CALOMAT 7 analyzer module with corresponding factory settings → Application scenario 1, preceding table. • Service action: The reference values/correction coefficients are determined again at the factory based on the application. A Siemens service technician transfers the changed correction coefficients locally to the affected analyzer module.
Result	The interference gas influence is determined from the measured interference gas and the application-specific reference values stored in the device. • Scenario 1: The interference gas concentration is measured and is valid. • Scenario 2: The interference gas concentration cannot be measured or is invalid.

See also

Services & Support (https://support.industry.siemens.com/cs/gb/en/sc)

7.9.4 Setting instructions

NOTICE

Malfunction of the device with correction of cross-interference via an analog input (only with variable correction of cross-interference)

The following applies to prevent the device from malfunctioning: Make sure that the correction gases in → menus "2.10.3" to "2.10.6" and "2.09.1.n" match. For additional information, see also → Set analog inputs (Page 137).

Note

Component-specific setup

Corrections of cross-interferences are component-specific. Repeat the procedure described below for all components, if necessary.

Note

Avoid loops (with the variable correction of cross-interference)

Loops in the correction of cross-references can result in incorrect measured values. The device does not detect loops. The measured-value status is set to "Uncertain" or "Invalid".

Assign the parameters for the correction of cross-references so that the components are not corrected reciprocally with each other. Avoid the following corrections, for example: Component 1 corrects component 2. Component 2 corrects component 1.

Note

Activation of correction of cross-interference

In the factory setting, all available process tags are activated. When the measuring point switchover is deactivated, however, the correction of cross-interference is always active. With the process tag switchover switched on, the following applies: selection of the active process tag simultaneously activates the correction of cross-interference.

7.9.5 Setting the correction of cross-interference

Procedure

1. Component > Main menu > "2. Settings" > "10. Correction of cross-interference"
   The menu includes six navigation lines that you use to set or activate the correction of cross-interferences for the selected component. The menu entries are structured as follows:

Structure of the navigation lines			
1	Total [1]		Activation status (on/off) Edit [4]
2	Constant [2]		Activation status (on/off) Edit [4]
3 ... 6 [3]	Source of cross-interference measured value	Name of cross-interference measured value	Activation status (on/off) Edit [4]

[1] Enable/disable all corrections of cross-interference

[2] Determine and enable constant correction of cross-interference.

[3] Variable corrections of cross-interference

[4] Editing line

2. Assign constant correction of cross-interference or variable correction of cross-interference.
   - Assigning correction of cross-interference with a constant (Page 168)
   - Assigning variable correction of cross-interference (Page 169)
3. Totally enable/disable assigned corrections of cross-interferences.
   - Enabling/disabling all corrections of cross-interferences (Page 179)

See also

Setting instructions (Page 166)

Correction of cross-interference in the application "H2 in N2 (Q)" for furnace gas, converter gas and wood distillation (Page 175)

7.9.6 OXYMAT 7

7.9.6.1 Assigning correction of cross-interference with a constant

Procedure with OXYMAT 7

1. Component > Main menu > "2. Settings" > "10. Correction of cross-interference" > "2 Constant"
2. Enable/disable correction of cross-interference: "Correction of cross-interference" parameter field.
   Authorize access with corresponding PIN, if necessary.
3. Enter interference gas concentration already known: "Interference gas concentration" parameter field.
4. Define the coefficient.

   Note

   Operator control options

   Refer to the coefficients stored in the device-internal reference table or enter a coefficient manually.

   Using the coefficients of the reference table:

   – Select the interference gas you want to correct: "Interference gas reference table" parameter field.
     The editing window includes all gases for which a correction coefficient is available in the reference table.
   – Select the corresponding gas.
     The selected coefficient is displayed in the "Coefficient" display.

   Using manually specified coefficient:

   – "Interference gas reference table" parameter field: Set "User-defined" value.
   – Enter coefficient already known manually: "Coefficient" parameter field.
5. Only with activated process tag switchover: Change the process tag assignment.
   – Check the displayed process tag assignment.
   – "Process tag" > "Change" parameter field.
     The displayed editing window includes all available process tags.
   – Activate the corresponding process tags that are to be integrated into the correction of cross-interference. Deactivate process tags that are not used.
6. Enabling/disabling all corrections of cross-interferences (Page 179).

7.9.6.2 Assigning variable correction of cross-interference

Procedure with OXYMAT 7

1. Component > Main menu > "2. Settings" > "10. Correction of cross-interference" > "3 ... 6 ..."
2. Enable/disable correction of cross-interference: "Correction of cross-interference" parameter field.
   Authorize access with corresponding PIN, if necessary.
   The correction of cross-interference is activated/deactivated for a specific correction value.

3. Select source for correction value: "Source of correction value" parameter field
   The following sources can be set for the correction of cross-interference:
   - "Device-internal"
   - "MODBUS TCP"
   - "Analog input" (with installed option module 2)

NOTICE
Malfunction of the device with correction of cross-interference via an analog input The following applies to prevent the device from malfunctioning: Make sure that the correction gases in → menus "2.10.3" to "2.10.6" and "2.09.1.n" match. For additional information, see also → Set analog inputs (Page 137).

Depending on the set parameter value, there will be different operating steps:

Source of correction value	
"Device-internal"/"Analog input"	**"MODBUS TCP"**
• Select an internally measured correction value. "Component" parameter field. The selection list contains all existing components of the device except the respective current measured component.	• Determine external analyzer which delivers the correction value via MODBUS TCP. "MODBUS node" parameter field
• Enter substitute value for the measured interference gas concentration. "Substitute value" parameter field. If the measurement of the interference gas concentration fails, the set substitute value is used for the correction of cross-interference. The measured value status is set to "Uncertain". The unit of the substitute value corresponds to that of the configured interference gas.	• Select external measured correction value for correction of cross-interference via MODBUS TCP. "Measured value" parameter field.
	• Enter substitute value for the externally measured interference gas concentration. If the measurement of the interference gas concentration fails, the set substitute value is used for the correction of cross-interference. The measured value status is set to "Uncertain". The unit of the substitute value corresponds to that of the configured interference gas.
• Specify correction coefficient(s).	• Specify correction coefficient(s).

4. Specify correction coefficient(s). "Interference gas reference table" parameter field.
   The correction of cross-interference coefficient of a component is stored in the device-internal interference gas reference table.
   By selecting the "User-defined" setting, you can determine the correction coefficient with the help of a wizard.

Specify correction coefficient	
Selection	**Wizard-guided determination**
• Select the component of the interference gas reference table. The associated linear correction coefficient is displayed in the "Coefficient" display [1].	• "Interference gas reference table" > "User-defined" parameter field:
	• Execute wizard: "Coeff. via measurement" parameter field: Follow the instructions on the display.
• Change the process tag assignment	• Change the process tag assignment

[1] Components linked to correction coefficients cannot be edited.

5. Change the process tag assignment:
   – Check the displayed process tag assignment.
   – "Use for process tag" > "Change" parameter field.
     The displayed editing window includes all available process tags.
   – Activate the corresponding process tags that are to be integrated into the correction of cross-interference. Deactivate process tags that are not used.
6. Enabling/disabling all corrections of cross-interferences (Page 179)

7.9.7 ULTRAMAT 7

7.9.7.1 Assigning correction of cross-interference with a constant

Procedure with ULTRAMAT 7

1. Component > Main menu > "2. Settings" > "10. Correction of cross interference" > "2 Constant"
2. Enable/disable correction of cross-interference: "Correction of cross-interference" parameter field.
   Authorize access with Expert PIN, if necessary.
3. Enter constant already known: "Constant" parameter field. The measured value is corrected by the amount entered.

4. If necessary, change assignment of process tags for correction of cross-interference

   Note

   Setting instruction

   You can only change the assignment of process tags for correction of cross-interference if process tag switching is enabled. To do this, proceed as follows:

   - Check the displayed process tag assignment.
   - "Process tag" > "Change" parameter field
     The displayed editing window includes all available process tags.
   - Activate the corresponding process tags that are to be integrated into the correction of cross-interference. Deactivate process tags that are not used.

5. Enabling/disabling all corrections of cross-interferences (Page 179).

7.9.7.2 Assigning variable correction of cross-interference

Procedure with ULTRAMAT 7

1. Component > Main menu > "2. Settings" > "10. Correction of cross-interference" > "3 ... 6 ..."
2. Enable/disable correction of cross-interference: "Correction of cross-interference" parameter field. Authorize access with appropriate Expert PIN, if necessary.
   The correction of cross-interference is activated/deactivated for a specific correction value.

3. Select source for correction value: "Source of correction value" parameter field
   The following sources can be set for the correction of cross-interference:
   - "Device-internal"
   - "MODBUS TCP"
   - "Analog input" (with installed option module 2)

NOTICE
Malfunction of the device with correction of cross-interference via an analog input The following applies to prevent the device from malfunctioning: Make sure that the correction gases in → menus "2.10.3" to "2.10.6" and "2.09.1.n" match. For additional information, see also → Set analog inputs (Page 137).

Depending on the set parameter value, there will be different operating steps:

Source of correction value	
"Device-internal"/"Analog input" [1]	**"MODBUS TCP"**
• Select an internally measured correction value. "Component" parameter field. The selection list contains all existing components of the device except the respective current measured component.	• Determine external analyzer which delivers the correction value via MODBUS TCP. "MODBUS node" parameter field
• Enter substitute value for the measured interference gas concentration. "Substitute value" parameter field. If the measurement of the interference gas concentration fails, the set substitute value is used for the correction of cross-interference. The measured value status is set to "Uncertain". The unit of the substitute value corresponds to that of the configured interference gas.	• Select external measured correction value for correction of cross-interference via MODBUS TCP. "Measured value" parameter field.
	• Enter substitute value for the externally measured interference gas concentration. If the measurement of the interference gas concentration fails, the set substitute value is used for the correction of cross-interference. The measured value status is set to "Uncertain". The unit of the substitute value corresponds to that of the configured interference gas.
• Specify correction coefficient(s).	• Specify correction coefficient(s).

[1] The "Device-internal correction of cross-interference" source was divided into "Device-internal correction of cross-interference" and "Module-internal correction of cross-interference". The latter only applies to a U7 module with two components. The "CompID" parameter does not need to be entered here because the other component is always taken.
The old configuration is left for all other device versions.

4. Specify correction coefficient(s). Use the manual input options or start wizard-guided determination.

Specify correction coefficient	
Manual input	**Wizard-guided determination**
• Enter the coefficients in the "Coefficient" and/or "Coefficient (*x^2)" parameter fields.	• Execute wizard: "Coeff. via measurement" parameter field: Follow the instructions on the display.
• Change the process tag assignment	• Change the process tag assignment

5. Change the process tag assignment:
   – Check the displayed process tag assignment.
   – "Use for process tag" > "Change" parameter field
   The displayed editing window includes all available process tags.
   – Activate the corresponding process tags that are to be integrated into the correction of cross-interference. Deactivate process tags that are not used.
6. Enabling/disabling all corrections of cross-interferences (Page 179)

7.9.8 CALOMAT 7

7.9.8.1 Correction of cross-interference in the application "H2 in N2 (Q)" for furnace gas, converter gas and wood distillation

Setting instructions

Note

Increased application-specific measuring errors despite correction of cross-interference

Compared with correction of cross-interference with binary gas mixtures and application-specific increase in measuring errors is possible. Depending on the application, the measuring error is up to 10% of the measuring range.

The reasons for this are in particular:

- Negative influences of the interference gas on zero point offsets and the course of characteristic curves
- Entry of measuring inaccuracies by external analyzers

Note

Non-permitted activation of correction of cross-interference

If you activate correction of cross-interference before an external analyzer supplies correction values, the device outputs the error message "[238] Interference gas measured value uncertain or faulty".

- Check whether the external analyzer devices/analyzer modules are correctly connected via MODBUS TCP or the analog outputs or inputs.
  Make sure that signal transfer operates reliably.
- If necessary, adapt the parameter assignment of the MODBUS communication or at the analog inputs of the device.

Note

Correction of cross-interference of the component CH_4 in the "furnace gas" and "converter gas" application

In the applications mentioned, no correction of cross-interference is possible for the component CH_4. In this case, deactivate correction of cross-interference for interference gas 3 (CH_4):

1. Menu [2.10]: → Change to Correction of cross-interference
2. Menu [2.10.5]: → Deactivate or set interference gas 3

See also

Assigning correction of cross-interference with a constant (Page 176)

Assigning variable correction of cross-interference (Page 177)

Correction of cross-interference in the application "H2 in N2 (Q)" for furnace gas, converter gas and wood distillation

Overview: Application "H_2 in N_2 (Q)"

Interference gases can be included in a measuring gas matrix invariable concentrations. The concentration values are detected by external analyzers and fed in via MODBUS or the analog inputs of the CALOMAT 7 analyzer module. With correction of cross-interference with SIPROCESS GA700 devices, the linear correction coefficients are application-dependent and are therefore set as default in the factory. No further parameter settings are required

Procedure

Note

Order of the settings

The following applies before you activate correction of cross-interference in the application "H_2 in N_2 (Q)" (" application 'furnace gas ', 'converter gas' and 'wood distillation'"):

- Make sure that you keep to the order described below.
- If necessary, check the interference gas assignment in the menu [2.10]: → Setting the correction of cross-interference (Page 167).

1. Setting the interference gas 1: Component > Main menu > "2. Settings" > "10. Correction of cross interference" > "3 ..."
   - For the "Measured value" parameter, set the value "Gas 1: CO_2. Correction: 0 to 30%
   - Set the measured value source to "Analog input" or "MODBUS TCP"
2. Setting the interference gas 2: Component > Main menu > "2. Settings" > "10. Correction of cross-interference" > "4 ..."
   - For the "Measured value" parameter, set the value "Gas 2: CO. Correction: 0 ... 100%
   - Set the measured value source to "Analog input" or "MODBUS TCP"
3. Setting the interference gas 3: Component > Main menu > "2. Settings" > "10. Correction of cross interference" > "5..."
   - For the "Measured value" parameter, set the value "Gas 3: CH_4. Correction: 0 to 10%
   - Set the measured value source to "Analog input" or "MODBUS TCP"
4. Additional settings per interference gas: → Assigning variable correction of cross-interference (Page 177).

7.9.8.2 Assigning correction of cross-interference with a constant

Procedure with CALOMAT 7

1. Component > Main menu > "2. Settings" > "10. Correction of cross-interference" > "2 Constant"
2. Enable/disable correction of cross-interference: "Correction of cross-interference" parameter field.
   Authorize access with Expert PIN, if necessary.
3. Enter constant already known: "Constant" parameter field. The measured value is corrected by the amount entered.

4. If necessary, change assignment of process tags for correction of cross-interference

Note

Setting instruction

You can only change the assignment of process tags for correction of cross-interference if process tag switching is enabled. To do this, proceed as follows:

- Check the displayed process tag assignment.
- "Process tag" > "Change" parameter field
  The displayed editing window includes all available process tags.
- Activate the corresponding process tags that are to be integrated into the correction of cross-interference. Deactivate process tags that are not used.

5. Enabling/disabling all corrections of cross-interferences (Page 179).

7.9.8.3 Assigning variable correction of cross-interference

Procedure with CALOMAT 7

1. Component > Main menu > "2. Settings" > "10. Correction of cross interference" > "3 ... 6 ..."
2. Enable/disable correction of cross-interference: "Correction of cross-interference" parameter field. Authorize access with appropriate Expert PIN, if necessary.
   The correction of cross-interference is activated/deactivated for a specific correction value.

3. Select source for correction value: "Source of correction value" parameter field
   The following sources can be set for the correction of cross-interference:
   – "Device-internal"
   – "MODBUS TCP"
   – "Analog input" (with installed option module 2)

NOTICE
Malfunction of the device with correction of cross-interference via an analog input The following applies to prevent the device from malfunctioning: Make sure that the correction gases in → menus "2.10.3" to "2.10.6" and "2.09.1.n" match. For additional information, see also → Set analog inputs (Page 137).

Depending on the set parameter value, there will be different operating steps:

Source of correction value	
"Device-internal"/"Analog input"	**"MODBUS TCP"**
• Select an internally measured correction value. "Component" parameter field. The selection list contains all existing components of the device except the respective current measured component.	• Determine external analyzer which delivers the correction value via MODBUS TCP. "MODBUS node" parameter field
• Enter substitute value for the measured interference gas concentration. "Substitute value" parameter field. If the measurement of the interference gas concentration fails, the set substitute value is used for the correction of cross-interference. The measured value status is set to "Uncertain". The unit of the substitute value corresponds to that of the configured interference gas.	• Select external measured correction value for correction of cross-interference via MODBUS TCP. "Measured value" parameter field.
	• Enter substitute value for the externally measured interference gas concentration. If the measurement of the interference gas concentration fails, the set substitute value is used for the correction of cross-interference. The measured value status is set to "Uncertain". The unit of the substitute value corresponds to that of the configured interference gas.

4. Change the process tag assignment:
   – Check the displayed process tag assignment.
   – "Use for process tag" > "Change" parameter field
     The displayed editing window includes all available process tags.
   – Activate the corresponding process tags that are to be integrated into the correction of cross-interference. Deactivate process tags that are not used.
5. Enabling/disabling all corrections of cross-interferences (Page 179)

7.9.9 Enabling/disabling all corrections of cross-interferences

Procedure

1. Component > Main menu > "2 Settings" > "10 Correction" > "1 Total"
2. "All corrections" parameter field:
   – "On": Only the corrections enabled in the corresponding parameter assignment are considered as part of the process tag switchover.
   – "Off": None of the configured corrections is active.

7.10 [2.11] Settings > Pressure sensor selection

7.10.1 Overview

OXYMAT 7/ULTRAMAT 7

To correct the influence of pressure on the measured value, each OXYMAT 7 or ULTRAMAT 7 analyzer module can be equipped with an internal pressure sensor. The pressure correction with the device-internal sensor is then preset in the factory.

Alternatively, the measured value can be corrected with external process values that are provided by another SIPROCESS GA700 device via MODBUS TCP or via an analog input (option module 2).

With OXYMAT 7 devices the sensor is integrated in the analyzer module. The sample gas pressure is measured directly using the reference gas infeed. Fluctuations in the sample gas pressure can be corrected in the following areas, depending on the installed type of pressure sensor:

- 0.5 to 1.5 bar (absolute) → "With tubes" (SENSOR_1500_HPA)
- 0.5 to 2.5 bar (absolute) → "With pipes" (SENSOR_2500_HPA)

You can cover a larger sample gas pressure range (max. 3 bar absolute) by connecting an external absolute pressure sensor. For additional information, refer to the references t the end of this section.

CALOMAT 7

You can use external pressure sensors to correct the influence of pressure. For additional information, refer to the references t the end of this section.

See also

Using device-internal pressure sensor (Page 181)

Integrating external pressure sensor via MODBUS TCP (Page 181)

Integrating external pressure sensor via analog inputs (Page 182)

7.10.2 Setting instructions

Note

Module-specific setting

The setting of the pressure sensor is specific to the module. Repeat the procedure for additional modules, if necessary.

Note

Different signal source setting options for CALOMAT 7

The signal source can be set to the "Device-internal" value only when there is an internal pressure sensor in the device.

In contrast to OXYMAT 7 or ULTRAMAT 7, the value "None" can be set for CALOMAT 7.

Note

Using an external pressure sensor

An external pressure sensor can process ambient or sample gas pressure values up to 3 bar (abs.), regardless of the application.

You can obtain additional information on the use of external pressure sensors from your service partner: → Technical support (Page 269).

See also

Using device-internal pressure sensor (Page 181)

Measured signal (Page 212)

Note

Pressure compensation

With OXYMAT 7 and CALOMAT 7 analyzer modules, the pressure compensation is activated automatically by the selection of the signal source.

With ULTRAMAT 7 analyzer modules, the activation status of the pressure compensation is displayed in the menu "[3.05.1.2] Measured signal Part 2" (LUI). You can obtain further information on activating this function from your service partner: → Technical support (Page 269).

See also

Using device-internal pressure sensor (Page 181)

Measured signal (Page 212)

7.10.3 Using device-internal pressure sensor

Procedure

1. Component > Main menu > "2 Settings" > "11 Pressure sensor selection"
   The currently set signal source and the currently measured pressure are displayed.
2. Set the signal source: "Signal source" parameter field.
   - Authorize access with the Expert PIN, if necessary.
   - Select "Device-internal" setting.
3. Repeat steps 1 and 2 for the other analyzer modules if two analyzer modules are installed in your device.
   The pressure value of the signal source can also be returned via MODBUS TCP or an analog input instead of being created device-internal:
   → Integrating external pressure sensor via MODBUS TCP (Page 181).
   → Integrating external pressure sensor via analog inputs (Page 182).

7.10.4 Integrating external pressure sensor via MODBUS TCP

Requirements

The following requirements must be met before you can connect an external pressure sensor via MODBUS TCP:

- MODBUS node(s) is/are configured: → Setting communication via MODBUS TCP (Page 243).
- MODBUS communication is active.

Procedure

1. Component > Main menu > "2. Settings" > "11 Pressure sensor selection"
   The currently set signal source and the currently measured pressure are displayed.
2. Set the signal source: "Signal source" parameter field.
   – Authorize access with the Expert PIN, if necessary.
   – Select "MODBUS TCP" setting.
3. Select an external communication partner: "MODBUS node" parameter field.
   The selection list contains all MODBUS nodes (servers) which have been activated for communication.
4. Select required pressure value P1 or P2: "Measured value" parameter field.
5. Repeat steps 1 to 3 for the other analyzer modules if two analyzer modules are installed in your device.
   The pressure value of the signal source can also be returned via an analog input instead of MODBUS TCP or be created device-internal:
   → Using device-internal pressure sensor (Page 181). In this case, no further signal source settings are required.
   → Integrating external pressure sensor via analog inputs (Page 182).

7.10.5 Integrating external pressure sensor via analog inputs

Requirements

The following requirements must be met before you can connect an external pressure sensor via an analog input:

- Option module 2.2 is installed.
- Pressure sensor is connected correctly.
- SIPROCESS GA700 analog inputs are configured accordingly.

Procedure

1. Component > Main menu > "2. Settings" > "11 Pressure sensor selection"
   The currently set signal source and the currently measured pressure are displayed.
2. Set the signal source: "Signal source" parameter field.
   – Authorize access with the Expert PIN, if necessary.
   – Select "Analog input" setting.

3. Select analog input to which an external pressure sensor is connected: "Analog input" parameter field.
   The following sensor data are displayed:
   - Measuring range of sensor: "Start-of-scale value" and "Full-scale value" display fields
   - Type of sensor supply: "Assigned analog current" display field.
   - Current measured value of sensor: "Current pressure" display field
4. Repeat steps 1 to 3 for the other analyzer modules if two analyzer modules are installed in your device.
   The pressure value of an external signal source can also be returned via MODBUS TCP instead of an analog input or be created device-internal:
   → Using device-internal pressure sensor (Page 181). In this case, no further signal source settings are required.
   → Integrating external pressure sensor via MODBUS TCP (Page 181).

7.11 [2.12] Settings > Gas path/process tag label

Note

Parameter assignment of the gas path/process tags

The parameter assignment of the process tags in case of a separate gas path is only possible if two analyzer modules are installed in the device. If there is only one analyzer module, this setting option is not available.

Requirement

Before you configure the gas path of the device, all lines conducting gas must be correctly connected.

More information on connecting the device can be found in the list of references in → Table A-3 References 3 - Operating Instructions (Page 271).

Procedure

1. Component > Main menu > "2 Settings" > "12 Gas path/process tag label"
2. Set the design: "Gas path" parameter field.
   Authorize access with Expert PIN, if necessary. Specify the design:
   – "Shared" (standard for devices with only one analyzer module)
   – "Separate" (one gas path for each of the installed analyzer modules)

   Note

   Operating mode and design of gas path:

   Analyzer modules can be operated serial or parallel. If you only use one analyzer module or two serial analyzer modules, in the parameter box "Gas path" set the value to "Shared".

   If, on the other hand, you operate two parallel analyzer modules, choose the "Separate" setting.

   You will also find additional information in → Combined operation (Page 31).
3. Enter the process tag labels:
   If you have assigned a shared gas path:
   – Open the "Designation of process tag" parameter field.
   – Enter a designation of up to seven characters in the text box.

   If you have assigned a separate gas path:
   – Open the "Process tag ..." parameter field.
   – Enter a designation of the module-specific process tag of up to seven characters in the text box.
   – Repeat the process for the process tag of the second analyzer module.

   The process tag label is displayed in the title bar.

See also

References (Page 271)

Setting the sample gas purging time (Page 126)

7.12 [2.13] Setting > Process tag switchover

7.12.1 Setting the process tag switchover

Procedure

1. Component > Main menu > "2. Settings" > "13. Process tag switchover"
   The menu includes 13 navigation lines that you use to assign the process tags for automatic process tag switchover. The menu entries have the following structure:

Structure of the navigation lines					
1	Total [1]				Activation status (on/off) Edit
2 ... 13	> [2]	Designation of the process tag	DO n/ ", .." [3]	Time [4]	Activation status (on/off) Edit

[1] Enable/disable all process tags for process tag switchover

[2] Designation of active process tag

[3] Digital output to which this process tag is connected. If the process tag is connected with several digital outputs, it is identified with "", .."".

[4] Remaining time of the currently active process tag or set measuring time for inactive process tags.

2. Assign process tags 1 to 12: Assigning process tags (Page 185).
3. Enable/disable all assigned process tags: Enabling/disabling all process tags (Page 186).

7.12.2 Assigning process tags

Requirements

For automatic process tag switchover, one or more digital outputs must be assigned to a process tag. Check the corresponding assignments under Setting digital outputs (Page 155).

Procedure

1. Main menu > "2. Settings" > "13. Process tag switchover" > "02. ..." to "13. ..."
2. Specify the sequence of the process tags within the automatic process tag switchover: "Move position to" parameter field
   - Authorize access with Standard PIN, if necessary.
   - Enter the required position number (1 to 12).
3. Activate/deactivate process tags for automatic process tag switchover:
   "Include process tag" parameter field (on/off).

4. Specify the name of the process tag: "Designation of process tag" parameter field.
   You can use up to seven characters for the process tag designation.
5. Check link with digital outputs: "Process tag combined with" display field.
   Change the assignment of digital outputs, if necessary: Setting digital outputs (Page 155).
6. Set the measuring time: "Measuring time" parameter field.
   Set the time for which the process tag is active during the switchover cycle.
7. Read calculated remaining time: "Remaining time" display field
   If the process tag is inactive, the remaining time is the same as the assigned measuring time.
   If the process tag is active, the remaining measuring time until the next switchover is displayed.
8. Activate automatic process tag switchover: Enabling/disabling all process tags (Page 186).

7.12.3 Enabling/disabling all process tags

Procedure

1. Main menu > "2. Settings" > "13. Process tag switchover" > "01. Total"
   This function gives you the option to switch off the process tag switchover and to switch it on again at one location.
2. Enable/disable all process tags for process tag switchover:
   "Process tag switchover" parameter field (on/off)
   - "Off": When you select this setting, the currently active process tag remains permanently active.
   - "On": The process tag switchover starts immediately with the process tag at position 1.

   Only process tags already enabled under Assigning process tags (Page 185) are considered during the switchover.

7.13 [2.14] Settings > Set message parameters

7.13.1 Set message parameters

Procedure

1. Main menu > "2 Settings" > "14. Set message parameters"
   This menu includes a filter in addition to the current messages that you can use to influence the display range of this menu.
   Changed filter settings have a direct effect on the menu.
   The menu entries have the following structure:

Structure of the navigation lines					
				Filter inactive/active [1]	Edit
[2]	[3]	Device [4]	0208 [5]	Ext. maint. demand 1: [6]	On [7]
[2]	[3]	Device [4]	0209 [5]	Ext. maint. demand 2: [6]	On [7]

[1] Activation status of filter. Default "Inactive"

[2] Symbol for identification of measuring type

[3] Display that acknowledgment is required. Yes: ■ / No: □

[4] Message reference: message refers to the device, a module, or a component. The corresponding designations are displayed.

[5] Message number

[6] Message text

[7] Activation status of message / editing line

2. Set filter: Filtering messages (Page 188).
3. Set individual message parameters: Set individual message parameters (Page 189).

7.13.2 Filtering messages

Procedure

1. Main menu > "2. Settings" > "14. Set message parameters" > "1. Filter..."
2. Set the filter conditions.
   Set one or more filter conditions. Use the following parameter fields or editing windows for this purpose:
   - "Message activity":
     "All": All messages are displayed by default.
     "Switched on": Only the switched on messages are displayed.
     "Turned off": Only the turned off messages are displayed.
   - "ID No.":
     The wildcards"???" are set by default.
     All messages are displayed.
     To filter messages with numbers 200 to 299, for example, replace the first "?" with the value "2" ("2??).
   - "Component/module":
     Select/deselect the check boxes included in the editing window. Only those messages whose properties you have selected are displayed.
     "Device" relates to general messages from components or two messages of the processing module. You can also filter for those messages that only apply to specific components or specific modules.
   - "Message type":
     Select/deselect the check boxes included in the editing window. Only those messages whose properties you have selected are displayed.
     All message types are activated by default. When you select the check box "None", all other check boxes are deselected.
3. Set individual message parameters: → Set message parameters (Page 187).

7.13.3 Set individual message parameters

Procedure

1. Main menu > "2. Settings" > "14. Configure messages" >"..."
   Select one of the displayed messages. The message text is displayed in the displayed menu.
2. Suppress display of message: "Toggle off/on" parameter field
   - Authorize access with Expert PIN, if necessary.

     Note

     Deactivation of monitoring

     If you suppress the display, you switch off the monitoring assigned to a message. Faults which occur are neither detected nor signaled.

   - "Off":
     The display of the message in the status bar is deactivated.
     A display of the message in menu → [2.14] Set message parameters (Page 187) is only possible if the following requirement is met: The filter condition "Message activity" = "Off" has been assigned.
   - Messages which cannot be suppressed for safety reasons are read-only.
3. Enable/disable required acknowledgment for messages. "Requires acknowledgment" parameter field.
4. Specify the message type: "Message type" parameter field. Set the maximum weighting of the message. The urgency increases as follows:

Message type	Urgency		
	Low	Medium	High
Maintenance messages	Maintenance required	Maintenance demanded	Maintenance alarm / fault
Limit messages	-	Limit warning	Limit alarm

5. Set the delay times:
   - "Incoming delay time" parameter field:
     Set time interval between detection and output of a message.
     This delay is only active for messages which are not suppressed.
   - "Outgoing delay time" parameter field:
     Set time interval between elimination of cause of message and deletion of message from the message list.
     The delay is only active for messages which do not require acknowledgment.
6. Change the filter settings, if necessary: → Filtering messages (Page 188)

7.14 [2.20] Settings > Service

7.14.1 [2.20.02] Heaters

7.14.1.1 [2.20.02] Heaters OXYMAT 7

Service menu. You only have read access.

The following information is displayed in this menu:

- Indication of the type of installed sample chamber.
- Display of temperature setpoints and actual values from sample chamber and measuring head.

7.14.1.2 [2.20.02] Heaters ULTRAMAT 7

Service menu. You only have read access.

The following information is displayed in this menu:

- Indication of the type of installed sample chamber.
- Indication of the activation state of the gradient controller. When the gradient controller is active, the corresponding temperature setpoint and actual temperature value are displayed.
- Display of the current chopper temperature.

7.14.1.3 [2.20.02] Heaters CALOMAT 7

Service menu. You only have read access.

The following information is displayed in this menu: Temperature setpoint and actual temperature values of the measuring block and the membrane.

7.14.2 [2.20.03] Factory calibrations

7.14.2.1 Overview

The following calibrations are grouped under the term "Factory calibrations":

- Signal frequency
- Phase calibration
- Normalization

Factory calibrations may be necessary, for example, after changes to the reference gas.

7.14.2.2 Note on setting

Changing the signal frequency

This function is used to set the setpoint for magnetic field frequency. Changing the frequency of the signal can prevent interference between two analyzer modules.

For this, you can also enter either the nominal frequency, the displayed alternative signal frequency or a frequency you select yourself. You need to perform normalization again depending on the selected frequency:

Table 7-49 Selection of the signal frequency

Setting	Consequences
Entering the nominal frequency	The nominal frequency is 8.33 Hz. A valid calibration parameter data record is already stored in the device for this setting. If you enter the nominal frequency, you can choose not to perform normalization.
Entering a frequency you selected yourself	The value differs from the nominal frequency and the displayed alternative signal frequency. If you select a frequency that is unequal to the alternative signal or the nominal frequency, you need to perform normalization. After normalization, the selected frequency is displayed as a "new" alternative signal frequency.
Entering an alternative signal frequency	Only for OXYMAT 7! Frequency, which deviates from the nominal frequency. You have already performed normalization for the displayed alternative signal frequency. The currently displayed alternative signal frequency can be set without further normalization.

7.14.2.3 [2.20.03] Factory calibrations OXYMAT 7

Changing signal frequency

Note

Signal frequencies with two OXYMAT 7 analyzer modules

If you install a second OXYMAT 7 analyzer module, the operating and signal frequencies of the two OXYMAT 7 analyzer modules have to differ from each other.

- Check the set frequencies of both OXYMAT 7 analyzer modules.
- If necessary, adjust the frequencies of the modules. We recommend a frequency of 8.33 Hz for Module 1 and a frequency of 10.00 Hz for Module 2.

Note

Combined operation with ULTRAMAT 7: Signal frequency of the OXYMAT 7

If you use an OXYMAT 7 and an ULTRAMAT 7 analyzer module in combined operation, the default OXYMAT 7 signal frequency can have a negative influence on the ULTRAMAT 7 analyzer module.

- Check the set signal frequency of the OXYMAT 7 analyzer module.
- If the nominal frequency 8.33 Hz is still set, change the signal frequency to the alternative signal frequency of 10.00 Hz.

Proceed as follows to change the signal frequency:

1. Main menu > "2. Settings" > "20. Service > "03. Factory calibrations" > "01. Signal frequency". The factory default signal frequency (nominal frequency) is 8.33 Hz and 10.00 Hz respectively (OXYMAT 7). You can specify an alternative signal frequency. The frequency range is from 6.94 Hz to 11.11 Hz.
2. Entering alternative signal frequency: "Signal frequency" parameter field.
   - Authorize access with Expert PIN, if necessary.
   - Change default value.
3. Carry out a normalization.

Executing phase calibration

1. Main menu > "2. Settings" > "20. Service > "03. Factory calibrations" > "02. Phase calibration". This function serves for test purposes. The phase is automatically set during normalization. The current phase is displayed: "Phase" display field.
2. Start phase calibration wizard:
   - Authorize access with Expert PIN, if necessary.
   - Follow the instructions of the wizard.

   The newly determined phase value is displayed at the end of the wizard process.

Executing normalization

Note

Measured value errors

If you change the setpoints but do not normalize the module, the changed values are saved and the measured value is calculated incorrectly.

After you have changed one or both setpoint settings, always run a normalization!

1. Main menu > "2. Settings" > "20. Service > "03. Factory calibrations" > "03. Normalization".
   The current values for Sraw min, Sraw max and for the phase are displayed in the corresponding display fields.
2. Enter setpoints:
   – Authorize access with Expert PIN, if necessary.
   – Enter setpoints: Use the parameter fields "Setpoint zero value" and "Setpoint end value".
3. Start normalization wizard: "Start normalization" parameter box this.
   The newly determined values for Sraw min, Sraw max and for the phase are displayed at the end of the wizard process.

See also

Displaying control reserve (Page 223)

7.14.2.4 [2.20.03] Factory calibrations ULTRAMAT 7

Changing signal frequency

Note

Signal frequencies for two ULTRAMAT 7 analyzer modules

Regardless of the slot, the standard signal frequency for ULTRAMAT 7 is set to 12.5 Hz. You do not have to change the preset frequency even if you install another analyzer module.

Note

Combined operation with ULTRAMAT 7: Signal frequency of the OXYMAT 7

If you use an OXYMAT 7 and an ULTRAMAT 7 analyzer module in combined operation, the default OXYMAT 7 signal frequency can have a negative influence on the ULTRAMAT 7 analyzer module.

- Check the set signal frequency of the OXYMAT 7 analyzer module.
- If the nominal frequency 8.33 Hz is still set, change the signal frequency to 10.00 Hz.

Note

Changing the nominal frequency

When you change the signal frequency, you are prompted to run a normalization calibration.

1. Main menu > "2. Settings" > "20. Service > "03. Factory calibrations" > "01. Signal frequency".
   The factory default signal frequency (nominal frequency) is 12.5 Hz.
   You have the option of selecting the available alternatives signal frequencies from a list. The frequency range is from 10.00 Hz to 15.15 Hz.
2. Changing signal frequency: "Signal frequency" parameter field.
   - Authorize access with Expert PIN, if necessary.
   - Change default value.
3. Carry out a normalization for all components involved.

Executing phase calibration

1. Main menu > "2. Settings" > "20. Service > "03. Factory calibrations" > "02. Phase calibration".
   The following information is displayed:
   - Factor for determining the intensity: "k norm intensity" display field
   - S_{norm} measured value at minimum signal: "S norm offset" display field
   - The current phase: "Phase" display field
2. Start phase calibration wizard:
   - Authorize access with Expert PIN, if necessary.
   - Follow the instructions of the wizard.

   The newly determined phase value is displayed at the end of the wizard process.

Executing normalization

Note

Measured value errors

If you change the setpoints but do not normalize the module, the changed values are saved and the measured value is calculated incorrectly.

After you have changed one or both setpoint settings, always run a normalization!

1. Main menu > "2. Settings" > "20. Service > "03. Factory calibrations" > "03. Normalization". The following current values are displayed in the corresponding display fields:
   - Factor for determining the intensity: "k norm intensity" display field
   - S_{norm} measured value at minimum signal: "S norm offset" display field
   - Factor for determining C_{norm}: "k norm span" display field
   - The current phase: "Phase" display field
2. Enter setpoints:
   - Authorize access with Expert PIN, if necessary.
   - Enter setpoints: Use the parameter fields "Setpoint zero value" and "Setpoint end value".
3. Start normalization calibration wizard: "Start normalization" parameter field. After the wizard has run, the following newly determined values are displayed:
   - "k norm intensity"
   - "S norm offset"
   - "k norm span"
   - "Phase"

7.14.2.5 [2.20.03] Factory calibrations CALOMAT 7

Executing normalization calibration

Note

Right to change setpoints

The analyzer module works with pure gases and is matched to the local application in the factory. Make sure that the settings for the setpoints are only changed by suitably trained personnel.

Note

Measured value errors

If you change the setpoints but do not normalize the module, the changed values are saved and the measured value is calculated incorrectly.

After you have changed one or both setpoint settings, always run a normalization!

1. Main menu > "2. Settings" > "20. Service > "03. Normalization calibration".
   The current values for "Sraw min" and "Sraw max" are displayed in the corresponding display fields.
2. Enter setpoints:
   – Authorize access with Expert PIN, if necessary.
   – Enter setpoints: Use the parameter fields "Setpoint zero value" and "Setpoint end value".
3. Start normalization calibration wizard: "Start normalization" parameter field.
   The newly determined values for "Sraw min" and "Sraw max" are displayed at the end of the wizard process.

7.14.3 [2.20.04] Calibrate pressure sensor

7.14.3.1 Overview

This function calibrates the pressure sensor. Your device is then capable of correcting fluctuations of the sample gas pressure.

In contrast to OXYMAT 7, ULTRAMAT 7 and CALOMAT 7 cannot be fitted with reference gas flow monitoring. The reference gas flow monitoring is available as an option for OXYMAT 7 analyzer modules. The information content of the module-specific service menus differ accordingly.

Table 7-50 Display for calibration of the pressure sensor

Displayed parameter values	OXYMAT 7	ULTRAMAT 7	CALOMAT 7 [3]
Actual value p sample gas	Yes	Yes	Yes
Actual value p2 reference gas	Yes [1]	No	No
Start pressure sensor calibration	Yes [2]	Yes [2]	Yes [2]
Offset p2 reference gas	Yes	No	No
Offset p sample gas	Yes	Yes	Yes
Linear factor p sample gas	No	Yes	Yes

[1] Display of the reference gas values only with optional flow monitoring

[2] Button to start the calibration wizard

[3] Display of the menu only when equipped with optional pressure sensor

→ [2.20.04] Calibrate pressure sensor OXYMAT 7 (Page 197)

→ [2.20.04] Calibrate pressure sensor ULTRAMAT 7 (Page 197)

→ [2.20.04] Calibrate pressure sensor CALOMAT 7 (Page 198)

7.14.3.2 [2.20.04] Calibrate pressure sensor OXYMAT 7

Procedure

1. Main menu > "2. Settings" > "20. Service > "04. Calibrate pressure sensor".
   The actual value and the currently calibrated offset of the pressure sensor for the sample gas are displayed. If the analyzer module is equipped with flow monitoring for the reference gas, the corresponding reference gas values are displayed as well.
2. Start calibration wizard:
   - Authorize access with Expert PIN, if necessary.
   - Follow the instructions of the wizard.
     The actual pressure values as well as the sample gas offset are displayed after successful calibration. Display of the corresponding values for the reference gas requires corresponding measurements using an external pressure sensor.

See also

[2.20.06] Reference gas pump OXYMAT 7 (Page 198)

7.14.3.3 [2.20.04] Calibrate pressure sensor ULTRAMAT 7

Procedure

1. Main menu > "2. Settings" > "20. Service > "04. Calibrate pressure sensor".
   This function calibrates the pressure sensor. A linear correction coefficient is used for this purpose. The device is then capable of correcting fluctuations of the sample gas pressure. The actual value and the currently calibrated offset of the pressure sensor for the sample gas are displayed. In addition, the linear factor specifically for the measured gas is displayed. The display and procedure also apply to the CALOMAT 7 analyzer module: → [2.20.04] Calibrate pressure sensor CALOMAT 7 (Page 198)
2. Start calibration wizard:
   - Authorize access with Expert PIN, if necessary.
   - Select the calibration variant:

Calibration variant	Short description
1-point calibration	If you select this calibration, the offset of the pressure characteristic curve is decided. The slope (linearization factor) remains unchanged.
2-point calibration	With this calibration, offset and slope (linearization factor) are determined. In addition to this, to noticeably different pressure values are required.

   - Follow the instructions of the wizard.
   - The actual pressure values as well as the sample gas offset are displayed after successful calibration. In addition, the current linear factor is displayed.

7.14.3.4 [2.20.04] Calibrate pressure sensor CALOMAT 7

Procedure

- Main menu > "2. Settings" > "20. Service > "04. Calibrate pressure sensor".
  The display and procedure correspond to the information in: → [2.20.04] Calibrate pressure sensor ULTRAMAT 7 (Page 197).

7.14.4 [2.20.06] Reference gas pump OXYMAT 7

Requirements

Note

Availability of the menu

This menu is displayed only for OXYMAT 7 analyzer modules of the low-pressure version.

- You use an external reference gas pump.

Procedure

1. Main menu > "2. Settings" > "20. Service > "06. Pump reference gas".
   This menu is only used to activate/deactivate the reference gas pump. Its performance cannot be controlled.
2. Activate/deactivate reference gas pump: "Pump" parameter field.
   - Authorize access with Expert PIN, if necessary.
   - If you select the setting "On", you can read the activation status of the optional pressure switch in the "Pressure switch for reference gas" display field.

7.14.5 [2.20.10] Name/unit

Procedure

1. Main menu > "2 Settings" > "20. Service" > "10. Name/unit"
   This menu is used for setting the component name and to select the appropriate unit.

   Note

   Component names with several meanings/assigned several times

   If you assign names several times, the components cannot be distinguished in the main view and during navigation.

   - Assign only unique component names, for example, "O2(A)" and "O2(B)" for a device with two OXYMAT 7 modules.
   - Make sure that you do not assign multiple names.

2. Enter the name of the measured component: "Component name" parameter field
   - Authorize access with Expert PIN, if necessary.
   - The component name can have a maximum of 31 characters. But only seven characters will be visible on the display.
   - Enter the name with no more than seven characters.
3. Specify the measurement unit of the component: "Unit" parameter field.

   Note

   Reference temperature during conversion of units

   When converting the measured values to volume-based units, e.g., vpm, mg/m³, the reference temperature is 0 °C.

   Select one of the units included in the selection list.

   - Selection "ppm"
     When you set this unit, the conversion factor for the conversion into the unit "ppm" is displayed.
     The current offset and the measured value in the unit "ppm" are also displayed.
   - Selection "User-defined"
     Additional parameter fields are displayed with this selection:

Parameter field	Action
"User-defined unit"	Assign name of unit, up to seven characters.
"Factor"	Enter conversion factor for conversion to "ppm".
"Offset"	Enter offset for conversion of user-defined unit to "ppm".

     The current measured value is output in the unit "ppm" ("Measured value in ppm" display field) and in the user-defined unit ("Meas. value in act. unit").
   - Unit not "ppm" or "User-defined"
     When you set this unit, the conversion factor for the unit "ppm" is displayed.
     The current offset (actual unit) and the measured value in the unit "ppm" and in the currently set unit are also displayed.

7.14.6 [2.20.11] Physical measuring range

Service menu. You only have read access.

This menu contains all information on the physical measuring range of the component. In particular, it includes information on the high and low range limits as well as the smallest span. The displays are the same as those for OXYMAT 7 and ULTRAMAT 7. The display range is expanded for CALOMAT 7:

Table 7-51 Display scope menu [2.20.11]

Displayed parameters	OXYMAT 7	ULTRAMAT 7	CALOMAT 7	Notes
High measuring range limit	Yes	Yes	Yes	Maximum permissible measured value (full-scale)
Permitted high limit violation	No	No	Yes	Maximum permitted violation of the upper measuring range limit. This value is specified as a percentage of the maximum measuring range span [1].
Smallest span, high	No	No	Yes	Smallest permitted measured value span for the upper measuring range limit in which the accuracy is specified.
Low range limit	Yes	Yes	Yes	Minimum permissible measured value (characteristic initial value)
Permitted low limit violation	No	No	Yes	maximum permitted violation of the lower measuring range limit. This value is specified as a percentage of the maximum measuring range span [1].
Smallest span, low	No	No	Yes	Smallest permitted measured value span for the lower measuring range limit in which the accuracy is specified.
Smallest span	Yes	Yes	No	Minimum permissible span in which the accuracy is specified

[1] Maximum measuring range span = upper measuring range limit - lower measuring range limit

7.14.7 [2.20.12] Switch message system off/on

Service menu. You only have read access.

This menu displays the activation status of the message system.

NOTICE
Damages caused by switched-off message system If the message system is switched off, all diagnostics-relevant functions of the device are disabled. The device will not operate reliably, and operating errors may damage the device. The message system may only be disabled temporarily by qualified service personnel. Make sure that the message system is switched on after maintenance and diagnostics.

7.14.8 [2.20.14] Abort warm-up phase

Service menu. You only have read access.

If the warm-up phase is aborted, the specified measuring accuracy cannot be maintained. For this reason, error messages relating to the measuring accuracy can occur.

7.14.9 [2.20.15] Enable OM 2.1

Service menu. You can change this parameter with the password for the 'EXPERT' level.

Specification of whether option module 2.1 (analog and digital outputs) is present.

7.15 [3.01] Maintenance & Diagnostics > Current messages

7.15.1 Displaying current messages

Procedure

Note

Distinction

SIPROCESS GA700 distinguishes between messages that require acknowledgment and messages that do not require acknowledgment.

Messages not requiring acknowledgement are cleared if the problem causing them no longer exists. Messages that require acknowledgment are identified by the symbol □ and are revoked when the cause of the message is no longer present and an acknowledgment is made.

For additional information, see also → OXYMAT 7 message list (Page 251).

1. Main menu > "3. Maintenance & Diagnostics" > "01. Current messages"
   The menu contains the following entries:

Structure of the navigation lines	
Filter active	►
Messages	►

2. → Reading current messages (Page 203). All current messages are initially listed unfiltered.
3. Set message filter: → Filtering current messages (Page 202).
   Set the filter to reduce the number of messages according to your needs.

7.15.2 Filtering current messages

Procedure

1. Main menu > "3. Maintenance & diagnostics" > "01. Current messages" > "1. Filter"
2. Set the filter conditions.
   Set one or more filter conditions. Use the following parameter fields or editing windows for this purpose:
   - "Component/module":
     Select/deselect the check boxes included in the editing window. Only those messages whose properties you have selected are displayed.
     "Device" relates to general messages from components or to messages of the processing module. You can also filter for those messages that only apply to specific components or specific modules.
   - "Message type":
     Select/deselect the check boxes included in the editing window.
     All message types are activated by default. When you select the check box "None", all other check boxes are deselected.
3. → Reading current messages (Page 203).

7.15.3 Reading current messages

Procedure

1. Main menu > "3. Maintenance & Diagnostics" > "01. Current messages" >
   This menu includes all messages that match your parameter assignment under → [2.14] Settings > Set message parameters (Page 187). The menu can have hundreds of entries. The status bar also includes the current date and the current time. All current message are assigned instructions for remedial measures.
   The menu entries have the following structure:

Structure of the navigation lines							
	1)	2)	Device 3)	0208 4)	Ext. maint. demand 1: 5)	Date 6)	Time 6)
	Shortened message text....						►
	1)	2)	Device 3)	0209 4)	Ext. maint. demand 2:	Date 6)	Time 6)
	Shortened message text....						►

   1) Symbol for identification of measuring type
   2) Display of acknowledgment status. acknowledged, yes: ■ / No: □
   An empty column indicates that the message does not require acknowledgment.
   3) Message reference: message refers to the device, a module, or a component.
   4) Message number
   5) Message name
   6) Date / time: The time information reflects the "Time incoming" of the message.

2. The following information is shown when you open a message:
   - Description of cause
   - Appropriate remedial measures
   - Time incoming
3. Remedy the cause of the message:
   - Messages that do not require acknowledgment:
     When you implement the remedial measures, the message is no longer present in the list of current messages.
   - Messages that require acknowledgment:
     The list entry is only deleted if you acknowledge the message before and after you remedy the cause.
4. If necessary, change the filter settings: → Filtering current messages (Page 202).

7.16 [3.02] Maintenance & Diagnostics > Messages to be acknowledged

7.16.1 Displaying messages to be acknowledged

Procedure

Note

Distinction

SIPROCESS GA700 distinguishes between messages that require acknowledgment and messages that do not require acknowledgment.

Messages not requiring acknowledgement are cleared if the problem causing them no longer exists. Messages that require acknowledgment are identified by the symbol □ and are revoked when the cause of the message is no longer present and an acknowledgment is made.

Note

Device behavior after voltage off/on

After the power supply has been switched off and on, messages that require acknowledgment are treated as follows:

- Analyzer module(s): Messages that have not been acknowledged but require acknowledgement are still pending.
- Device: Messages that have not been acknowledged but require acknowledgement were deleted.

For additional information, see also → OXYMAT 7 message list (Page 251).

1. Main menu > "3. Maintenance & Diagnostics" > "2 Messages to be acknowledged"
   The menu contains the following entries:

Structure of the navigation lines		
1.	Messages to be acknowledged	►
2.	Acknowledge all messages	►

2. → Acknowledge message (Page 205). All messages to be acknowledged are listed unfiltered.
3. → Acknowledge all messages (Page 206). All messages requiring acknowledgment can be acknowledged in total with this function.

7.16.2 Acknowledge message

Procedure

1. Main menu > Main menu > "3. Maintenance & Diagnostics" > "2. Messages to be acknowledged" > "1. Messages to be acknowledged"
   This menu includes all messages to be acknowledged that match your parameter assignment under [2.14] Settings > Set message parameters (Page 187). The menu can have hundreds of entries. The status bar also includes the current date and the current time. All messages to be acknowledged are assigned instructions for remedial measures.
   The menu entries have the following structure:

Structure of the navigation lines						
 1)	 2)	Device 3)	0208 4)	Ext. maint. demand 1: 5)	Date 6)	Time 6)
				Shortened message text....		►
 1)	 2)	Device 3)	0209 4)	Ext. maint. demand 2: 5)	Date 6)	Time 6)
				Shortened message text....		►

1) Symbol for identification of measuring type
2) Acknowledgment status. Message not acknowledged: ☐
3) Message reference: message refers to the device, a module, or a component.
4) Message number
5) Message name
6) Date / time: shows the "Time incoming".

2. The following information is shown when you open a message:
   - Description of cause
   - Appropriate remedial measures
   - "Acknowledge" parameter field.
   - Time incoming
3. Remedy the cause of the message:
   The list entry is only deleted in the menu [2.14] Settings > Set message parameters (Page 187) if you acknowledge the message before and after you remedy the cause.
4. Acknowledge message: "Acknowledge" parameter field.
   - Main menu > "3. Maintenance & Diagnostics" > "2. Messages to be acknowledged" > "1. Messages to be acknowledged" > " ... "
   - This function is triggered immediately after the Standard PIN is entered.

7.16.3 Acknowledge all messages

Procedure

1. Main menu > "3. Maintenance & Diagnostics" > "2 Messages to be acknowledged" > "2. Acknowledge all"
2. "Acknowledge all messages" parameter field
   - Enter user pin
     The acknowledgment is triggered immediately after the Standard PIN is entered.
   - There are no more messages in the message list.
3. If the message list still includes messages:
   - Check to see if the cause of the message has been remedied: [3.01] Maintenance & Diagnostics > Current messages (Page 201).
     Remedy the causes.
   - Check or change the parameter assignment of the message system, if necessary: [2.14] Settings > Set message parameters (Page 187).

Note

"USER FUNC" key

The factory default setting for the "USER FUNC" key is the "Acknowledge all messages" function. If this function is still assigned, you can acknowledge all messages with one keystroke. Additional information is available under: → [2.01] Settings >Display/USER FUNC key (Page 102).

7.17 [3.03] Maintenance & Diagnostics > Logbook

7.17.1 Overview of logbook

Structure

The logbook is formed from the device-specific and module-specific partial logbooks. These logbooks log all operator control actions and reactions of the device or the modules. A logbook includes historical information that does not reflect the current status.

Note

Historical depth

Logbooks with different historical depths can be created by the uneven filling with entries. All logbooks are structured as a circular buffer. In case of an overflow of the logbooks, the oldest entry in one of the logbooks is deleted.

Note

Representation of wizard-based error messages in the logbook

Errors which prevent starting the wizard do not generate an entry in the logbook.

Errors which occur during execution of a wizard generate an entry in the logbook. However, only the corresponding error number is entered in this case, not the message text.

Information on identification of wizard-based errors is available in → Wizard-based error messages (Page 264).

Entries

The table below gives you an overview of the different types of logbook entries:

Table 7-52 Logbook entries (types)

Entry type [1)]	Brief description
All	You will find the following information in all logbook entries: • Place of origin (component/module) • Operating mode as well as date/time when the logbook entry was made.
Parameter change	The changed parameter is uniquely identified. The type of change as well as the parameter values before and after the change are displayed. • "Parameter":→ ID / name of the changed parameter • "Type of change": → Type of parameter change • "Old value":→ Value of the parameter before the change • "New value"→ Value of the parameter following the change • "Index":→ Index of the changed parameter
Calibration	Also includes information on the type and success of the calibration. • "Type of calibration":→ Type of calibration • "Single/total":→ Selection of single or total calibration. If total calibration, the selected measuring range is used as the leading measuring range • "Measuring range": → Selection of measuring range to be calibrated • "Components": → Selection of calibrated components • "Type of change": → Type of change • "Result":→ Calibration result
Save/reject	• "Type of change": → Type of parameter change
Messages	Messages include error messages, maintenance messages, and limit messages. • "Message":→ Message ID • "Message type":→ Message type • "Message status": → status of the message • "Affected Parameter":→ ID of parameter affected by a configuration problem (for example, whose value is outside the permitted input limits because of a change to another parameter) • "Causative Parameter": → ID of parameter whose setting has caused the configuration problem

Entry type [1)]	**Brief description**	
Function check	The cause of the function check is displayed. • "Cause":→ Cause of the function check • "Message status": → status of the message	
Plug & measure	The following Plug & Measure messages are logged: Changes of the system configuration, firmware incompatibilities, and invalid system configurations.	
	Changing the system configuration	• "Plug & Measure message": → Type of Plug & Measure message • "Type of change": → Type of configuration change • "Affected module": → ID of the changed module • "Module type":→ Type of the changed module • "Status": → Synchronization of the parameters
	Firmware incompatibility	• "Plug & Measure message": → Type of Plug & Measure message • "Affected module": → ID of the incompatible module • "Incompatible module type": → Type of the incompatible module • "Expected firmware version": → Expected firmware version
	Invalid system configuration	• "Plug & Measure message": → Type of Plug & Measure message
Logbook deleted	-	
Cold restart	Information on the date and the cause of a cold restart. • "Message": → Type of message	
Update	Information on loading of firmware or of configuration files. The display includes information on the target module, the file type, and the progress of the download. • "Target module": → Target module of the loaded data • "Data type":→ Type of loaded data • "Status":→ Download status • "Module type": → Type of target module • "version": → Version of the loaded software	
Load/save parameter set	"Load/save parameter set": Information on the source and destination of the parameter set as well as on the success of the process are displayed. • "Parameter set source": → Source of the parameter set • "Parameter set target": → Target of the parameter set • "Status":→ Status of the the load/save process	
Date/time change	Manual or automatic changes are logged. • "Daylight saving time": → Mode of summer/winter time switchover • "type of change": → Info on whether the change was carried out manually (by the user) or automatically (switchover to summer/winter time) • "Time before change" → Date/time before change • "Date before change" → Date/time before change	
Reset maint. interval	"Reset maintenance interval": Maintenance-interval related information, especially on remaining expiration time and on start date of follow-up interval. • "Interval No.": → ID of reset maintenance interval • "New expiration time": → Next expiration date (up to set highest message level) • "New expiration time": → Next expiration date (up to set highest message level)	

Entry type [1]	Brief description
AutoCal AutoVal	Information on start and end of an AutoCal process. • "Operation":→ AutoCal 1, AutoCal 2, AutoVal 1 or AutoVal 2 • "Action": → Started, completed or failed • "Result":→ Result of the AutoCal procedure
Reset drift values	Display ID and type of reset drift values. • "Drift values which have been reset": → ID of reset drift values • "Type of change": → Type of change
Coeff. interference correction:	"Coefficients interference correction": The coefficients of a interference gas correction were determined via measurement. • "Type of interference gas correction": → Type of interference gas correction • "Interference gas": → Affected interference gas • "Type of change": → Type of change • "Result": → Measurement result

[1] You have the option to filter the logbook entries according to your needs. Logbook entries can only be deleted entirely.

See also

[3.03.1] Display logbook (Page 210)
[3.03.1] Filter logbook entries (Page 210)
[3.03.2] Delete logbook (Page 211)

7.17.2 [3.03.1] Display logbook

Procedure

1. Main menu > "3. Maintenance & Diagnostics" > "3. Logbook > "1. Display logbook"
   All logbook entries which correspond to the defined filter conditions are displayed in this menu. The menu entries have the following structure:

Structure of the navigation lines			
Place of origin [1]	Message text	Date	Time
			Show details [2]

   [1] Components or modules that have created this logbook entry.

   [2] Editing line

   The current time is also displayed as reference in the status bar of the display.

2. Select and open menu entry:
   Main menu > "3. Maintenance & Diagnostics" > "3. Logbook > "1. View logbook" > " ... "
   A characterization of the different types of entry is available in → Table 7-52 Logbook entries (types) (Page 207).
3. View additional logbook entries or adapt filter settings: → [3.03.1] Filter logbook entries (Page 210).

See also

Overview of logbook (Page 206)

7.17.3 [3.03.1] Filter logbook entries

Procedure

1. Main menu > "3. Maintenance & Diagnostics" > "3. Logbook > "2. Display logbook"
   Set the filter conditions.
   Set one or more filter conditions. Use the following parameter fields or editing windows for this purpose:
   - "Component / module":
     Select/deselect the check boxes included in the editing window:
     "Device" refers to all modules included in the device. You can also filter for those messages that only apply to specific components.
   - "Type of entry":
     Select/deselect the check boxes included in the editing window.
     All message types are activated by default. When you select the check box "None", all other check boxes are deselected. A characterization of the log book entries is available in → Table 7-52 Logbook entries (types) (Page 207).
2. Check the filter results: → [3.03.1] Display logbook (Page 210)

See also

Overview of logbook (Page 206)

7.17.4 [3.03.2] Delete logbook

Procedure

1. Main menu > "3. Maintenance & Diagnostics" > "3. Logbook > "2. Delete logbook"
   When you activate this function, all logbook entries are deleted. It is not possible to remove single entries.
2. Delete: "Delete all logbook entries" parameter field.
   – Enter Expert pin.
   – Activate deletion with <ENTER>.
   → Overview of logbook (Page 206)

7.18 [3.04] Maintenance & Diagnostics > Measured value status

Display measured value status

1. Main menu > "3. Maintenance & Diagnostics" > "4. Measured value status"
   The measured value status of all gas measured values is available in this menu. The current measured value as well as symbolic and text status information is displayed for each component. The window has the following structure:

	Structure of the window	
Component 1 .. n	Status symbol [1]	Measured value [2]
Component 1 measured value status: Good The measured value is valid. The device is in normal measuring mode.		

[1] Measured value status

[2] Info of measured value and unit

2. Component with the buttons <▲> or <▼>
   The respective measured value status is displayed with these status symbols in the display:
   – : Measured value status "Good" - no symbolic representation
   – ?: Measured value status "Uncertain"
   – X: Measured value status "Bad"

   An overview of the possible status messages is found in the section Alarm, error, and system messages (Page 249).

7.19 [3.05] Maintenance & Diagnostics > Diagnostics values

7.19.1 [3.05.1] Measured signal diagnostics

7.19.1.1 Measured signal

Overview

This menu provides you access to status information/current values that you can use to evaluate the quality of the measured signal:

The access paths vary depending on the installed analyzer modules:

- OXYMAT 7/CALOMAT 7:
  Component > "3. Maintenance & Diagnostics" > "05. Diagnostics values" > "1. Measured signal diagnostics" > "1. Measured signal".
- ULTRAMAT 7:
  - Component > "3. Maintenance & Diagnostics" > "05. Diagnostics values" > "1. Measured signal diagnostics" > "1. Measured signal".
  - Component > "3. Maintenance & Diagnostics" > "05. Diagnostics values" > "1. Measured signal diagnostics" > "1. Measured signal Part 2".

You only have read access for the majority of parameters in these menus.

OXYMAT 7: Evaluation of the measured signal quality

Table 7-53 OXYMAT 7: [3.05.1.1] Measured signal

Parameter	Description
Magnetic field	Activation/deactivation by service personnel
Signal frequency	
Vibration compensation	Only for devices with vibration compensation. Can be enabled/disabled with Expert PIN.
Vibration comp. factor	Only for devices with vibration compensation.
Lock x TC	
Lock y TC	
Phase	
S after low pass	Sensor signal converted to mV
Temp. measuring head	Current temperature value
Temp. heating element	
Temp. sample chamber	
Temp. analyzer module	
p sample gas	Sample gas pressure
Pressure switch ref. gas	Not displayed on OXYMAT 7 without pressure switch

Parameter	Description
p1 reference gas	Reference gas pressure Only for OXYMAT 7 with flow monitoring
p2 reference gas	
Reference gas flow	
Measured value	

ULTRAMAT 7: Evaluation of the measured signal quality

Table 7-54 ULTRAMAT 7: [3.05.1.1] Measured signal

Parameter	Description
IR source	Activation/deactivation by service personnel
Lock x	
Lock y	
Vibration comp. ON/OFF	When "Vibration compensation present":
Lock x vibration	
Lock y vibration	
Lock x after vibration	
Lock y after vibration	
S raw	Sensor signal converted to mV
Phase	Displays the angle value of signal "f" in the "degree" unit
Lock x 2f	Signal lock x, determined with 2f
Lock y 2f	Signal lock y, determined with 2f
R 2f	Raw value of 2f signal
Lock x 2f vibration	When "Vibration compensation present":
Lock y 2f vibration	
Lock x 2f after vibration	
Lock y 2f after vibration	
Intensity I_0	Intensity I_0 for determining S_{norm}
S norm	Signal that is normalized with intensity I_0

Table 7-55 ULTRAMAT 7: [3.05.1.2] Measured signal Part 2

Parameter	Description
Temp. comp. Zero point	Activation/deactivation by service personnel
Temp. compensation	Activation/deactivation by service personnel
Temp. detector	Current temperature value
Temp. analyzer module	
Temp. sample chamber	When heating is present
Temp. sample chamber 2	
S norm TC zero	S_{norm} with temperature compensation zero point
S norm TC pre	S_{norm} with temperature pre-compensation

Parameter	Description
S norm auxco	The auxiliary characteristic coefficient of calculated S_{norm} value
C lin	Linearized measured value
C lin after low pass	Linearized measured value after application of the low-pass filter
C lin TC post	Linearized measured value with temperature post compensation
Pressure compensation	Activation/deactivation by service personnel
p sample gas	Sample gas pressure
C lin PC	Linearized measured value with pressure compensation
Calibration correction	Activation/deactivation by service personnel
C norm	Normalized concentration measured value
C norm after calibration	Normalized concentration measured value after calibration
Chopper frequency	
C abs	Absolute concentration measured value
C abs HC	Absolute concentration measured value after moisture correction
Measured value	

CALOMAT 7: Evaluation of the measured signal quality

Table 7-56 CALOMAT 7: [3.05.1.1] Measured signal

Parameter	Description
RM resistance	Current RM resistance
RT1 resistance	Current RT 1 resistance
Resistance ratio	Resistance ratio between RM and RT 1 ?
S raw after low pass	Sensor signal converted into mV after application of the low-pass filter
C norm	Normalized concentration measured value
C lin PC	Linearized measured value with pressure compensation
Sensor temp.	Current sensor temperature
Temp. analyzer module	Show current temperature at analyzer
Measured value	Current measured value

7.19.1.2 Heating controller

Overview

In this menu you access status information/current values that you can use to check the function of the heating controller.

You only have read access.

Component > "3. Maintenance & Diagnostics" > "05. Diagnostics values" > "1. Measured signal diagnostics" > "3. Heating controller".

OXYMAT 7: Status information for the heating control

Table 7-57 OXYMAT 7: [3.05.1.3] Heating controller

Parameter	Description
Temp. measuring head	Current temperature measured values
Temp. sample chamber	
Temp. heating element	
Temp. analyzer module	
Manip. val. meas. head	Show manipulated value of the measuring head heater
Sample chamber manipulated variable	Current manipulated variable of the sample chamber heater

CALOMAT 7: Status information for the heating control

Table 7-58 CALOMAT 7: [3.05.1.3] Heating controller

Parameter	Description
Measurement block temp.	Current temperature measured values
Membrane temp.	
Temp. analyzer module	
Sensor temp.	
Measurement block manipulated variable	Current block gauge heater manipulated value.

ULTRAMAT 7: Status information for the heating control

Table 7-59 ULTRAMAT 7: [3.05.1.3] Heating controller

Parameter	Description
Temp. sample chamber	Current temperature measured values
Temp. sample chamber 2	
Temp. gradient	
Temp. gas path	
Sample chamber manipulated variable	Current manipulated variable of the sample chamber heater
Manipulated variable MK1	Current manipulated variable of the sample chamber heater
Manipulated variable MK2	Current manipulated variable of the sample chamber heater
Gas path manipulated variable	Current manipulated variable of gas path heater

7.19.2 [3.05.2] Predictive self-diagnostics ULTRAMAT 7

Overview

This menu is available only for ULTRAMAT 7 analyzer modules:

Component > "3. Maintenance & Diagnostics" > "05. Diagnostics values" > "2. Predictive self-diagnostics"

This menu contains status information/current values to evaluate the quality of the signal. You can also assess whether the device may require service.

You only have read access. The displayed alarm or warning limits can be set with the Service PIN.

Only ULTRAMAT 7: predictive self-diagnostics

Table 7-60 ULTRAMAT 7: [3.05.2] Predictive self-diagnostics

Parameter		Description
Source intensity	High alarm limit	Maximum positive deviation of the source intensity (in %). A maintenance alarm is signaled on a high limit violation.
	High warning limit	Maximum positive deviation of the source intensity (in %). A maintenance demanded is signaled on a high limit violation.
	Current deviation	Percentage deviation of the current intensity I_0 from the normalized intensity $I_{0\ norm}$.
	Low warning limit	Maximum negative deviation of the source intensity (in %). A maintenance demanded is signaled on a low limit violation.
	Low alarm limit	Maximum negative deviation of the source intensity (in %). A maintenance alarm is signaled on a low limit violation.
Intensity I_0 TC		Source intensity I_0 after temperature compensation

7.19.3 [3.05.3] Electric parameters

Overview

In this menu you access information/current values that you can use to evaluate the supply status of the device. The menu shows the modules installed in the device for which electrical parameters are available. This includes analyzer modules and any installed option modules. The menu can include up to three navigation lines, depending on the features:

You only have read access.

Navigation lines in the menu [3.05.03]			
Navigation number [1]	Module name [2]	Component/ module type [3]	
			Display details ►

[1] AM1 → "1.", AM2 → "2.", OM2 → "4."; "3" currently not assigned.

[2] Depending on features: AM1, AM2, OM2

[3] Gas component or module type, for OM2, e.g., "AI/DI"

Display

Table 7-61 [3.05.3.1] to [3.05.3.4] Electrical parameters

Parameter	**[3.05.03.1] = Analyzer Module 1 and [3.05.03.2] = Analysis Module 2**			**[3.05.03.4]**
	OXYMAT 7	**ULTRAMAT 7**	**CALOMAT 7**	**OM2**
Reference voltage 2.5 V	X	X	X	X
Supply voltage 3.3 V	X	X	X	X
Supply voltage +5 V	X	X	X	-
Supply voltage -5 V	X	X	X	-
Supply voltage 23 V	X	X	X	-
Supply voltage 24 V	X	X	X	X
Solenoid voltage	X	-	-	-
Solenoid current [1]	X	-	-	-
Source voltage	-	X [2]	-	-
Source current	-	X	-	-
Bridge voltage	-	-	X	-
Half-bridge voltage RM	-	-	X	-
Half-bridge voltage RT	-	-	X	-
Test signal	X	X	-	-

[1] Current information as effective value, for example, calculated based on redundantly measured values of the solenoid current 1 and 2.

[2] Setting of the source in AM1 to 7.5 V, in AM2 deviating to 15 V

7.19.4 [3.05.4] Inputs/outputs

7.19.4.1 [1] Analog inputs

Service menu. You only have read access.
In this menu you get information about the actual current values of the available analog inputs. The following information is displayed for each analog input:

Navigation lines in the menu [3.05.4.1]		
Standard name of the analog input [1]		User-specific name
Actual current value	Status symbol [3]	Display in mA
Current measured value	Status symbol [2]	Display in set unit [3]

[1] AI01 ...AIn

[2] Measured value status

[3] Current value converted into currently set unit

The following symbols are used to display the measured value status:

- : Measured value status "Good" - no symbolic representation
- ?: Measured value status "Uncertain"
- X: Measured value status "Bad"

7.19.4.2 [2] Analog outputs

You only have read access.
In this menu you get information about the actual current values of the available analog outputs. The menu is only displayed with installed option modules (2.1 or 2.2). The following information is then displayed for each analog output:

Navigation lines in the menu [3.05.4.2]		
Standard name of the analog output [1] [2]		User-specific name
Actual current value	Status symbol [3]	Display in mA
Current measured value	Status symbol [3]	Display in set unit [4]

[1] AM1: AO11 (component 1), AO12 (component 2), AO13 (not assigned)

[2] AM2: AO21 (component 3), AO22 (component 4), AO23 (not assigned)

[3] Measured value status

[4] Current value converted into currently set unit

The following symbols are used to display the measured value status:

- : Measured value status "Good" - no symbolic representation
- ?: Measured value status "Uncertain"
- X: Measured value status "Bad"

7.19.4.3 [3] Digital inputs

You only have read access.
In this menu you can get information on the function assigned for each input as well as the status of the input (High/Low). The following information is displayed for each digital input:

Navigation lines in the menu [3.05.4.3.0.n]	
Current status	Low/ High
DI active for	Low/ High
Function	Function assignment[1)]

1) No display of function group

The assignment of the inputs to the device modules can be identified by the numbering:

- DI01 ...DI08 ↔ Processing unit
- DI09 ... DI16 ↔ Option module 1
- DI17 ... DI20 ↔ Option module 2

For additional information go to → [2.09.3] Digital inputs (Page 142).

7.19.4.4 [4] Digital outputs

You only have read access.
In this menu you can get information about the digital outputs available with the current hardware configuration. The following information is displayed for each digital output:

Navigation lines in the menu [3.05.4.4.0.n]	
Current status	Live/De-energized
Function	Function assignment[1)]

1) No display of function group

The assignment of the inputs to the device modules can be identified by the numbering:

- DO01 ... 8 ↔ Processing unit
- DO09 ... 20 ↔ Option module 1
- DO21 ... 23 ↔ Analyzer module 1
- DO24 ... 26 ↔ Analyzer module 2

For additional information go to → [2.09.5] Digital outputs (Page 151).

7.19.5 [3.05.5] Communications

7.19.5.1 MODBUS TCP node

Procedure

1. Main menu > "3. Maintenance & Diagnostics" > "5. Diagnostics values" > "5. Communication" > "1. MODBUS TCP node"
   You can use this menu to display and check the parameter assignments of the individual nodes. The navigation lines are structured as follows:

Structure of the navigation lines			
1	TAG [1]	IP address	Communication status [2] Show details [3]

[1] Designation of the MODBUS TCP node

[2] Communication status: "Stopped" (communication is inactive)/ "Started"/ "Running" (communication is active)

[3] Editing line

2. Open menu entry:
   The following information is displayed for each menu entry:
   - TAG, IP address, and communication status
   - Designation and amount of the process values supplied by the respective MODBUS TCP node
3. Adapt the parameter assignment, if necessary: → Setting communication via MODBUS TCP (Page 243).

7.19.5.2 MODBUS TCP digital inputs

Procedure

1. Main menu > "3. Maintenance & Diagnostics" > "5. Diagnostics values" > "5. Communications" > "2. MODBUS TCP digital inputs"
   You can use this menu to display and check the parameter assignments of the individual digital inputs. The navigation lines are structured as follows:

Structure of the navigation lines			
1	TAG [1]:	Function [2]	High [3] Show details

[1] Designation of the MODBUS TCP digital input

[2] Function that was assigned to the digital input

[3] Status of digital input

2. Open menu entry:
   The following information is displayed for each menu entry:
   - Current status and activation level ("High" or "Low")
   - Function group and function
3. Adapt the parameter assignment, if necessary: Setting MODBUS digital inputs (Page 244).

7.19.6 [3.05.6] Operating hours counter

You only have read access.

This menu includes information on the operation time of the device and the modules included in the device. The operation time is displayed in hours. Deviations in the information can result from the replacement of modules.

7.20 [3.06] Maintenance & Diagnostics > Drift values

7.20.1 Editing zero point drift values

Procedure

1. Main menu > "3. Maintenance & Diagnostics" > "6. Drift values" > "1. Zero point drift"
   This menu includes the following information on each measuring range which makes it easier for you to detect/monitor the zero point drift:
   - Previous zero gas calibrations
   - Previous deviations
2. Set warning limit for the total deviation of the measuring ranges.
   The total deviation is calculated for a specific number of zero calibrations. The corresponding deviation is added following each zero calibration. A warning is output if the value of the total deviation exceeds the warning limit.
   - "Warning limit in % of MR" parameter field.
   - Authorize access with Standard PIN, if necessary.
   - Enter the limit in %.
3. Reset the zero point drift
   - Enter number of calibrations after which the zero point drift is reset.
     The deviations of the zero calibration are added up to the entered number. The total deviation is then reset to 0, and counting of the calibrations begins again.
     "Monitored zero calibration" parameter field: Change the default value, if necessary (setting range 0 to 100)
   - Reset the zero point deviation values for all measurement ranges:
     "Reset deviations" parameter field

7.20.2 Editing QAL3 drift values

Procedure

1. Main menu > "3. Maintenance & Diagnostics" > "6. Drift values" > "2. QAL3 drift values"
   The following QAL3 drift values are displayed for each measuring range:
   - Start-of-scale value
   - Full-scale value
   - Deviation of zero gas calibration and deviation of span gas calibration as well as associated total deviations
2. Reset total deviation: "Reset total dev." parameter field.
   Authorize access with Expert PIN, if necessary.

7.20.3 Displaying control reserve

Display

The following menu is available for OXYMAT 7 and ULTRAMAT 7.

Main menu > "3. Maintenance & Diagnostics" > "6. Drift values" > "3. Control reserve" The currently used control reserve is displayed (in %).

Additional information

The control reserve is an electronic value which compensates for zero point drift. The control reserve is determined as part of the zero point calibration.

Control reserve can be taken up by frequently readjusting the zero point. A warning that must be acknowledged is output if the consumption is greater than 85%. If the consumption of the control reserve drops below 85%, the maintenance demand is deleted automatically.

To reset the control reserve, execute a normalization calibration → [2.20.03] Factory calibrations OXYMAT 7 (Page 191). If you cannot reset the control reserve, contact your service partner/employee.

7.21 [3.08] Maintenance & Diagnostics > Maintenance intervals

7.21.1 Displaying maintenance intervals

Procedure

1. Main menu > "3. Maintenance & Diagnostics" > "8. Maintenance intervals"
   This menu contains all user-assignable maintenance intervals. The menu entries are structured as follows:

Structure of the navigation lines					
01.[1]	 2)	TAG [3]	5d [4]	10d [5]	20d [6]
					Edit ►

[1] Menu entry number
[2] Symbol of the highest message level
[3] Designation of the maintenance interval
[4] Remaining runtime of the maintenance required status in days
[5] Remaining runtime of the maintenance demanded status in days
[6] Remaining runtime of the maintenance alarm status in days

2. Check remaining runtimes: Remaining runtimes with the value "0" indicate that the corresponding message (maintenance required, maintenance demanded, maintenance alarm) has already been generated.
3. Set maintenance intervals: Assigning maintenance interval parameters (Page 224).

7.21.2 Assigning maintenance interval parameters

Procedure

Note

Sequence time/update of maintenance intervals

The maintenance intervals are always updated at midnight (00:00 hours): initially on the day after the parameter assignment, then daily. If a maintenance interval expires, the message "Maintenance interval expired" is output. This message is also output at midnight (00:00 hours).

1. Main menu > 3. "Maintenance & diagnostics" > "8. Maintenance intervals" > "..."
2. Specify the message level: "Message type" parameter field
   – Authorize access with Expert PIN, if necessary.
   – Specify whether maintenance required, maintenance demanded or a maintenance alarm is to be output.
     You can specify additional message levels for the maintenance demanded and maintenance alarm settings, → Step 6.
3. Enter message text: "Message text" parameter field.

   Note

   Effects of changed message texts

   When you change an existing message text, all existing logbook entries are overwritten with the new text.

   The message text can be up to 12 characters long and is displayed in the message list or in the logbook.
4. Specify the duration of the maintenance interval: "Maintenance interval" parameter field. Enter the duration in days.

   Note

   Effective date of a changed interval duration

   Changes to the duration of a maintenance interval do not become effective until after expiration or reset of the running maintenance interval.
5. Calculate the remaining time and expiration date: "Reset remaining time" parameter field. When you reset the remaining time, the data relating to the maintenance interval are newly displayed in the "Remaining time" and "Expiration date" displays.
6. Specify additional message levels, if necessary:
   To do so, use the displayed parameter fields "Maint. dem. n days before" or "Maint. required n days before".
   You specify with these settings how many days before the end of the remaining time a corresponding message is generated.
7. Enable/disable maintenance interval: If you select the "Off" value, this maintenance interval is no longer displayed in the status bar.
8. Assign additional maintenance interval parameters, if necessary.

7.22 [3.09] Maintenance & Diagnostics > Identification

7.22.1 Overview

This function gives you read access to data pertaining, in particular, to the hardware and firmware of your device. Identification data refer either to the basic device or to a module.

The data enable the unique identification of your device. Have the identification data available when you contact service.

The menu shows the devices recognized in the module. The navigation lines are structured as follows:

Table 7-62 Exemplary menu structure

Structure of the navigation lines [1]			
01.	Device (PU)		SIPROCESS GA 700 Edit ►
02.	AM1		OXYMAT 7
03.	Measuring head		O_2
07.	AM2		OXYMAT 7
08.	Measuring head		O_2
12.	OM1		DI/DO
13.	OM2		AI/DI

[1] Only the currently recognized equipment is displayed. The menu numbering is not adapted. Variable: Menu numbers 03 to 08.

See also

Identifying a device (Page 226)

Identifying analyzer modules (Page 227)

Identifying additional features (Page 229)

7.22.2 Identifying a device

Procedure

1. Main menu > "3. Maintenance & diagnostics" > "09. Identification" > "01 Device (PU)".
   The menu includes all identification data specified for the device in the factory. You have the option to assign a device name and enter the commissioning date.
2. Assign device name: "TAG" parameter field.
   The device name is used as a means of identifying the device in a network.
   - Authorize access with Standard PIN, if necessary.
   - You can use up to 31 characters for the designation.
3. Enter commissioning date: "Commissioning date" parameter field.

4. Write down the identification data, if necessary. The following device-specific data is displayed:

Display field	Remark
Product name	SIPROCESS GA700
Article number Part 1 [1)]	Display of first part of device article number, e.g. "7MB3000".
Article number Part 2 [1)]	Display of second part of device article number, e.g. "0AA00-0AA0".
Article number suffixes [1)]	Display of article number suffix, e.g. "ZABC". The article number suffix identifies options for your device.
Serial number	Display serial number of the device.
Product version	Display hardware version of the device.
Firmware version	Display installed firmware version.

[1)] Complete article number, e.g.: 7MB3000-0AA00-0AA0-ZABC

5. Complete identification: → Identifying analyzer modules (Page 227).

See also

Overview (Page 225)

7.22.3 Identifying analyzer modules

Safety instruction(s)

NOTICE

Installation of ULTRAMAT 7 analyzer modules

ULTRAMAT 7 analyzer modules-that are installed contrary to their intended purpose in another device variant can cause damage. Therefore:

- Prior to installation, check the device variant for which the analyzer module is intended. You will find the relevant information in the article number on the module nameplate:
  - 7MB3010-xxxxx-xx**A**x-Z → "**A**": Analyzer module for slide-in devices
  - 7MB3010-xxxxx-xx**B**x-Z → "**B**": Analyzer module for wall-mounted devices
- Compare the information on the nodule plate with the identification data of the analyzer module.
- If installation/operation is impermissible, deactivate the device
- Contact Siemens service → Services & Support (https://support.industry.siemens.com/cs/gb/en/sc).

Procedure

1. The access path depends on the hardware configuration: The menu includes all the identification data specified for the analyzer module in the factory.
2. Write down the identification data, if necessary. The following module-specific data is displayed:

Display field	Remark
Module type	OXYMAT 7/ULTRAMAT 7/CALOMAT 7
Article number Part 1 [1)]	Display of first part of module article number, e.g. "7MB3020" (OXYMAT 7)
Article number Part 2 [1)]	Display of second part of module article number, e.g. "0AA00-0AA0".
Article number suffixes [1)]	Display of article number suffix, e.g. "ZABC". The article number suffix identifies options for your module.
Serial number	Display serial number of the analyzer module.
Product version	Display hardware version of the module.
Firmware version CALC	Display installed firmware version of the analyzer module.
Firmware version ADU	Display installed firmware version of the signal processor.

[1)] Complete article number, e.g.: 7MB3020-0AA00-0AA0-ZABC

3. Complete identification: → Identifying additional features (Page 229).

See also

Overview (Page 225)

7.22.4 Identifying additional features

Procedure

1. The access paths depend on the hardware configuration: The menus include all identification data specified in the factory for the following features:
   - OXYMAT 7: Measuring head
   - ULTRAMAT 7: Detector 1 and detector : 2
   - CALOMAT 7: Component
2. Write down the identification data, if necessary. The following equipment-specific data is displayed:

Display field	Remark
Physical measured component	Actual, physically correct designation of the measured component
Component name	Component name defined by the user.
Item number	Manufacturer identification number.

7.22.5 Identify sensor module CALOMAT 7

Procedure

1. The access paths depend on the hardware configuration: The menus include all identification data specified in the factory for the following features:
2. Write down the identification data, if necessary. The following equipment-specific data is displayed:

Display field	Remark
Article number Part 1 [1)]	Display of first part of module article number, e.g. "7MBXXXX"
Article number Part 2 [1)]	Display of second part of module article number, e.g. "0AA00-0AA0".
Serial number	Display serial number of the sensor module.
Product version	Display hardware version of the module.

7.22.6 Identifying option modules

Procedure

1. The access paths depend on the hardware configuration: The menus include all identification data specified in the factory for the following features:
   - Option module 1
   - Option module 2
2. Write down the identification data, if necessary. The following equipment-specific data is displayed:

Display field [1]	Remark
Module type	DI/DO or AI/DI [2]
Item number	Manufacturer identification number.
Serial number	-
Product version	Technical status of hardware
Firmware version	Version of the firmware

[1] Only visible with option module 2.

[2] DI/DO: Option module 1.1, AI/DI: Option module 2.2

7.23 [3.10] Maintenance & Diagnostics > Save/load parameter set

7.23.1 Overview

In this menu you can access the parameters with which you save and load parameters sets. Parameter sets contain the parameter assignment of the device. Two types can be distinguished:

- Factory data: This parameter set is the factory default and is used to restore the original parameter assignment. For this reason, factory data can only be loaded.
- User data: This parameter set maps a current, application-specific parameter assignment. You can save and reload user data at any time.

The navigation lines of the device are structured as follows:

Table 7-63 Example of menu structure (all equipment options)

Structure of the navigation bars	
1.	Save parameter set Edit ►
2.	Select module. From an "m of n" selection, the modules for which the parameter set should be saved can be selected here.
3.	Load parameter set

See also

Save parameter set (Page 231)

Load parameter set (Page 231)

7.23.2 Save parameter set

Procedure

1. Main menu > "3. Maintenance and diagnostics" > "10. Save/load parameter set" > "1. Save parameter set"
   Use this function to save the current parameter assignment in the device. The data is saved as "user data".
2. Start save process: "Save parameter set" parameter box.
   Follow the instructions in the displayed window.
   When the procedure is completed, the "Save data" window appears on the display.

You will find Information on the restoring the original parameter assignment at: → Load parameter set (Page 231).

7.23.3 Load parameter set

Procedure

1. Main menu > "3. Maintenance & diagnostics" > "10. Save/load parameter set" > "2. Load parameter set"
   Depending on the user level, you can load "user data" or "factory data".
   Use this function to load a parameter assignment saved in the device. You have the option to restore the original settings with this function. Loading always relates to all existing modules. The loading of the parameter set of only one analyzer module is not possible.
2. Select module.
   From an "m of n" selection, the modules for which the parameter set should be saved can be selected here.
3. Select the parameter set: "Loading" parameter box.
   - Authorize access with Standard PIN, if necessary.
   - Load factory data or user data:
     When you select the "Factory data" setting, you prepare for loading the factory-assigned basic parameters.
     When you select the "User data" setting, you prepare for loading the most recently saved user-defined parameter assignment.
   - Depending on the selection, different dates are displayed of the last saved parameter set.
4. Start save process: "Load parameter set" parameter box.
   Follow the instructions in the displayed window.

7.24 [3.11] Maintenance & Diagnostics > Test

7.24.1 Overview of test

You can use the submenus in this menu to test inputs/outputs, the display, and the keyboard for functionality.

Note

"Simulation or substitute value" operating mode (Namur: "Check function")

Activation of a test requires registration at the device. When you activate a test, the device goes into "Simulation or substitute value" operating mode. The device is in "Function check" status, but outputs a simulation value or substitute value. The corresponding function control indicator is displayed with the following symbols:

- → SIMATIC PCS7 (symbol "Hand, 2 points")
- → NAMUR

The function control indicator is hidden once the test is complete. Information on the used symbols, especially when changing the operating mode, is available in: → Table 8-1 Function check indicators (Page 249).

See also

LUI symbol sets (Page 249)

7.24.2 [3.11.1] Test inputs/outputs

7.24.2.1 Testing of analog outputs

Requirement

Note

Availability of the menu

This menu is only available if your device has at least one of the option modules (2.1 and/ or 2.2) installed.

- Make sure that a suitable test device is connected.

Procedure

1. Main menu > "3. Maintenance & diagnostics" > "11. Test" > "1. Test inputs/outputs" > "1. Analog outputs"
   Use this menu to access the assigned test parameters of all analog outputs. You can also start the test function for all activated analog outputs.

   Note

   Equipment-dependent display

   Only the analog outputs actually available on the device are listed in the menu. Example:
   - Analyzer module 1 with a component exists: Only analog output AO11 is displayed
   - Analyzer modules 1 and 2 exist each with one component: The analog outputs AO11 and AO21 are displayed.

   Note

   Principle of operation

   When you enable the test function, the analog outputs are released from their actual function.

   The navigation lines of the menus are structured as follows:

Structure of the navigation lines		
1.	Test mode	Active [1]
		Edit ►
2.	AO11: O2 [2] [3] [4]	4 mA [5]
		Specify setpoint for testing ►

   [1] Activity indicator test mode (active/ inactive)

   [2] Designation of the analog output and the component

   [3] AM1: AO11 (component 1), AO12 (component 2), AO13 (not assigned)

   [4] AM2: AO21 (component 3), AO22 (component 4), AO23 (not assigned)

   [5] Actual value display

2. Enter setpoint for testing the first analog output, e.g.:
   Main menu > "3. Maintenance & diagnostics" > "11. Test" > "1. Test inputs/outputs" > "1. Analog outputs" > "2. AO01: ..."
3. Specify unit for setpoint to be defined: "Setpoint input" parameter field.
   - Authorize access with Standard PIN, if necessary.
   - Depending on the measuring device, select the value "mA" or "Gas unit".
4. Specify the test setpoint: "Setpoint in mA" or "Setpoint in gas unit" parameter field.
   - When you output the setpoint in the gas unit, the analog output is output depending on the assigned measuring range.
   - Enter the corresponding value.
5. Enter setpoints for additional analog outputs, if necessary: Repeat steps 2 to 4.

6. Enable/disable test mode:
   Main menu > "3. Maintenance & diagnostics" > "11. Test" > "1. Test inputs/outputs" > "1. Analog outputs" > "1. Test mode" > "Test mode" parameter box:
   – When you enable test mode, the analog outputs can only be used for test purposes. This operational status can only be recognized by the function control indicators in the status bar (Symbol "Hand, 2 points") or (Symbol "Screw wrench" → Table 8-1 Function check indicators (Page 249).
   – Disable the function directly after the test is complete.
7. Measure/check test signal externally.
8. Disable test mode:
   Main menu > "3. Maintenance & diagnostics" > "11. Test" > "1. Test inputs/outputs" > "1. Analog outputs" > "1. Test mode" > "Test mode" parameter box
   When you disable test mode, the analog outputs work once again according to their parameter assignment.

See also

LUI symbol sets (Page 249)

7.24.2.2 Testing analog inputs

Requirement

Note

Availability of the menu

This menu is only available if your device has at least one of the option modules (2.1 and/ or 2.2) installed.

- Make sure that a suitable test device is connected.
- When entering the setpoint using internal analog outputs: The analog outputs of the used option module must be connected to the analog inputs of the option module 2.
- When entering the setpoint using external analog outputs: Current signal must be applied externally. Make sure that the analog inputs are wired accordingly.

Procedure

1. Main menu > "3. Maintenance & diagnostics" > "11. Test" > "1. Test inputs/outputs" > "2. Analog inputs"
   Use this menu to access the assigned test parameters of all analog inputs. You also activate the test function for all activated analog inputs.

   Note

   Principle of operation

   When you enable the test function, the analog inputs are released from their actual function.

   You can have a test current set by one of the existing analog outputs for the analog input to be tested. Use of an external current simulator is not required. If you are specifying a setpoint for the connected analog output, the current value can be tested at the analog input.
   The navigation lines of the menus are structured as follows:

Structure of the navigation lines			
1.	Test mode		Active [1]
			Edit ►
2.	AI01: "Measured value type" [2]	Designation [2]	4 mA [3]
			Interconnection with analog output ►

   [1] Activity indicator test mode (active/ inactive)

   [2] Designation of the measured value type ("Gas", "Pressure", "Flow", "Temperature", "Other") as well as designation specified by user

   [3] Actual value display

2. Open menu command of at least one of the up to four analog inputs that can be tested, for example:
   Main menu > "3. Maintenance & diagnostics" > "11. Test" > "1. Test inputs/outputs" > "2. Analog inputs" > "2 AI01: ..."
   - The actual value of the selected analog input is displayed.
   - The factory default setting in the "Test with analog output" parameter field is the value "Free".
3. Assign analog output: "Test with analog output" parameter field.

   Note

   Wiring

   If the assignment does not correspond to the existing wiring between analog outputs and analog inputs, an incorrect test result is output.

   Therefore check the wiring between analog outputs and analog inputs, if necessary.

   - Authorize access with Standard PIN, if necessary.
   - Select one of the analog outputs included in the list window.

   The actual value of the assigned analog output is displayed after the selection.
4. Enter test setpoint: "Setpoint analog output" parameter field
5. Integrate other analog inputs into the test, if necessary. Repeat steps 2 to 4.

6. Enable/disable test mode:

   Note

   Status

   When you activate the test mode, the status "Uncertain is output for the "Actual value analog input" current values respectively.

   Main menu > "3. Maintenance & diagnostics" > "11. Test" > "1. Test inputs/outputs" > "2. Analog inputs" > "1. Test mode" > "Test mode" parameter box

   – When you enable test mode, the analog inputs can only be used for test purposes. This operational status can only be recognized by the function control indicators in the status bar or (Symbol "Screw wrench" → Table 8-1 Function check indicators (Page 249).
   – Disable the function directly after the test is complete.

7. If you are using an external analog output: Apply external test signal.
8. Disable test mode:
   Main menu > "3. Maintenance & diagnostics" > "11. Test" > "1. Test inputs/outputs" > "2. Analog inputs" > "1. Test mode" > "Test mode" parameter box
   When you disable test mode, the analog inputs work once again according to their parameter assignment.

7.24.2.3 Testing of digital outputs

Requirements

- Make sure that a suitable test device is connected.
- Make sure that triggering the test function does not have a negative impact on the entire system.

NOTICE
Triggering of alarms by the system Execution of the test function can trigger system alarms and therefore also protective tripping of the entire system. Before you execute the test function: • Make sure that the test signals in the control system are treated accordingly as "Test" and that protective tripping is prevented. • If necessary, interrupt the connection between SIPROCESS GA700 and the control system after consultation.

Procedure

1. Main menu > "3. Maintenance & diagnostics" > "11. Test" > "1. Test inputs/outputs" > "3. Digital outputs"
   Use this menu to access the assigned test parameters of all digital outputs. You also activate the test function for all digital outputs.

   Note

   Principle of operation

   When you enable the test function, the digital outputs are released from their actual function.

   The navigation lines of the menus are structured as follows:

Structure of the navigation lines		
Test mode		Inactive
DO01: [1]	Process tag 01 [2]	Live [3]
DO08:	Free [4]	De-energized
DO26:	Fault / alarm	De-energized

   [1] The following digital outputs are displayed, depending on the configuration level of the device: 01 ... 08 (PU), 09 ... 20 (OM 1), 21 ... 23 (AM 1) and 24 ... 26 (AM 2)

   [2] User defined function groups or function assignment

   [3] Activation level

   [4] Digital output is not assigned / no function group or function assigned.

2. Select the first digital output you want to test.
   - Change the activation level for test purposes.
     Authorize access with Standard PIN, if necessary.
   - Set the parameter value to "Live" or "De-energized".
3. Check and, if necessary, change the activation level of additional digital outputs.
4. Enable test mode.
   When you enable test mode, the digital outputs can only be used for test purposes. The "?" symbol is displayed behind the measured value in the TLV.
   The function control indicators appear in the status bar (Symbol "Hand, 2 points") or (Symbol "Screw wrench" → Table 8-1 Function check indicators (Page 249).
5. Read out test results on the test device.
6. Disable test mode.
   When you disable test mode, the digital outputs work once again according to their parameter assignment.

See also

LUI symbol sets (Page 249)

7.24.2.4 Testing of digital inputs

Requirement

- Make sure that a suitable test device is connected.

Procedure

1. Main menu > "3. Maintenance & diagnostics" > "11. Test" > "1. Test inputs/outputs" > "4. Digital inputs"
   In this menu you enable/disable the test mode.

   Note

   Principle of operation

   When you enable the test function, the digital inputs are released from their actual function.

   The following information is also displayed for each digital input:

Structure of the navigation lines		
Linked functions		Trigger/ Do not trigger
DI01: [1]	Calibration 01 [2]	LOW [3]
DI08:	Free [4]	HIGH

   [1] The digital inputs 01 to 08 are displayed. With option module 1 also digital inputs 09 to 16. With option module 2 also digital inputs 17 to 20.

   [2] User defined function groups or function assignment

   [3] Activation level

   [4] Digital input is not assigned / no function group or function assigned.

2. Enable test mode.
   When you enable test mode, the digital inputs can only be used for test purposes.
3. Apply external test signals.
4. Disable test mode.
   When you disable test mode, the digital inputs work once again according to their parameter assignment.

See also

LUI symbol sets (Page 249)

7.24.3 [3.11.2] Test display

Test the display

1. Main menu > "3. Maintenance & Diagnostics" > "11. Test" > "2. Test display"
   This test allows you to check whether the display has faulty pixels. Surface areas are displayed successively in the greyscales that can be displayed.
2. Start or advance test with <ENTER> or cancel with <ESC>.

7.24.4 [3.11.3] Test keyboard

Test the keyboard

1. Main menu > "3. Maintenance & Diagnostics" > "11. Test" > "3. Test keyboard"
   This test allows you to check whether the keys of the LUI function reliably. During this test, the keyboard is emulated on the display. The keys are only assigned with the test function during the test.
2. Test the keyboard: Press all keys on the keyboard in succession, except the <ESC> key. Pressed keys are shown as inverted on the display.
3. Exit test: Press <ESC>.

7.24.5 [3.11.4] Test internal communication

Test internal communication

1. Main menu > "3. Maintenance & Diagnostics" > "11. Test" > "4. Test internal communication"
   Use this menu to test the device-internal CAN bus.
2. Start the test: "Find modules" parameter field.
   - Authorize access with Standard PIN, if necessary.
   - The test progress is displayed by a rotating progress sign.

   At the end of the test, the CAN bus address is output for each recognized module.

7.25 [3.12] Maintenance & Diagnostics > Cold restart

Restart the device

1. Main menu > "3. Maintenance & Diagnostics" > "12. Cold restart"
   In this menu you start a cold restart of the device. Any parameter changes that have not been saved yet are accepted.
2. Start cold restart: "Restart device" parameter field
   - Authorize access with Standard PIN, if necessary.
   - Cancel process with <ESC> or start with <ENTER>.

   While the device restarts, the splash screen is displayed.

7.26 [3.20] Maintenance & Diagnostics > Service trace

Service menu. You only have read access.

The service technician can use the included menus to get extended diagnostics information on device-internal states in case of problems or faults.

7.27 [4] Communications

7.27.1 Overview

Basic concepts

The basic concepts described below will help you with the parameter assignment of the Ethernet and MODBUS communication.

Protocols

The device supports network communication via:

- Ethernet
  You can connect your device to the control technology via Ethernet. The Ethernet capability allows for parameter assignment of the device with SIMATIC PDM.
- MODBUS TCP
  The device uses MODBUS TCP connections for the communication with other SIPROCESS GA700 gas analyzers.
  A SIPROCESS GA700 gas analyzer can receive measured values from up to seven other gas analyzer simultaneously via MODBUS TCP. The received measured values can be used, for example, for correction of cross-reference or for pressure compensation of the device's own measured values.

IP address

Note

Supported IP addresses

The device supports only Class A, Class B, and Class C addresses. You cannot use Class D or Class E addresses.

IP addresses are used for unique identification of devices within a network or a network segment. They are used for data exchange between the communication partners via TCP/IP. An IP address has the following decimal notation:

Table 7-64 Example of an IP address

192.	168.	0.	2

Network mask

Subnet mask

The network mask masks the IP address of a device. The IP address is divided into a "network component" and a "device component".

Table 7-65 Masking

Subnet mask	255.	255.	255.	0
IP address	192.	168.	0.	3
Division	Network component			Device component

The result is a logical separation of a physically uniform network into different network segments (subnets). Within a segment the network component must be identical and the device component different.

Default gateway

The masking determines which IP addresses a device looks for in its own segment and which are forwarded to a default gateway. The default gateway of a network forwards all network requests that are not part of the same subnet to other subnets.

7.27.2 Setting communication via Ethernet

First setting

Note

Plausibility check

The parameter assignment of the Ethernet communication is checked for plausibility. Parameter changes that result in inadmissible address combinations are rejected.

1. Main menu > "4. Communications" > "1. Ethernet"
2. Call the parameter display: Press <ENTER>.
   In addition to the factory-set MAC address, the parameter display includes three additional parameter fields that you can use to assign addresses for the Ethernet communication:
   - IP address
   - Subnet mask
   - Default gateway address

   The operation/setting procedure is the same for all three address parameters.
3. Set IP address:
   - Open the parameter field.
   - Authorize access with Expert PIN.
   - Enter the four components of the required IP address one after the other.
4. Set subnet mask:
   Procedure is the same as step 3.
5. Assign default gateway address:
   Procedure is the same as step 3.

Change subnet mask

1. Main menu > "4. Communications" > "1. Ethernet"
2. Call the parameter display: Press <ENTER>.
3. Set the default gateway address to 0:
   - Write down the gateway address.
   - Open the parameter field.
   - Authorize access by input of Expert PIN.
   - Enter "0" in all four components of the gateway address.
4. Enter new subnet mask.
5. Specify new IP address, if necessary.
6. Set the default gateway address back to its original value.

7.27.3 Setting communication via MODBUS TCP

Procedure

1. Main menu > "4. Communications" > "2. MODBUS TCP" > "1. MODBUS TCP node"
   The menu lists the up to seven MODBUS nodes with which your device can communicate. The following information is displayed for each menu entry (navigation line):

Structure of the navigation line for each MODBUS node			
Navigation number	TAG [1]	IP address	Communication status Edit

   [1] Designation of the MODBUS node Is transmitted when MODBUS connection is established. Not editable.

2. Open selected menu entry: Press <ENTER>.
   The parameter display of the MODBUS TCP node is opened.
3. Enter IP address.
   Enter the IP address of the MODBUS node that provides the external process values.
4. Enable/disable MODBUS communication: "Communications" parameter field.
   - When you select the "active" setting, the device tries to establish communication with the configured MODBUS node.
   - When you select the "inactive" setting, an existing MODBUS communication is interrupted.
5. Check the communication status: Display in "Communication status" parameter field ("Stopped", "Starting", "Running").
6. Read out gas measured values of components: Display in display fields "Gas measured value 1 to 5". The number of displayed gas measured values depends on the available components. For additional information go to → [3.05.5] Communications (Page 220).
   - The display is updated every time you start MODBUS communication.
   - If a MODBUS TCP node is unavailable (communication status "stopped"), TAG, gas measured values, and external process values are not updated. The values are set to 0.000% (including hPa and °C). The measured value is set to "Bad" status and is identified with the X symbol.
7. Assign designation for external measured values:
   - Each MODBUS node can receive up to two pressure measured values, two temperature measured values, as well as two flow measured values. The assignment of the designation in only possible for the external process values transmitted by the MODBUS node.
   - Use the corresponding parameter fields "Pressure 1/ 2", "Temperature 1/ 2" and/ or "Flow 1/ 2" for the setting.

See also

MODBUS TCP node (Page 220)

MODBUS interface for SIPROCESS GA700 (Page 274)

7.27.4 Setting MODBUS digital inputs

Procedure

1. Main menu > "4. Communications" > "2. MODBUS TCP" >
   "2. MODBUS TCP digital inputs"
   The menu lists the up to eight MODBUS digital inputs that other MODBUS nodes can use. The information in the navigation lines depends on the assigned function (pre-selection) of the digital input:

Structure versions of the navigation line for MODBUS digital inputs				
Navigation no.	Designation	Function (pre-selection)	-[1) 2) 3)]	[4)] Edit

   [1)] Designation of component, with function (pre-selection) "Measuring range"

   [2)] Function, with "Ext. fault", "Ext. maint. required", "Ext. maint. demand", "Ext. maint. alarm", or "Ext. funct. check"

   [3)] Function, with "Calibration", "AutoCal", or "Other fct."

   [4)] Free text, with "Ext. fault", "Ext. maint. required", "Ext. maint. demand", "Ext. maint. alarm" or "Ext. funct. check" Not assigned otherwise.

2. Open selected menu entry: Press <ENTER>.
3. Authorize access with Standard PIN.
   The parameter display of the MODBUS digital input is opened.
4. Set the trigger: "DI active for" parameter box.
   The digital input can be enabled for "High" or "Low" signals.
5. Select function (pre-selection):
   - When you select the function (pre-selection) "Free", no additional displays or parameter fields are shown.
   - If you make different function pre-selections, you must assign a function to the digital input.
6. Assign function: "Function" parameter field.
7. Complete parameter assignment:
   Additional display or parameter fields are displayed, depending on the function:

Function (pre-selection)	**Function**	**Display/Parameter assignment**
Calibration pool	Calibration n	Parameter assignment of calibration n is displayed.
Measuring range	Measuring range 1 to 4	Select component designation
	Autom. measuring range	
...with message reference	...with message reference	Enter free text.

See also

Setting digital inputs (Page 147)
Linking digital inputs (Page 149)
MODBUS TCP digital inputs (Page 221)
MODBUS interface for SIPROCESS GA700 (Page 274)

7.28 [5] Security

7.28.1 Assigning / changing personal identification numbers (PIN)

Procedure

1. Main menu > "5. Security" > "1. Access management"
   The parameter display includes parameter boxes that you use to specify the PINs of the permission levels.
2. Assign/change passwords:
   The table below summarizes the assignment/change options:

Permission level	Assignment/change options [1]
Standard →	Standard only
Expert →	Standard and Expert
Service →	Standard, Expert, and Service

[1] Parameter boxes that require a higher permission level are locked.

– Select the required permission level.

– Open the parameter box.
  Authorize access by input of the corresponding PIN.
  Use the following PIN for the corresponding permission levels during initial commissioning: Standard: 1111, Expert: 2222.

– Enter new four-digit password in the "PIN" editing window. A PIN must have 4 digits.
  The editing window is closed after the input.

7.28.2 Automatic log-off

Procedure

Note

Factory setting

The "Automatic log-off" function is activated in the factory. The default time is 5 minutes. If required, disable the function or set a different value for the time.

Note

Function of automatic log-off

When this function is activated and the log-off time expires, the device logs you off automatically. All changes that are not saved permanently will be discarded.

Before log-off time expires, a warning window will make you aware of the pending log-off process. You can disable the automatic log-off by pressing <ESC>.

Confirm the changes of the parameter assignment by pressing <MEAS> twice.

Note

Data in non-volatile memory

The following data are saved in non-volatile memory immediately after a change and are retained even in case of an automatic log-off:

- Date & time
- IP address
- Display contrast and brightness

1. Main menu > "5. Security" > "2. Automatic log-off"
2. Set the log-off time:
   - Open the "Duration" parameter box.
     You are prompted to enter the Expert PIN.
   - Enter a time in the format hh:mm:ss.
3. Enable/disable function:
   - Open "Automatic log-off" parameter box.
   - Select and accept "active" or "inactive" value.

7.29 [6] Language

Setting the language

1. Main menu > "6. Language"
   The default operating language is displayed. The default setting is "English".
2. Change the language setting:
   - Press <Enter>.
     The displayed list selection includes all available languages.
   - Select the required language with the <▲><▼> keys.
   - Accept language selection with the <►> key.
   - Confirm the selection with <ENTER>.

Alarm, error, and system messages

8

8.1 LUI symbol sets

Indicators

The symbols are displayed in the status bar and the message list. They provide visual information on the current status of your device. The symbols of messages with the highest message level are displayed in the status bar. You will find additional information in the section → OXYMAT 7 message list (Page 251).

You use either the SIMATIC PCS7 symbol set or the Namur symbol set. For information on making settings, see: → Setting the symbol sets (Page 105).

Table 8-1 Function check indicators

Symbols		Description
PCS7	Namur	
		Manual operation, e.g., calibration. Function check is active.
		Simulation or substitute value is output. Function check is active. For example: a predefined simulation value is output at the current output.
		Function check is active, e.g. a user is logged on.

Table 8-2 Maintenance indicators

Symbols		Description
PCS7	Namur	
		Maintenance alarm / fault The measured value is invalid. Check list of pending messages.
		Maintenance demanded
		Maintenance required

Table 8-3 Configuration indicators

Symbols		Description
PCS7	**Namur**	
		Configuration error Device configuration is damaged.
	-	Configuration warning One or more parameters are set incorrectly. For example: A parameter is outside the min/max limits.
	-	Configuration changed The symbol indicates that you have changed parameters but that you have not saved these changes permanently yet. You must confirm or discard the changes when you log off. The symbol does not expire until you log off.

Table 8-4 Limit indicators

Symbols		Description
PCS7	**Namur**	
	-	Limit alarm (in SIMATIC PDM: "Process value alarm") Limit with message level "Alarm" was violated.
	-	Limit warning (in SIMATIC PDM: "Process value warning") Limit with message level "Warning" was violated.

Table 8-5 Remote access indicators

Symbols		Description
PCS7	**Namur**	
	-	Write access from SIMATIC PDM. Only read-only access for local user interface.

Table 8-6 Write protection indicators

Symbols		Description
PCS7	**Namur**	
	-	Only read access on LUI as well as SIMATIC PDM. Protection of measurement is set via digital input.
	-	User of LUI is logged on with the device. Read-only access for SIMATIC PDM.

8.2 OXYMAT 7 message list

Note

Message behavior at a restart

After a restart, the messages with the messages numbers 22 to 32 remain in the message list. All other previous messages are deleted.

Table 8-7 OXYMAT 7 message list

Message		Cause	Remedy
No.	**Text**		
2	Maximum warming-up time exceeded	• Device is operated outside the permitted ambient temperature range • Errors in temperature control	• Check ambient temperature • Check if there are additional messages and follow the instructions.
3	Temperature on measuring chamber too high	• Device is operated outside the permitted ambient temperature range • Errors in temperature control	• Check ambient temperature • Replace analyzer module
4	Temperature on measuring chamber too low	• Temperature sensor of measuring chamber has short-circuit/is faulty • Heating controller faulty	• Check ambient temperature • Replace analyzer module
5	Temperature on heating cartridge too high	• Temperature sensor of heating cartridge is not connected/is faulty • Heating controller faulty	• Check ambient temperature • Replace analyzer module
6	Temperature on heating cartridge too low	• Temperature sensor of heating cartridge is not connected/is faulty • Heating controller faulty	• Check ambient temperature • Replace analyzer module
9	Temperature on probe too high	• Device is operated outside the permitted ambient temperature range • Temperature control measuring head faulty	• Check ambient temperature • Replace analyzer module
10	Temperature on probe too low	• Device is operated outside the permitted ambient temperature range • Temperature control measuring head faulty	Check ambient temperature, replace analyzer module, if necessary
11	Maximum temperature exceeded. Heaters turned off automatically.	Safety function • Ambient temperature too high • One or more heater control loops faulty	• Check ambient temperature • Check the other messages including the logbook and act accordingly

Message		Cause	Remedy
No.	**Text**		
15	Sample gas pressure outside tolerance	• Pressure sensor faulty • Reference gas open, sample gas input/output closed	• Set sample gas pressure to permitted range. • If sample gas input/output is closed, the reference gas must be turned off. • Replace analyzer module
18	Reference gas pressure too low	• Reference gas pressure - sample gas pressure < 2 000 hPa • Sample gas path closed • Reference gas path leaking	• Check pressure of reference gas source • Check flow of reference gas, see operating instructions.
22	Calibration tolerance exceeded at zero point	• Zero gas changed, setpoint faulty • Incorrect reference gas • Drift probe	• Check setpoint • Check reference gas • Replace analyzer module
23	Validation tolerance exceeded at zero point	Calibration successful	Execute zero point calibration
24	Calibration tolerance exceeded at span point	• Span gas changed, setpoint faulty • Incorrect reference gas • Drift probe	• Check setpoint • Check reference gas • Replace measuring head
25	Validation tolerance exceeded at span point	Calibration successful	Execute span calibration
27	Signal frequency changed	Frequency change executed	Normalization required; contact Service if necessary
28	Control reserve used up	Difference of O_2 concentration between zero gas and reference gas too large.	• Check zero gas, reference gas pressure • Carry out zero and full-scale value calibrations
29 to 32	Zero drift MR1 to MR4 outside tolerance	• Gas line dirty, gas cooler faulty • Gas lines leaking • Incorrect zero gas or setpoint faulty	• Check gas preparation, e.g., check filter • Check gas lines for leaks • Check setpoint
33	Measured value greater than full-scale value	• Sample gas concentration too high • Sample gas pressure too high/ outside pressure correction range	• Check sample gas concentration • Check sample gas pressure • Execute span gas calibration
34	Analyzer module temperature not in permissible range	Device is operated outside the permitted ambient temperature range	Check ambient temperature
64	Power supply 3.3 V outside tolerance	Electronic fault	• Disconnect device from power supply. • Check plug-in connections between the power supply unit and the analyzer module for proper fit and correct contacting.
65	Operating voltage 24 V outside tolerance	Electronic fault Power supply unit fault	Replace basic unit

Message		Cause	Remedy
No.	**Text**		
66	Power supply +5 V outside tolerance	Electronic fault	• Disconnect device from power supply. • Check plug-in connections between the power supply unit and the analyzer module for proper fit and correct contacting.
67	Power supply -5 V outside tolerance	Electronic fault	• Disconnect device from power supply. • Check plug-in connections between the power supply unit and the analyzer module for proper fit and correct contacting.
68	Source/solenoid voltage outside tolerance	Electronic fault	Replace analyzer module
69	Power supply +22 V outside tolerance	Electronic fault	Replace analyzer module
70	Reference voltage 2.5 V outside tolerance	Electronic fault	Replace analyzer module
71	Temperature sensor on probe faulty	Electronic fault	Replace analyzer module
72	Temperature sensor on measuring chamber faulty	Electronic fault	Replace analyzer module
74	Temperature sensor on heating cartridge faulty	Electronic fault	Replace analyzer module
75	Temperature sensor on electronics faulty	Electronic fault	Replace analyzer module
77	Solenoid current faulty	Electronic fault	• Check status of magnetic field (ON) • Replace analyzer module
78	Solenoid current measurement faulty	Electronic fault	• Check status of magnetic field (ON) • Replace analyzer module
79	Solenoid current control faulty	Electronic fault	• Check status of magnetic field (ON) • Replace analyzer module
82	Reference voltage outside tolerance	Electronic fault	Replace analyzer module
83	Signal acquisition faulty	Electronic fault	Replace analyzer module
84	Test signal outside tolerance	Electronic fault	Replace analyzer module
85	System error	Electronic fault	Restart the device
86	System error	Electronic fault	Restart the device
87	AM parameter memory faulty	Electronic fault	Replace analyzer module
88	Analog output faulty	Electronic fault	• Check circuit • Replace analyzer module
89	ADC faulty	Electronic fault	Replace analyzer module
90	Program memory faulty	Electronic fault	Replace analyzer module
91	Data storage faulty	Electronic fault	Replace analyzer module
92	Data storage faulty	Electronic fault	Replace basic unit

Message		Cause	Remedy
No.	**Text**		
93	Real-time clock faulty	Electronic fault	Replace basic unit
128	SPI communication faulty	AM electronics faulty	Replace analyzer module
129	Communication with ADU faulty	AM electronics faulty	Replace analyzer module
130	CAN communication faulty	• CAN bus connection faulty • AM electronics faulty • PU electronics faulty	• Check plug-in connections of CAN cable on the modules • If a specific analyzer module is not recognized during startup ⇒ replace module. • If no analyzer module is recognized during startup ⇒ replace basic unit.
131 to 137	Communication error with MODBUS TCP nodes 1 to 7	• Assigned IP address of MODBUS TCP node 1 faulty. • Ethernet connection faulty (connector, cable) • In case of gateway via router: Assigned gateway address is faulty	• Check assigned IP address • Check Ethernet plug-in connections and cables • In case of gateway via router: Check assigned default gateway address
138	TFTP communication faulty	• IP address of download host faulty • Path or file name of file to be loaded is faulty • Ethernet connection faulty (connector, cable) • In case of gateway via router: Assigned gateway address is faulty	• Check IP address of download host in PDM dialog "Software/Download configuration". • Check path and file name of file to be loaded in PDM dialog "Load software/configuration". • Check Ethernet plug-in connections and cables • In case of gateway via router: Check assigned default gateway address • If necessary, repeat the download / upload. • If necessary, restart the device.
144	System error	Internal software error	Perform cold restart
145	Watchdog reset	• If the error is signaled by the AM: AM electronics faulty • Internal software error (AM or PU)	Contact service
146	Configuration faulty	Content of parameter memory faulty and cannot be restored	Load user data or factory data in "Load parameter set" menu
147	Configuration inconsistent	Inconsistent data between modules	Restart the device
148	Saved user data faulty	Content of user data in parameter memory faulty and cannot be restored	Save user data in "Save parameter set" menu
149	Factory data faulty	Content of factory data in parameter memory faulty and cannot be restored	Contact service

Message		Cause	Remedy
No.	**Text**		
150	Parameter value invalid	Change of input limits of a parameter due to change of another parameter. The previously displayed value is now outside the changed input limits.	• Call list of current messages, look for or filter for message type "Config. warn.". • Call message detail view. The affected parameter is displayed here. Set the value of this parameter within the valid input limits.

Note

Message no. 150

Information on parameters that have caused configuration problems can be found in the menu "Current messages". The parameters causing the problems as well as the parameters affected by them are listed so that you can start the corresponding remedial measures.

When the text "Remote service" is displayed, the parameters that cause the problems and those affected by them can only be set with the remote service tool. Contact the service technician in charge.

Message		Cause	Remedy
No.	**Text**		
151	Configuration restored following fault	Content of parameter memory was faulty but has been recovered	• Call list of current messages, look for or filter for message type "Config. warn.". • Call message detail view. The affected parameter is displayed here. Set the value of this parameter within the valid input limits.
153	Factory synchronization of the electronics faulty	Synchronization values of analyzer module electronics faulty and cannot be restored	Replace analyzer module
160 to 175	Main. interval 1 to 16:	Maintenance interval has expired	• User-specific action • Reset expiration time of maintenance interval.
192 to 199	Ext. fault 1 to 8:	External fault signaled by digital input	User-specific action
200 to 207	Ext. main. alarm 1 to 8:	External maintenance alarm signaled by digital input	User-specific action
208 to 215	Ext. main. demand. 1 to 8:	External maintenance demanded signaled by digital input	User-specific action
216 to 223	Ext. main. alarm 1 to 8:	External maintenance required signaled by digital input	User-specific action
224	Limit 1 violated	Measured value outside limit 1	User-specific action
225	Limit 2 violated	Measured value outside limit 2	User-specific action

Message		Cause	Remedy
No.	**Text**		
226	Gas warning preliminary alarm	Gas warning (preliminary alarm)	User-specific action
227	Gas warning main alarm	Gas warning alarm (main alarm)	User-specific action
228 to 235	Ext. measured value violates limit:	External measured value outside warning limit 1 to 8	User-specific action
236	AutoCal 1 aborted	AutoCal could not be executed due to a fault.	• Check and remedy pending errors in the list of current messages. • Then: Execute AutoCal manually.
237	AutoCal 2 canceled	AutoCal could not be executed due to a fault.	• Check and remedy pending errors in the list of current messages. • Then: Execute AutoCal manually.
238	Cross-interference measured value uncertain or faulty	External or internal cross-interference measured value is faulty or the external cross-interference measured value is not transmitted.	Check the sources for the measured values of the parameterized interference gases. • Check source of measured value for assignable interference gases • Check interference gas supply • If transmission is via MODBUS TCP, check if errors no. 131 to 137 are pending and follow their instructions.
239	External pressure value faulty	External pressure value is not transmitted or is faulty.	• Check external pressure measurement • If transmission is via MODBUS TCP, check if errors no. 131 to 137 are pending and follow their instructions.

8.3 ULTRAMAT 7 message list

Message		Cause	Remedy
No.	**Text**		
2	Maximum warming-up time exceeded.	• Device is operated outside the permitted ambient temperature range	• Check the ambient temperature of the analyzer • Check if there are additional messages and follow the instructions.
3	Temperature on measuring chamber too high.	• Device is operated outside the permitted ambient temperature range • Errors in temperature control	• Check the ambient temperature of the analyzer • Check the temperatures of the measuring chamber and analyzer module in the menu "[3.05.1.3] Heating controller".

Message No.	Text	Cause	Remedy
4	Temperature on measuring chamber too low	• Temperature sensor analyzer chamber short-circuited / defect • Errors in temperature control	• Check the ambient temperature of the analyzer • Check the temperatures of the measuring chamber and analyzer module in the menu "[3.05.1.3] Heating controller".
7	Temperature on chopper too high.	• Device is operated outside the permitted ambient temperature range • Errors in temperature measurement	• Check the ambient temperature of the analyzer and in the menu "[3.05.1.1] Measured signal" the temperatures of the chopper and analyzer module.
8	Temperature on chopper too low.	• Device is operated outside the permitted ambient temperature range • Errors in temperature measurement	• Check the ambient temperature of the analyzer • Check the temperatures of the chopper and analyzer module in the menu "[3.05.1.1] Measured signal".
9	Temperature on probe too high.	• Device is operated outside the permitted ambient temperature range Error in the temperature measurement	• Check the ambient temperature of the analyzer • Check the temperatures of the measuring head/detector and analyzer module in the menu "[3.05.1.1] Measured signal".
10	Temperature on probe too low.	• Device is operated outside the permitted ambient temperature range Error in the temperature measurement	• Check the ambient temperature of the analyzer • Check the temperatures of the measuring head/detector and analyzer module in the menu "[3.05.1.1] Measured signal".
11	Maximum temperature exceeded. Heaters turned off.	• Safety function • Ambient temperature too high • One or more heater control loops faulty	• Wait until the device has cooled down. • Then acknowledge the message. • You should also note the messages in the logbook.
14	Atmospheric pressure measurement outside tolerance.	• Atmospheric pressure< 500 hPa or > 1500 hPa • Atmospheric pressure sensor faulty • Hose connection to atm. pressure sensor loosened	• Check the input of the atmospheric pressure sensor.
15	Sample gas pressure outside tolerance.	• Pressure sample gas < 500 hPa or > 1500 hPa • Sample gas outlet closed • pressure sensor faulty • Gas path to the pressure sensor untight • Gas path to the pressure sensor blocked	• Check the sample gas pressure in the menu "[2.20.04] Calibrate pressure sensor".

Message No.	Text	Cause	Remedy
20	Intensity outside tolerance.	• Source defective • Receiver chamber faulty	• Exchange the IR radiators. • Clean the cuvette.
22	Calibration tolerance exceeded at zero point.	• Zero gas changed, setpoint faulty • Drift in the analyzer	• Check the setpoint for the zero gas calibration in the menu "[2.08.1.1] Setpoints" • O7/U7: Check the reference gas supply
23	Validation tolerance exceeded at zero point.		• Carry out a zero gas calibration.
24	Calibration tolerance exceeded at span point.	• Span gas changed, setpoint faulty • Drift in the analyzer	• Check the setpoint for the span gas calibration in the menu "[2.08.1.1] Setpoints" • U7/O7: Check the reference gas supply.
25	Validation tolerance exceeded at span point.		• Carry out a span gas calibration.
27	Signal frequency changed. Normalization required!		• Carry out a normalization calibration menu "[2.20.3.3] Normalization"
28	Control reserve used up.		• Check the zero gas and reference gas supplies.
29 to 32	Zero drift MR1 to MR4 outside tolerance.	• Gas lines contaminated • Gas cooler defective, ... • Gas lines leaking • Incorrect zero gas or setpoint faulty	• Check the setpoint for the zero gas calibration in the menu "[2.08.1.1] Setpoints" • Check the zero gas supply. • U7/O7: Check the reference gas supply.
33	Measured value greater than full-scale value.	• Sample gas concentration too high • Sample gas pressure too high / outside pressure correction range	• Check the sample gas concentration and the sample gas pressure. If necessary, carry out a span gas calibration.
34	Analyzer module temperature not in permissible range.	• Device is operated outside the permitted ambient temperature range	• Check the ambient temperature of the analyzer
64	Power supply 3.3 V outside tolerance.	• Electronic fault	• Check the plug-in connections between the power supply unit and the module • If necessary, replace the module.
65	Operating voltage 24 V outside tolerance.	• Electronic fault • Power supply unit fault	• The power supply unit is defective. • Replace the basic device.
66	Power supply +5 V outside tolerance.	• Electronic fault	• Check the plug-in connections between the power supply unit and analyzer module • If necessary, replace the analyzer module.

Message No.	Text	Cause	Remedy
67	Supply voltage -5 V outside tolerance	• Electronic fault	• Check the plug-in connections between the power supply unit and analyzer module • If necessary, replace the analyzer module.
68	Source/solenoid voltage outside tolerance.	• Electronic fault	• Replace the analyzer module.
69	Power supply +23 V outside tolerance.	• Electronic fault	• Replace the analyzer module.
70	Reference voltage 2.5 V outside tolerance.	• Electronic fault	• Replace the module.
71	Temperature sensor on probe defective.	• Electronic fault	• Replace the analyzer module.
72	Temperature sensor on measuring chamber faulty.	• Electronic fault	• Replace the analyzer module.
73	Temperature sensor on chopper faulty.	• Electronic fault	• Replace the analyzer module.
75	Temperature sensor on AM PCB faulty.	• Electronic fault	• Replace the analyzer module printed circuit board or the analyzer module.
80	Source current faulty.	• Electronic fault	• Check the status of the source in "[3.05.1.1] Measured signal". • If necessary, replace the analyzer module.
81	Chopper faulty.	• Electronic fault	• Replace the analyzer module.
82	Reference voltage outside tolerance.	• Electronic fault	• Replace the analyzer module.
83	Signal acquisition faulty	• Electronic fault	• Replace the analyzer module.
84	Test signal outside tolerance.	• Electronic fault	• Replace the analyzer module.
85	System error	• Electronic fault	• Restart the device.
86	System error	• Electronic fault	• Restart the device.
87	Parameter memory faulty.	• Electronic fault	• Replace the module.
88	Analog output faulty.	• Electronic fault	• Check the electrical circuit in the menu "[3.11.1.1] Test analog outputs". • If necessary, replace the analyzer module.
89	ADC faulty.	• Electronic fault	• Replace the module.
95	Measured signal transient reaction active.	• Change the signal frequency • Turn the source off/on • Restart of chopper	• Parameters of signal processing were changed. • The measured value is invalid during the subsequent settling time.
128	SPI communication faulty.	• Electronics of the analyzer module or the option module defective	• Replace the module.

Message No.	Text	Cause	Remedy
129	Communication with ADC faulty	• Analyzer module electronics defective	• Replace the analyzer module
144	System error	• Internal software error	• Restart the device
145	Watchdog reset	• If the error is signaled by the AM: Analyzer module electronics defective • Internal software error (analyzer module or processing module)	• Acknowledge the message. • Contact Service.
146	Configuration faulty.	• Content of parameter memory faulty and cannot be restored	• The active device configuration is faulty. • Load the user or factory data in the work data.
148	Saved user data faulty.	• Content of user data in parameter memory faulty and cannot be restored	• Save the work data in the user data again • Alternatively: transfer a valid parameter set to the device.
149	Factory data faulty.	• Content of factory data in parameter memory faulty and cannot be restored	• The saved factory data is faulty. • Contact Service.
150	Parameter value invalid.	• Change of input limits of a parameter due to change of another parameter. The previously set value is now outside the changed input limits.	• Due to a change in a parameter, the value of another parameter is outside its valid limits. • Correct the value of the associated parameter.
151	Configuration restored following fault.	• Content of parameter memory was faulty but has been recovered	• An error was detected when loading the device configuration. • However, a valid configuration could be recovered without data loss.
153	Factory synchronization of the electronics faulty.	• Synchronization values of analyzer module/option module electronics faulty and cannot be restored	• The synchronization data saved at the factory for the module electronics is corrupt. • Replace the module.
238	Interference gas measured value uncertain or faulty.		• Check the sources for the measured values of the parameterized interference gases.
239	External pressure value faulty.		• Check the external pressure measurement.

8.4 CALOMAT 7 message list

Message		Cause	Remedy
No.	**Text**		
2	Maximum warming-up time exceeded	• Device is operated outside the permitted ambient temperature range • Errors in temperature control	• Check the ambient temperature of the analyzer • Check if there are additional messages and follow the instructions
11	Maximum temperature exceeded. Heaters turned off.	• Safety function • Ambient temperature too high • One or more heater control loops faulty	• Wait until the device has cooled down • Then acknowledge the message • You should also note the messages in the logbook
19	Temperature on measurement block too high	• Device is operated outside the permitted ambient temperature range Error in the temperature control	• Check the ambient temperature of the analyzer • In the menu "[3.05.1.3] Heating controller", check the temperatures of the measurement block and analyzer module
21	Temperature on measurement block too low	• Device is operated outside the permitted ambient temperature range • Errors in temperature control	• Check the ambient temperature of the analyzer • In the menu "[3.05.1.3] Heating controller", check the temperatures of the measurement block and analyzer module
22	Calibration tolerance exceeded at zero point	• Zero gas changed, setpoint faulty • Drift heat conductor sensor	• Check the setpoint for the zero gas calibration in the menu "[2.08.1.1] Setpoints"
23	Validation tolerance exceeded at zero point	• Calibration successful	• Carry out a zero gas calibration
24	Calibration tolerance exceeded at span point	• Span gas changed, setpoint faulty • Drift heat conductor sensor	• Check the setpoint for the span gas calibration in the menu "[2.08.1.1] Setpoints"
25	Validation tolerance exceeded at span point	• Calibration successful	• Carry out a span gas calibration.
26	Measured value outside the physical specifications	• Wrong gas mixture (extraneous gases) • Wrong sample gas pressure: pressure is outside the specification	• Check the sample gas concentration and the sample gas pressure • Carry out a zero point and full-scale value calibration if necessary
28	Control reserve used up	• High fluctuations in the thermal conductivity sensor due to influence of foreign matter, e.g. condensation residues, dirt particles	• Check the zero gas and reference gas supplies

Message		Cause	Remedy
No.	**Text**		
29 to 32	Zero drift MR1 to MR4 outside tolerance	• Gas line dirty, gas cooler faulty, ... • Gas lines leaking • Incorrect zero gas or setpoint faulty	• Calibrate zero point and full-scale value • Check the setpoint for the zero gas calibration in the menu "[2.08.1.1] Setpoints" • Check the zero gas supply
34	Analyzer module temperature not in permissible range	• Device is operated outside the permitted ambient temperature range	• Check the ambient temperature of the analyzer
35	Measurement block temperature uncertain	• Temperature sensor defective	• Check the ambient temperature of the analyzer • In the menu "[3.05.1.3] Heating controller", check the temperatures of the measurement block and sensor
36	Membrane temperature too high	• Gas temperature too high • Flow rate too low • Membrane temperature control defective	• Check the ambient temperature of the analyzer • Check the temperatures of membranes in the menu "[3.05.1.1] Measured signal". • Check the external gas flow rate with a suitable measuring device
37	Membrane temperature too low	• Membrane defective • Strong cooling due to extremely cold gas • Flow rate much too high compared with the specification	• Check the ambient temperature of the analyzer • Check the temperatures of membranes in the menu "[3.05.1.1] Measured signal". • Check the external gas flow rate with a suitable measuring device
64	Power supply 3.3 V outside tolerance	• Electronic fault	• Check the plug-in connections between the power supply unit and the module • If necessary, replace the module
65	Operating voltage 24 V outside tolerance	• Electronic fault • Power supply unit fault	• The power supply unit is defective • Replace the basic device
66	Power supply +5 V outside tolerance	• Electronic fault	• Check the plug-in connections between the power supply unit and analyzer module • If necessary, replace the analyzer module
67	Supply voltage -5 V outside tolerance	• Electronic fault	• Check the plug-in connections between the power supply unit and analyzer module • If necessary, replace the analyzer module
69	Power supply +23 V outside tolerance	• Electronic fault	• Replace the analyzer module

Message		Cause	Remedy
No.	**Text**		
70	Reference voltage 2.5 V outside tolerance	• Electronic fault	• Replace the module
75	Temperature sensor on AM PCB faulty	• Electronic fault	• Replace the analyzer module printed circuit board or the analyzer module
76	Temperature sensor on measurement block defective	• Electronic fault	• Replace the sensor module
83	Signal acquisition faulty	• Electronic fault	• Replace the analyzer module
84	Test signal outside tolerance	• Electronic fault	• Replace the analyzer module
85	System error	• Electronic fault	• Restart the device
86	System error	• Electronic fault	• Restart the device
87	AM parameter memory faulty	• Electronic fault	• Replace the module
88	Analog output faulty	• Electronic fault	• Check the electrical circuit in the menu "[3.1.11.1] Test analog outputs". • If necessary, replace the analyzer module
89	ADC faulty	• Electronic fault	• Replace the module
94	Membrane defective	• Electronic fault	• Replace the sensor module
96	Temperature sensor PT1000 defective	• Electronic fault	• Replace the sensor module
128	SPI communication faulty	• Analyzer module / option module faulty	• Replace the module
129	Communication with ADC faulty	• Analyzer module electronics defective	• Replace the analyzer module
144	System error	• Internal software error	• Restart the device
145	Watchdog reset	• If the error is signaled by the AM: Analyzer module electronics defective • Internal software error (analyzer module or processing module)	• Acknowledge the message. • Contact Service
146	Configuration faulty	• Content of parameter memory faulty and cannot be restored	• The active device configuration is faulty • Load the user or factory data in the work data.
148	Saved user data faulty	• Content of user data in parameter memory faulty and cannot be restored	• Save the work data in the user data again • Alternatively: Transfer a valid parameter set to the device
149	Factory data faulty	• Content of factory data in parameter memory faulty and cannot be restored	• The saved factory data is faulty • Contact Service

Message		Cause	Remedy
No.	**Text**		
150	Parameter value invalid	• Change of input limits of a parameter due to change of another parameter • The previously set value is now outside the changed input limits	• Due to a change in a parameter, the value of another parameter is outside its valid limits • Correct the value of the associated parameter
151	Configuration restored following fault	• Content of parameter memory was faulty but has been recovered	• An error was detected when loading the device configuration • However, a valid configuration could be recovered without data loss
153	Factory synchronization of the electronics faulty	• Synchronization values of analyzer module/option module electronics faulty and cannot be restored	• The synchronization data saved at the factory for the module electronics is corrupt • Replace the module
154	Saved sensor module data faulty	• Content of sensor module data in parameter memory faulty and cannot be restored	• The saved sensor data is faulty • Contact Service
226	Gas warning preliminary alarm	• Gas warning (preliminary alarm)	
227	Gas warning main alarm	• Gas warning alarm (main alarm)	
238	Cross-interference measured value uncertain or faulty	• External or internal interference gas measured value is faulty • Alternatively: the external interference gas measured value is not transferred	• Check the sources for the measured values of the set interference gases.
239	External pressure value faulty	• External pressure measured value is not being transferred or is faulty	• Check the external pressure measurement

8.5 Wizard-based error messages

Overview

The following tables include descriptions of errors which may occur when executing wizard-based processes. The wizard-based procedures especially include calibrations and AutoCal procedures.

Note

Representation of wizard-based error messages in the logbook

Errors which prevent starting the wizard do not generate an entry in the logbook.

Errors which occur during execution of a wizard generate an entry in the logbook. However, only the corresponding error number is entered in this case, not the message text.

Error messages

Table 8-8 Wizard-based error messages (F1001, ... , F1031)

Error ID	Message text (cause/remedy)
F1001 to F1004	Internal error occurred.
F1006	"F1006: The redetermined zero point and span point deviate too much from the last zero point and span point determined. The maximum permitted deviation is set in the menu Calibration tolerance. Possible causes: 1. An incorrect gas, 2. Faulty switching of the solenoid valves, 3. Different reference gas without new standardization or 4. A faulty analyzer module."
F1007	"F1007: The measured or calculated parameter is outside of the permitted min/max limits. Check your entries and setpoints."
F1008	"F1008: The gas flow is too low. Check to see if the gas bottle is open or if the correct valve is connected and turned on."
F1009	"F1009: Incorrect calibration gas detected."
F1010	"F1010: There are active errors. Correct the pending errors and restart the wizard."
F1012	"F1012: Internal error occurred."
F1013	"F1013: A component could not be found. The wizard cannot be started."
F1014	"F1014: The calibration type does not match the selected components. Check the selection of components or change the calibration type."
F1015, ... , F1017	"F101n: Internal error occurred. The wizard cannot be started."
F1018	"F1018: A calculation error has occurred. Possible causes: An incorrectly configured concentration characteristic curve or an incorrect setpoint."
F1020	"F1020: The redetermined zero point deviates too much from the last zero point determined. The maximum permitted deviation is set in the menu Calibration tolerance. Possible causes: 1. An incorrect gas, 2. Faulty switching of the solenoid valves, 3. Different reference gas without new standardization or 4. A faulty analyzer module."

Error ID	Message text (cause/remedy)
F1021	"F1021: The redetermined span point deviates too much from the last span point determined. The maximum permitted deviation is set in the menu Calibration tolerance. Possible causes could be: 1. An incorrect gas, 2. Faulty switching of the solenoid valves, 3. Different reference gas without new standardization or 4. A faulty analyzer module."
F1022	"F1022: Internal error occurred."
F1023	"F1023: An internal communication error has occurred between the modules. Possible reasons can be: A faulty or non-connected CAN bus cable, or one of the modules is damaged and no longer responds."
F1024	"F1024: The component selection is invalid. Possible causes could be: 1. No component whatsoever is set in the parameters. 2. Components are set in the parameters which are no longer available on the device. You can check the currently available components in menu 3.09 Identification."
F1025	"F1025: System error occurred."
F1026	"F1026: Pressure or flow calibration not possible because the sample gas purging time is still running: hh:mm:ss"
F1027	"F1027: The component calibration was not successful because the total calibration or another component calibration has failed. Check the other component calibration or the total calibration. This component can only be successfully calibrated after troubleshooting."
F1029	"F1029: The validation tolerances of the zero gas and span gas has been violated. Calibration necessary."
F1030	"F1030: The validation tolerance of the zero gas has been violated. Calibration necessary."
F1031	"F1031: The validation tolerance of the span gas has been violated. Calibration necessary."

See also

Overview of logbook (Page 206)

8.6 Measured value status

8.6.1 Messages

Overview

The tables below include information that can be displayed for the measured value status by the device.

Table 8-9 Display of measured value status "Good"

Measured value qualifier	Cause	Effect/remedy
141	The measured value is valid, but is below an alarm limit.	-
142	The measured value is valid, but is above an alarm limit.	-
143	The measured value is valid, but is not in the permitted alarm limit range.	-
137	The measured value is valid, but is below a warning limit.	-
138	The measured value is valid, but is above a warning limit.	-
139	The measured value is valid, but is within or outside a warning limit range.	-
188	The measured value is valid, but the function check is active. For example, measuring mode is active and a user is logged on.	-
168	The measured value is valid, but a maintenance demanded is signaled.	-
164	The measured value is valid, but a maintenance required is signaled.	-
128	The measurement is valid (normal measuring mode).	-

Table 8-10 Display of measured value status "Uncertain"

Measured value qualifier	Cause	Effect/remedy
104	The measured value is uncertain because of a maintenance demanded.	The measured value is still output, amended by the symbol "?". (TLV and submenus).
120	The module is in the "Warming-up", "Calibration" or "Test mode" state. The measured value is uncertain, because the module is in warming-up or calibration state or inputs/outputs are in test mode.	The measured value is still output.
79	The measured value is not available because the device is in the initialization phase (startup) or measuring mode has not yet been started.	An initial value is output instead of the measured value.

Table 8-11 Display of measured value status "Bad"

Measured value qualifier	Cause	Effect/remedy
0	The measured value is invalid because it is not available with the existing device configuration.	• LUI: – The measured value is no longer displayed in the TLV. "- - - " is output instead. – In submenus: The measured value is still displayed but with the qualifier symbol "x". • SIMATIC PDM: The substitute value 0.0 is output instead of the measured value.
60	The measured value is invalid for one of the following reasons: • Parameters are being downloaded	Effect/remedy: → Measured value qualifier "0"
63	The measured value is invalid for one of the following reasons: • Firmware is being downloaded • The device is in the pause or standby state	A substitute value or the last valid measured value is output instead of the measured value.
36	The measured value is invalid because of a fault or a maintenance alarm.	Effect/remedy: → Measured value qualifier "0"
39	The measured value is invalid because of a fault or a maintenance alarm.	A substitute value or the last valid measured value is output instead of the measured value.
40	The measured value is invalid because of a fault whose cause can be found in the process (gas supply).	The measured value is still output.
43	The measured value is invalid because of a fault whose cause can be found in the process (gas supply).	A substitute value or the last valid measured value is output instead of the measured value.

8.6.2 Symbolic representation

The following symbols are used to display the measured value status:

- : Measured value status "Good" - no symbolic representation
- ? : Measured value status "Uncertain"
- X : Measured value status "Bad"

Appendix

A

A.1 Technical support

Technical Support

If you have any technical questions, contact Technical Support.

Use our online request form Support Request**.**

Service & Support on the Internet

In addition to our documentation, we offer further information online on the Internet:

Industry Online Support

There you will find:

- The latest product information, FAQs, downloads, tips and tricks.
- A newsletter that provides you with up-to-date information about the products.
- The Knowledge Manager that finds the right documents for you.
- Your local contact partner for automation technology in our contacts database.
- Information about on-site services, repairs, spare parts and much more is available on our "Services" pages.

Our bulletin board, where users and specialists share their knowledge worldwide.

Additional Support

Contact your local Siemens partner if you have any questions about the use of products described in this manual and cannot find the answers here.

Find your contact partner at:

Partner (http://www.automation.siemens.com/partner)

A signpost to the documentation of the various products and systems is available at:

Instructions and manuals (http://www.automation.siemens.com/w1/process-analytics-anleitungen-handbuecher-4126.htm)

See also

Support request (http://www.siemens.de/automation/support-request)

Technical Support (http://www.siemens.de/automation/csi/service)

Service & Support (http://www.siemens.de/automation/service&support)

Help Desk (helpdesk.gasanalytics.i-ia@siemens.com)

A.2 Approvals

A.2.1 Conformity with European directives

The manufacturer of the gas analyzers listed below is authorized to provide the respective labels with a CE marking:

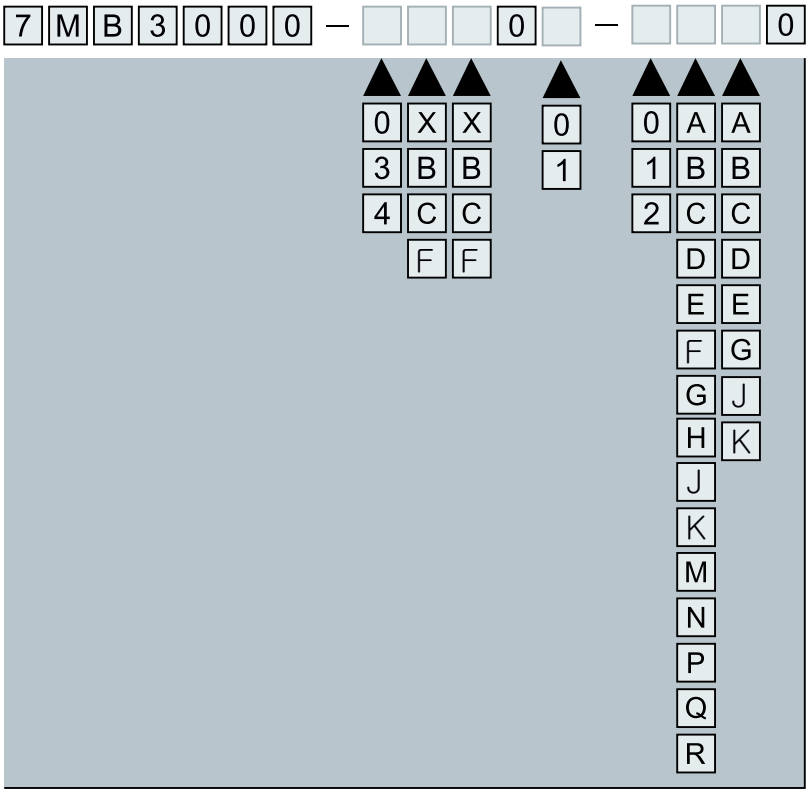


Figure A-1 SIPROCESS GA700 gas analyzers with CE marking

The version of the identified product sold by the manufacturer conforms with the directives of the following European guidelines:

2014/30/EU EMC	Directive of the European Parliament and of the Council on the harmonization of the laws of the Member States relating to electromagnetic compatibility
2014/35/EU LVD	Directive of the European Parliament and of the Council on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits

SIPROCESS GA700 without / ohne / sans ULTRAMAT:

2011/65/EU RoHS	Directive of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment

Conformity with the specified directives is proven through adherence to the following standards (depending on the version):

Directive	Standard	Edition
2014/30/EU	EN 61326-1*	2013
2014/35/EU	EN 61010-1	2010

* Applies to all surrounding areas

A.3 Certificate

The certificates are available on the Internet at:

Certificates (http://www.automation.siemens.com/w1/process-analytics-zertifikate-4127.htm).

A.4 References

Table A-1 References 1 - Operating Manuals LUI

Title	Languages	Article numbers
SIPROCESS GA700 Operating with the local user interface Operating manual	German (de-DE)	A5E31930441
	English (en-US)	A5E31930478

Table A-2 References 2 - Operating Manuals PDM

Title	Languages	Article numbers
SIPROCESS GA700 Operation with SIMATIC PDM Operating Manual	German (de-DE)	A5E31930523
	English (en-US)	A5E31930531

Table A-3 References 3 - Operating Instructions

Title	Languages	Article numbers
SIPROCESS GA700 Rack-mounted device Operating Instructions	German (de-DE)	A5E31873438
	English (en-US)	A5E31874006
SIPROCESS GA700 Wall-mounted device Operating Instructions	German (de-DE)	A5E31930383
	English (en-US)	A5E31930403

Table A-4 References 4 - Compact Operating Instructions

Title	Languages	Article numbers
SIPROCESS GA700 Quick Start Compact Operating Instructions	German (de-DE)	A5E31805153
	English (en-US)	A5E31805656
	French (fr-FR)	A5E31809624
	Italian (it-IT)	A5E31809652
	Spanish (es-ES)	A5E31809707
	Portuguese (pt-BR)	A5E31809812

Table A-5 References 5 - Compact Operating Instructions Ex

Title	Languages	Article numbers
SIPROCESS GA700 Devices with explosion-proof models Quick Start Compact Operating Instructions	German (de-DE)	A5E35134047
	English (en-US)	
	Danish (da-DK)	A5E35134119
	Swedish (sv-SE)	
	Finnish (fi-FI)	
	Estonian (et-ET)	A5E35134150
	Latvian (lt-LT)	
	Lithuanian (lv-LV)	
	Spanish (es-EM)	A5E35134177
	Italian (it-IT)	
	Portuguese (pt-PT)	
	Czech (cs-CZ)	A5E35134191
	Polish (pl-PL)	
	Slovak (sk-SK)	
	Romanian (ro-RO)	A5E35134200
	Bulgarian (bg-BG)	
	Greek (el-GR)	
	Hungarian (hu-HU)	A5E35134219
	Slovenian (sl-SI)	
	Croatian (hr-HR)	
	French (fr-FR)	A5E35134270
	Dutch (nl-NL)	

Table A-6 References 6 - Operating Instructions Field device "Ex d"

Title	Languages	Article numbers
SIPROCESS GA700 field device Operating Instructions	German (de-DE)	A5E35640463
	English (en-US)	
	Danish (da-DK)	A5E35640359
	Swedish (sv-SE)	
	Finnish (fi-FI)	
	Estonian (et-ET)	A5E35640371
	Latvian (lt-LT)	
	Lithuanian (lv-LV)	
	Spanish (es-EM)	A5E35640420
	Italian (it-IT)	
	Portuguese (pt-PT)	
	Czech (cs-CZ)	A5E35640437
	Polish (pl-PL)	
	Slovak (sk-SK)	
	Romanian (ro-RO)	A5E35640444
	Bulgarian (bg-BG)	
	Greek (el-GR)	
	Hungarian (hu-HU)	A5E35640455
	Slovenian (sl-SI)	
	Croatian (hr-HR)	
	French (fr-FR)	A5E35640457
	Dutch (nl-NL)	

Table A-7 References 6 - Catalogs

Title / address	Address
SIPROCESS GA700 → Catalog AP 01	→ Information and Download Center (https://support.industry.siemens.com/cs/ww/en/view/109745623)

A.5 MODBUS TCP

A.5.1 MODBUS interface for SIPROCESS GA700

General

Note

This product includes software developed by the MODBUS Organization, Inc. and its suppliers.

MODBUS TCP is an industry standard for linking measuring and control instruments to process control systems.

The standardized MODBUS TCP protocol based on TCP/IP is envisaged for the following applications:

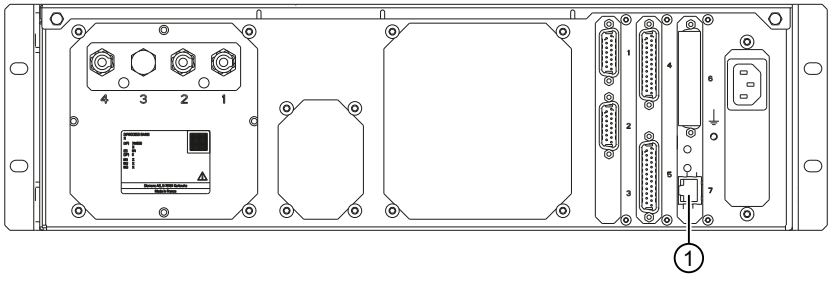
- Transmission of measured gas or pressure values between several analyzers in order to correct the analytical values (correction of cross-interference, pressure compensation)
- Transmission of measured values and diagnostics data from analyzer to process control system

The MODBUS uses a master/slave transmission procedure. The process control system is always the master, analyzers are the slave.

In the case of a transmission of measured values between several analyzers, the device using the measured values is the master. Devices that provide the measured values are the slaves. Each master can scan the measured values of up to seven slaves.

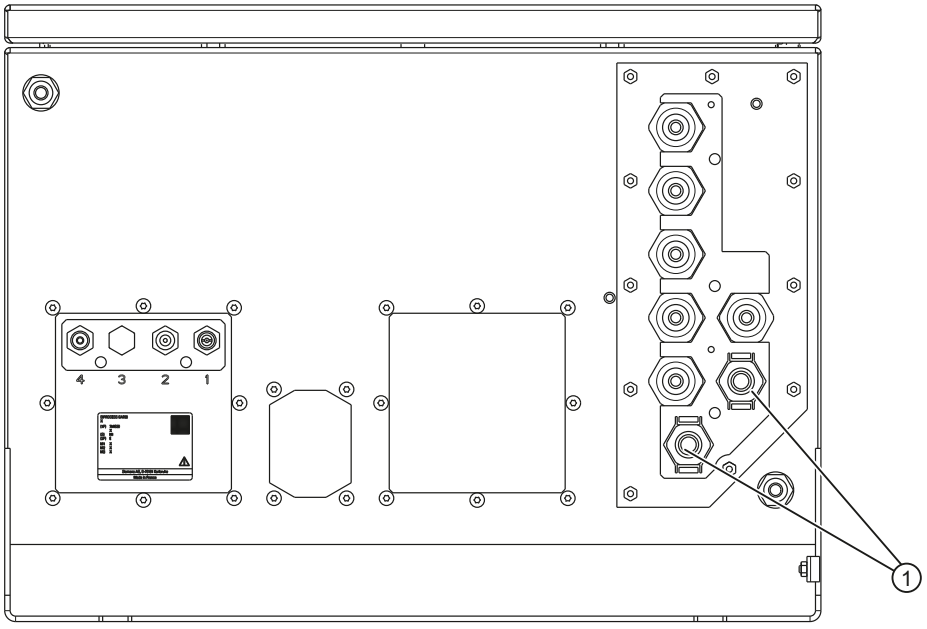
Interfaces

The analyzer offers MODBUS communication with another analyzer or a process control system over an Ethernet interface.



① Ethernet connection

Figure A-2 Rear view of rack-mounted device



① Metal cable gland, e.g. for Ethernet cable

Figure A-3 Bottom of wall-mounted device

See also

Setting communication via MODBUS TCP (Page 243)

Setting MODBUS digital inputs (Page 244)

A.5.2 Planning/configuring

Cyclic data transfer

Cyclic data transmission is used to transfer the useful data relevant to the process between the control or automation system and the analyzer.

Status byte

A status byte is additionally transmitted in synchronism with each measured value. This byte provides information on the quality of the value in the form of a "Status code". The status byte has the following structure:

Table A-8 Coding of status byte/structure

Quality		Substatus				Limits		Structure
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Status
0	0							bad
0	1							uncertain

Quality		Substatus				Limits		Structure
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**	**Status**
1	0							good
						0	0	ok
						0	1	low limited
						1	0	high limited
						1	1	high and low limited [1]

[1] With limit violations within one band

Coding of the status byte for the measured value output

Table A-9 Measured value status "Good" (MODBUS TCP)

Quality byte								Dec	Hex	Cause	Effect/remedy
7	**6**	**5**	**4**	**3**	**2**	**1**	**0**				
1	0	0	0	1	1	0	1	141	0x8d	The measured value is valid, but is below an alarm limit.	-
1	0	0	0	1	1	1	0	142	0x8e	The measured value is valid, but is above an alarm limit.	-
1	0	0	0	1	1	1	1	143	0x8f	The measured value is valid, but is within an invalid alarm limit band.	-
1	0	0	0	1	0	0	1	137	0x89	The measured value is valid, but is below a warning limit.	-
1	0	0	0	1	0	1	0	138	0x8a	The measured value is valid, but is above a warning limit.	-
1	0	0	0	1	0	1	1	139	0x8b	The measured value is valid, but is within a warning limit band.	-
1	0	1	1	1	1	0	0	188	0xbc	The measured value is valid, but the function check is active. For example, measuring mode is active and a user is logged on.	-
1	0	1	0	1	0	0	0	168	0xa8	The measured value is valid, but a maintenance demanded is signaled.	-
1	0	1	0	0	1	0	0	164	0xa4	The measured value is valid, but a maintenance demanded is signaled.	-
1	0	0	0	0	0	0	0	128	0x80	The measurement is valid (normal measuring mode).	-

Table A-10 Measured value status "Uncertain" (MODBUS TCP)

Quality byte								Dec	Hex	Cause	Effect/remedy
7	**6**	**5**	**4**	**3**	**2**	**1**	**0**				
0	1	1	0	1	0	0	0	104	0x68	The measured value is uncertain because of a maintenance demanded.	The measured value is still output.
0	1	1	1	1	0	0	0	120	0x78	The module is in the "Warming-up" state. The measured value is uncertain because the ambient conditions are outside the specifications.	The measured value is still output.
0	1	0	0	1	1	1	1	79	0x4f	The measured value is not available because the device is in the initialization phase (startup) or measuring mode has not yet been started.	An initial value is output instead of the measured value.

Table A-11 Measured value status "Bad" (MODBUS TCP)

Quality byte								Dec	Hex	Cause	Effect/remedy
7	**6**	**5**	**4**	**3**	**2**	**1**	**0**				
0	0	0	0	0	0	0	0	0	0x00	The measured value is invalid because it is not available with the existing device configuration.	The substitute value 0.0 is output instead of the measured value.
0	0	1	1	1	1	0	0	60	0x3c	The measured value is invalid for one of the following reasons: • A calibration or an AutoCal is being carried out • Parameters are being downloaded	The measured value is still output.
0	0	1	1	1	1	1	1	63	0x3f	The measured value is invalid for one of the following reasons: • Firmware is being downloaded • The device is in the pause or standby state	A substitute value or the last valid measured value is output instead of the measured value.
0	0	1	0	0	1	0	0	36	0x24	The measured value is invalid because of a fault or a maintenance alarm.	The measured value is still output.
0	0	1	0	0	1	1	1	39	0x27	The measured value is invalid because of a fault or a maintenance alarm.	A substitute value or the last valid measured value is output instead of the measured value.
0	0	1	0	1	0	0	0	40	0x28	The measured value is invalid because of a fault whose cause can be found in the process (gas supply).	The measured value is still output.
0	0	1	0	1	0	1	1	43	0x2b	The measured value is invalid because of a fault whose cause can be found in the process (gas supply).	A substitute value or the last valid measured value is output instead of the measured value.

A.5.3 Transfer of device data

A.5.3.1 Device data

Transfer from the analyzer to the process control system

The data in the following table is data of the "Device Identification Register - Function Code 43".

Table A-12 Device identification data

Object ID	Object name / description	Category	Type	Object length	Coding
0x00	VendorName	Basic	STRING	0x0C	
0x01	ProductCode	Basic	STRING	0x30	
0x02	MajorMinorRevision	Basic	STRING	0x10	
0x04	ProductName	Regular	STRING	0x10	
0x06	UserApplicationName	Regular	STRING	0x20	
0x80	SerialNumber	Extended	STRING	0x10	
0x81	Component1_Code	Extended	UINT8	0x01	Table A-14 MODBUS TCP: Coding of gas components [Object ID 0x81, 0x87, 0x8D, 0x93, 0x99, 0x0000, 0x000C, 0x0018, 0x0024, 0x0030] (Page 289)
0x82	Component1_Name	Extended	STRING	0x20	
0x83	Component1_UnitCode	Extended	UINT16	0x02	Table A-15 MODBUS TCP: Coding of component units [Object ID 0x83, 0x89, 0x8F, 0x95, 0x9B, 0x0001, 0x000D, 0x0019, 0x0025, 0x0031] (Page 289)
0x84	Component1_UnitName	Extended	STRING	0x08	
0x85	Component1_RangeBegin	Extended	FLOAT32	0x04	
0x86	Component1_RangeEnd	Extended	FLOAT32	0x04	
0x87	Component2_Code	Extended	UINT8	0x01	Table A-14 MODBUS TCP: Coding of gas components [Object ID 0x81, 0x87, 0x8D, 0x93, 0x99, 0x0000, 0x000C, 0x0018, 0x0024, 0x0030] (Page 289)
0x88	Component2_Name	Extended	STRING	0x20	
0x89	Component2_UnitCode	Extended	UINT16	0x02	Table A-15 MODBUS TCP: Coding of component units [Object ID 0x83, 0x89, 0x8F, 0x95, 0x9B, 0x0001, 0x000D, 0x0019, 0x0025, 0x0031] (Page 289)
0x8A	Component2_UnitName	Extended	STRING	0x08	
0x8B	Component2_RangeBegin	Extended	FLOAT32	0x04	
0x8C	Component2_RangeEnd	Extended	FLOAT32	0x04	

Object ID	Object name / description	Category	Type	Object length	Coding
0x8D	Component3_Code	Extended	UINT8	0x01	Table A-14 MODBUS TCP: Coding of gas components [Object ID 0x81, 0x87, 0x8D, 0x93, 0x99, 0x0000, 0x000C, 0x0018, 0x0024, 0x0030] (Page 289)
0x8E	Component3_Name	Extended	STRING	0x20	
0x8F	Component3_UnitCode	Extended	UINT16	0x02	Table A-15 MODBUS TCP: Coding of component units [Object ID 0x83, 0x89, 0x8F, 0x95, 0x9B, 0x0001, 0x000D, 0x0019, 0x0025, 0x0031] (Page 289)
0x90	Component3_UnitName	Extended	STRING	0x08	
0x91	Component3_RangeBegin	Extended	FLOAT32	0x04	
0x92	Component3_RangeEnd	Extended	FLOAT32	0x04	
0x93	Component4_Code	Extended	UINT8	0x01	Table A-14 MODBUS TCP: Coding of gas components [Object ID 0x81, 0x87, 0x8D, 0x93, 0x99, 0x0000, 0x000C, 0x0018, 0x0024, 0x0030] (Page 289)
0x94	Component4_Name	Extended	STRING	0x20	
0x95	Component4_UnitCode	Extended	UINT16	0x02	Table A-15 MODBUS TCP: Coding of component units [Object ID 0x83, 0x89, 0x8F, 0x95, 0x9B, 0x0001, 0x000D, 0x0019, 0x0025, 0x0031] (Page 289)
0x96	Component4_UnitName	Extended	STRING	0x08	
0x97	Component4_RangeBegin	Extended	FLOAT32	0x04	
0x98	Component4_RangeEnd	Extended	FLOAT32	0x04	
0x99	Component5_Code	Extended	UINT8	0x01	Table A-14 MODBUS TCP: Coding of gas components [Object ID 0x81, 0x87, 0x8D, 0x93, 0x99, 0x0000, 0x000C, 0x0018, 0x0024, 0x0030] (Page 289)
0x9A	Component5_Name	Extended	STRING	0x20	
0x9B	Component5_UnitCode	Extended	UINT16	0x02	Table A-15 MODBUS TCP: Coding of component units [Object ID 0x83, 0x89, 0x8F, 0x95, 0x9B, 0x0001, 0x000D, 0x0019, 0x0025, 0x0031] (Page 289)
0x9C	Component5_UnitName	Extended	STRING	0x08	
0x9D	Component5_RangeBegin	Extended	FLOAT32	0x04	
0x9E	Component5_RangeEnd	Extended	FLOAT32	0x04	
0x9F	Pressure1_Type	Extended	UINT8	0x01	Table A-16 MODBUS TCP: Coding of process value type [Object ID 0x9F, 0xA1, 0xA3, 0xA5, 0xA7, 0x003C, 0x0049, 0x0054, 0x0060, 0x006C, 0x0078] (Page 290)

Object ID	Object name / description	Category	Type	Object length	Coding
0xA0	Pressure1_UnitCode	Extended	UINT16	0x02	Table A-16 MODBUS TCP: Coding of process value type [Object ID 0x9F, 0xA1, 0xA3, 0xA5, 0xA7, 0x003C, 0x0049, 0x0054, 0x0060, 0x006C, 0x0078] (Page 290)
0xA1	Pressure2_Type	Extended	UINT8	0x01	Table A-17 MODBUS TCP: Coding of process value units [Object ID 0xA0, 0xA2, 0xA4, 0xA6, 0xA9, 0x003D, 0x004A, 0x0055, 0x0061, 0x006D, 0x0079] (Page 290)
0xA2	Pressure2_UnitCode	Extended	UINT16	0x02	Table A-16 MODBUS TCP: Coding of process value type [Object ID 0x9F, 0xA1, 0xA3, 0xA5, 0xA7, 0x003C, 0x0049, 0x0054, 0x0060, 0x006C, 0x0078] (Page 290)
0xA3	Temperature1_Type	Extended	UINT8	0x01	Table A-17 MODBUS TCP: Coding of process value units [Object ID 0xA0, 0xA2, 0xA4, 0xA6, 0xA9, 0x003D, 0x004A, 0x0055, 0x0061, 0x006D, 0x0079] (Page 290)
0xA4	Temperature1_UnitCode	Extended	UINT16	0x02	Table A-16 MODBUS TCP: Coding of process value type [Object ID 0x9F, 0xA1, 0xA3, 0xA5, 0xA7, 0x003C, 0x0049, 0x0054, 0x0060, 0x006C, 0x0078] (Page 290)
0xA5	Temperature2_Type	Extended	UINT8	0x01	Table A-17 MODBUS TCP: Coding of process value units [Object ID 0xA0, 0xA2, 0xA4, 0xA6, 0xA9, 0x003D, 0x004A, 0x0055, 0x0061, 0x006D, 0x0079] (Page 290)
0xA6	Temperature2_UnitCode	Extended	UINT16	0x02	Table A-16 MODBUS TCP: Coding of process value type [Object ID 0x9F, 0xA1, 0xA3, 0xA5, 0xA7, 0x003C, 0x0049, 0x0054, 0x0060, 0x006C, 0x0078] (Page 290)
0xA7	Flow1_Type	Extended	UINT8	0x01	Table A-17 MODBUS TCP: Coding of process value units [Object ID 0xA0, 0xA2, 0xA4, 0xA6, 0xA9, 0x003D, 0x004A, 0x0055, 0x0061, 0x006D, 0x0079] (Page 290)
0xA8	Flow1_UnitCode	Extended	UINT16	0x02	Table A-16 MODBUS TCP: Coding of process value type [Object ID 0x9F, 0xA1, 0xA3, 0xA5, 0xA7, 0x003C, 0x0049, 0x0054, 0x0060, 0x006C, 0x0078] (Page 290)

Object ID	Object name / description	Category	Type	Object length	Coding
0xA9	Flow2_Type	Extended	UINT8	0x01	Table A-17 MODBUS TCP: Coding of process value units [Object ID 0xA0, 0xA2, 0xA4, 0xA6, 0xA9, 0x003D, 0x004A, 0x0055, 0x0061, 0x006D, 0x0079] (Page 290)
0xAA	Flow2_UnitCode	Extended	UINT16	0x02	Table A-16 MODBUS TCP: Coding of process value type [Object ID 0x9F, 0xA1, 0xA3, 0xA5, 0xA7, 0x003C, 0x0049, 0x0054, 0x0060, 0x006C, 0x0078] (Page 290)

Function Code 43 - Read Device Identification

Table A-13 Measured values and diagnostics data

Address	Name / description	Register type	R/W	Type	Coding
0x0000	Component1_Code	Holding (function code 3)	R	UINT8	Table A-16 MODBUS TCP: Coding of process value type [Object ID 0x9F, 0xA1, 0xA3, 0xA5, 0xA7, 0x003C, 0x0049, 0x0054, 0x0060, 0x006C, 0x0078] (Page 290)
0x0001	Component1_UnitCode	Holding (function code 3)	R	UINT16	Table A-17 MODBUS TCP: Coding of process value units [Object ID 0xA0, 0xA2, 0xA4, 0xA6, 0xA9, 0x003D, 0x004A, 0x0055, 0x0061, 0x006D, 0x0079] (Page 290)
0x0002	Component1_MeasValue	Holding (function code 3)	R	FLOAT32	DECIMAL
0x0003					
0x0004	Component1_Status[1)]	Holding (function code 3)	R	UINT32	Bit-Enum
0x0005					
0x0006	Component1_Factor	Holding (function code 3)	R	FLOAT32	DECIMAL
0x0007					
0x0008	Component1_Offset	Holding (function code 3)	R	FLOAT32	DECIMAL
0x0009					
0x000A	RESERVED				
0x000B	RESERVED				

Address	Name / description	Register type	R/W	Type	Coding
0x000C	Component2_Code	Holding (function code 3)	R	UINT8	Table A-16 MODBUS TCP: Coding of process value type [Object ID 0x9F, 0xA1, 0xA3, 0xA5, 0xA7, 0x003C, 0x0049, 0x0054, 0x0060, 0x006C, 0x0078] (Page 290)
0x000D	Component2_UnitCode	Holding (function code 3)	R	UINT16	Table A-17 MODBUS TCP: Coding of process value units [Object ID 0xA0, 0xA2, 0xA4, 0xA6, 0xA9, 0x003D, 0x004A, 0x0055, 0x0061, 0x006D, 0x0079] (Page 290)
0x000E	Component2_MeasValue	Holding (function code 3)	R	FLOAT32	DECIMAL
0X000F					
0x0010	Component2_Status[1)]	Holding (function code 3)	R	UINT32	Bit-Enum
0x0011					
0x0012	Component2_Factor	Holding (function code 3)	R	FLOAT32	DECIMAL
0x0013					
0x0014	Component2_Offset	Holding (function code 3)	R	FLOAT32	DECIMAL
0x0015					
0x0016	RESERVED				
0x0017	RESERVED				
0x0018	Component3_Code	Holding (function code 3)	R	UINT8	Table A-16 MODBUS TCP: Coding of process value type [Object ID 0x9F, 0xA1, 0xA3, 0xA5, 0xA7, 0x003C, 0x0049, 0x0054, 0x0060, 0x006C, 0x0078] (Page 290)
0x0019	Component3_UnitCode	Holding (function code 3)	R	UINT16	Table A-17 MODBUS TCP: Coding of process value units [Object ID 0xA0, 0xA2, 0xA4, 0xA6, 0xA9, 0x003D, 0x004A, 0x0055, 0x0061, 0x006D, 0x0079] (Page 290)
0x001A	Component3_MeasValue	Holding (function code 3)	R	FLOAT32	DECIMAL
0x001B					

Address	Name / description	Register type	R/W	Type	Coding
0x001C	Component3_Status[1)]	Holding (function code 3)	R	UINT32	Bit-Enum
0x001D					
0x001E	Component3_Factor	Holding (function code 3)	R	FLOAT32	DECIMAL
0x001F					
0x0020	Component3_Offset	Holding (function code 3)	R	FLOAT32	DECIMAL
0x0021					
0x0022	RESERVED				
0x0023	RESERVED				
0x0024	Component4_Code	Holding (function code 3)	R	UINT8	Table A-16 MODBUS TCP: Coding of process value type [Object ID 0x9F, 0xA1, 0xA3, 0xA5, 0xA7, 0x003C, 0x0049, 0x0054, 0x0060, 0x006C, 0x0078] (Page 290)
0x0025	Component4_UnitCode	Holding (function code 3)	R	UINT16	Table A-17 MODBUS TCP: Coding of process value units [Object ID 0xA0, 0xA2, 0xA4, 0xA6, 0xA9, 0x003D, 0x004A, 0x0055, 0x0061, 0x006D, 0x0079] (Page 290)
0x0026	Component4_MeasValue	Holding (function code 3)	R	FLOAT32	DECIMAL
0x0027					
0x0028	Component4_Status[1)]	Holding (function code 3)	R	UINT32	Bit-Enum
0x0029					
0x002A	Component4_Factor	Holding (function code 3)	R	FLOAT32	DECIMAL
0x002B					
0x002C	Component4_Offset	Holding (function code 3)	R	FLOAT32	DECIMAL
0x002D					
0x002E	RESERVED				
0x002F	RESERVED				
0x0030	Component5_Code	Holding (function code 3)	R	UINT8	Table A-16 MODBUS TCP: Coding of process value type [Object ID 0x9F, 0xA1, 0xA3, 0xA5, 0xA7, 0x003C, 0x0049, 0x0054, 0x0060, 0x006C, 0x0078] (Page 290)

Address	Name / description	Register type	R/W	Type	Coding
0x0031	Component5_UnitCode	Holding (function code 3)	R	UINT16	Table A-17 MODBUS TCP: Coding of process value units [Object ID 0xA0, 0xA2, 0xA4, 0xA6, 0xA9, 0x003D, 0x004A, 0x0055, 0x0061, 0x006D, 0x0079] (Page 290)
0x0032	Component5_MeasValue	Holding (function code 3)	R	FLOAT32	DECIMAL
0x0033					
0x0034	Component5_Status[1)]	Holding (function code 3)	R	UINT32	Bit-Enum
0x0035					
0x0036	Component5_Factor	Holding (function code 3)	R	FLOAT32	DECIMAL
0x0037					
0x0038	Component5_Offset	Holding (function code 3)	R	FLOAT32	DECIMAL
0x0039					
0x003A	RESERVED				
0x003B	RESERVED				
0x003C	Pressure1_Type	Holding (function code 3)	R	UINT8	Table A-16 MODBUS TCP: Coding of process value type [Object ID 0x9F, 0xA1, 0xA3, 0xA5, 0xA7, 0x003C, 0x0049, 0x0054, 0x0060, 0x006C, 0x0078] (Page 290)
0x003D	Pressure1_UnitCode	Holding (function code 3)	R	UINT16	Table A-17 MODBUS TCP: Coding of process value units [Object ID 0xA0, 0xA2, 0xA4, 0xA6, 0xA9, 0x003D, 0x004A, 0x0055, 0x0061, 0x006D, 0x0079] (Page 290)
0x003E	Pressure1_MeasValue	Holding (function code 3)	R	FLOAT32	DECIMAL
0x003F					
0x0040	Pressure1_Status[1)]	Holding (function code 3)	R	UINT32	Bit-Enum
0x0041					
0x0042	Pressure1_Factor	Holding (function code 3)	R	FLOAT32	DECIMAL
0x0043					
0x0044	Pressure1_Offset	Holding (function code 3)	R	FLOAT32	DECIMAL

Address	Name / description	Register type	R/W	Type	Coding
0x0045					
0x0046	RESERVED				
0x0047	RESERVED				
0x0048	Pressure2_Type	Holding (function code 3)	R	UINT8	
0x0049	Pressure2_UnitCode	Holding (function code 3)	R	UINT16	Table A-16 MODBUS TCP: Coding of process value type [Object ID 0x9F, 0xA1, 0xA3, 0xA5, 0xA7, 0x003C, 0x0049, 0x0054, 0x0060, 0x006C, 0x0078] (Page 290)
0x004A	Pressure2_MeasValue	Holding (function code 3)	R	FLOAT32	Table A-17 MODBUS TCP: Coding of process value units [Object ID 0xA0, 0xA2, 0xA4, 0xA6, 0xA9, 0x003D, 0x004A, 0x0055, 0x0061, 0x006D, 0x0079] (Page 290)
0x004B					
0x004C	Pressure2_Status[1)]	Holding (function code 3)	R	UINT32	Bit-Enum
0x004D					
0x004E	Pressure2_Factor	Holding (function code 3)	R	FLOAT32	DECIMAL
0x004F					
0x0050	Pressure2_Offset	Holding (function code 3)	R	FLOAT32	DECIMAL
0x0051					
0x0052	RESERVED				
0x0053	RESERVED				
0x0054	Temperature1_Type	Holding (function code 3)	R	UINT8	Table A-16 MODBUS TCP: Coding of process value type [Object ID 0x9F, 0xA1, 0xA3, 0xA5, 0xA7, 0x003C, 0x0049, 0x0054, 0x0060, 0x006C, 0x0078] (Page 290)
0x0055	Temperature1_UnitCode	Holding (function code 3)	R	UINT16	Table A-17 MODBUS TCP: Coding of process value units [Object ID 0xA0, 0xA2, 0xA4, 0xA6, 0xA9, 0x003D, 0x004A, 0x0055, 0x0061, 0x006D, 0x0079] (Page 290)

Address	Name / description	Register type	R/W	Type	Coding
0x0056	Temperature1_MeasValue	Holding (function code 3)	R	FLOAT32	DECIMAL
0x0057					
0x0058	Temperature1_Status[1)]	Holding (function code 3)	R	UINT32	Bit-Enum
0x0059					
0x005A	Temperature1_Factor	Holding (function code 3)	R	FLOAT32	DECIMAL
0x005B					
0x005C	Temperature1_Offset	Holding (function code 3)	R	FLOAT32	DECIMAL
0x005D					
0x005E	RESERVED				
0x005F	RESERVED				
0x0060	Temperature2_Type	Holding (function code 3)	R	UINT8	Table A-16 MODBUS TCP: Coding of process value type [Object ID 0x9F, 0xA1, 0xA3, 0xA5, 0xA7, 0x003C, 0x0049, 0x0054, 0x0060, 0x006C, 0x0078] (Page 290)
0x0061	Temperature2_UnitCode	Holding (function code 3)	R	UINT16	Table A-17 MODBUS TCP: Coding of process value units [Object ID 0xA0, 0xA2, 0xA4, 0xA6, 0xA9, 0x003D, 0x004A, 0x0055, 0x0061, 0x006D, 0x0079] (Page 290)
0x0062	Temperature2_MeasValue	Holding (function code 3)	R	FLOAT32	DECIMAL
0x0063					
0x0064	Temperature2_Status[1)]	Holding (function code 3)	R	UINT32	Bit-Enum
0x0065					
0x0066	Temperature2_Factor	Holding (function code 3)	R	FLOAT32	DECIMAL
0x0067					
0x0068	Temperature2_Offset	Holding (function code 3)	R	FLOAT32	DECIMAL
0x0069					
0x006A	RESERVED				
0x006B	RESERVED				

Address	Name / description	Register type	R/W	Type	Coding
0x006C	Flow1_Type	Holding (function code 3)	R	UINT8	Table A-16 MODBUS TCP: Coding of process value type [Object ID 0x9F, 0xA1, 0xA3, 0xA5, 0xA7, 0x003C, 0x0049, 0x0054, 0x0060, 0x006C, 0x0078] (Page 290)
0x006D	Flow1_UnitCode	Holding (function code 3)	R	UINT16	Table A-17 MODBUS TCP: Coding of process value units [Object ID 0xA0, 0xA2, 0xA4, 0xA6, 0xA9, 0x003D, 0x004A, 0x0055, 0x0061, 0x006D, 0x0079] (Page 290)
0x006E	Flow1_MeasValue	Holding (function code 3)	R	FLOAT32	DECIMAL
0x006F					
0x0070	Flow1_Status[1)]	Holding (function code 3)	R	UINT32	Bit-Enum
0x0071					
0x0072	Flow1_Factor	Holding (function code 3)	R	FLOAT32	DECIMAL
0x0073					
0x0074	Flow1_Offset	Holding (function code 3)	R	FLOAT32	DECIMAL
0x0075					
0x0076	RESERVED				
0x0077	RESERVED				
0x0078	Flow2_Type	Holding (function code 3)	R	UINT8	Table A-16 MODBUS TCP: Coding of process value type [Object ID 0x9F, 0xA1, 0xA3, 0xA5, 0xA7, 0x003C, 0x0049, 0x0054, 0x0060, 0x006C, 0x0078] (Page 290)
0x0079	Flow2_UnitCode	Holding (function code 3)	R	UINT16	Table A-17 MODBUS TCP: Coding of process value units [Object ID 0xA0, 0xA2, 0xA4, 0xA6, 0xA9, 0x003D, 0x004A, 0x0055, 0x0061, 0x006D, 0x0079] (Page 290)
0x007A	Flow2_MeasValue	Holding (function code 3)	R	FLOAT32	DECIMAL
0x007B					

Address	Name / description	Register type	R/W	Type	Coding
0x007C	Flow2_Status[1)]	Holding (function code 3)	R	UINT32	Bit-Enum
0x007D					
0x007E	Flow2_Factor	Holding (function code 3)	R	FLOAT32	DECIMAL
0x007F					
0x0080	Flow2_Offset	Holding (function code 3)	R	FLOAT32	DECIMAL
0x0081					
0x0082	RESERVED				
0x0083	RESERVED				Table A-18 MODBUS TCP: Coding of device states [Object ID 0x0100] (Page 290)
0x0101	DeviceSubState	Holding (function code 3)	R	UINT16	Table A-19 MODBUS TCP: Coding of device sub-states [Object ID 0x0101] (Page 290)
0x0102	GlobalStatus	Holding (function code 3)	R	UINT16	Table A-20 MODBUS TCP: Coding of message system masking [Object ID 0x0102] (Page 291)
0x1000	DigitalInputs	Multiple coils	R/W	UINT8	Bit-Enum

Register map

1) Status byte has 32 bits; Register address: 0000000 <status byte>;
Register address +1: 0000000 0000000

Supported Modbus functions (extract)

- 0x03 (03) Read Holding Register
- 0x04 (04) Read Input Register
- 0x06 (06) Write Holding Register (1 register)
- 0x10 (16) Write multiple binary inputs via MODBUS TCP (coils)
- 0x2B (43) Read device ID

Modbus Exception Codes

- 1 - Function not supported
- 2 - Wrong data address
- 3 - Wrong data value
- 26 - Wrong user level
- 27 - Access not possible (login already performed, e.g. via LUI)
- 28 - Access blocked for 5 minutes - PIN was entered incorrectly 3 times

A.5.3.2 Device data: Extras

Table A-14 MODBUS TCP: Coding of gas components [Object ID 0x81, 0x87, 0x8D, 0x93, 0x99, 0x0000, 0x000C, 0x0018, 0x0024, 0x0030]

Values	Static Label	Description
0	None	No gas component selected
1	User-defined	User-specific gas component
2	O_2	Oxygen
3	CO	Carbon monoxide
4	CO_2	Carbon dioxide
5	CH_4	Methane
6	SO_2	Sulphur dioxide
7	NO	Nitrogen monoxide
8	N_2O	Dinitrogen monoxide
9	NH_3	Ammonia
10	H_2O	Water vapor
11	C_2H_2	Ethine
12	C_2H_4	Ethene
13	C_2H_6	Ethane
14	C_3H_6	Propylene
15	C_3H_8	Propane
16	C_4H_6	Butadiene
17	C_4H_{10}	n-butane
18	C_6H_{14}	n-hexane

Table A-15 MODBUS TCP: Coding of component units [Object ID 0x83, 0x89, 0x8F, 0x95, 0x9B, 0x0001, 0x000D, 0x0019, 0x0025, 0x0031]

Values	Static Label	Description
1101	g/m^3	-
1105	g/l	-
1342	%	-
1423	ppm	-
1558	mg/l	-
1561	vpm	-
1566	mg/m^3	-
1995	User-defined	Input of a user-defined unit.

Table A-16 MODBUS TCP: Coding of process value type [Object ID 0x9F, 0xA1, 0xA3, 0xA5, 0xA7, 0x003C, 0x0049, 0x0054, 0x0060, 0x006C, 0x0078]

Values	Static Label	Description
0	Free	No measured value
1	Gas	Measured gas value
2	Pressure	Measured pressure
3	Flow	Measured flow rate
4	Temperature	Temperature measurement value
5	Other	Other measured value

Table A-17 MODBUS TCP: Coding of process value units [Object ID 0xA0, 0xA2, 0xA4, 0xA6, 0xA9, 0x003D, 0x004A, 0x0055, 0x0061, 0x006D, 0x0079]

Values	Static Label	Description
1001	°C	-
1101	g/m³	-
1105	g/l	-
1136	hPa	-
1342	%	-
1423	ppm	-
1558	mg/l	-
1561	vpm	-
1563	ml/min	-
1566	mg/m³	-
1995	User-defined	Input of a user-defined unit.
1997	No unit	-

Table A-18 MODBUS TCP: Coding of device states [Object ID 0x0100]

Values	Static Label	Description
2	Run	Device status
3	Standby	
4	Power down	
5	Maintenance	

Table A-19 MODBUS TCP: Coding of device substates [Object ID 0x0101]

Values	Static Label	Description
0	Init	Initialization / start-up
1	Warming-up	Warm-up phase
2	Pause	Pause state
3	Calibration	Calibration state
4	Download	Loading of firmware or configuration files

Values	Static Label	Description
5	Reset	Cold restart
6	Test	Test mode
7	Measurement	Measuring mode
8	Standby	Standby state

Table A-20 MODBUS TCP: Coding of message system masking [Object ID 0x0102]

Values	Static Label
0x0001	Fault/Main. alarm
0x0002	Warning/Main. demand
0x0004	Function check
0x0008	Limit message
0x0010	Parameter change
0x0020	Simulation
0x0040	Maintenance required
0x0080	Limit alarm
0x0100	Configuration changed
0x0200	Configuration warning
0x0400	Configuration saved
0x0800	Configuration error
0x1000	LUI log-on
0x2000	Remote log-on
0x4000	Measuring protection

Table A-21 MODBUS TCP: MODBUS Exception Codes [Object ID 0x]

Values	Static Label	Description
1	Illegal Function	Wrong function
2	Illegal Data Address	Wrong data address
3	Illegal Data Value	Wrong data value
1A	Wrong User Level	GA700-specific
1B	Access Blocked - already logged on	
1C	Access Blocked - Pin 3 times wrong -> 5 min time-out	

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