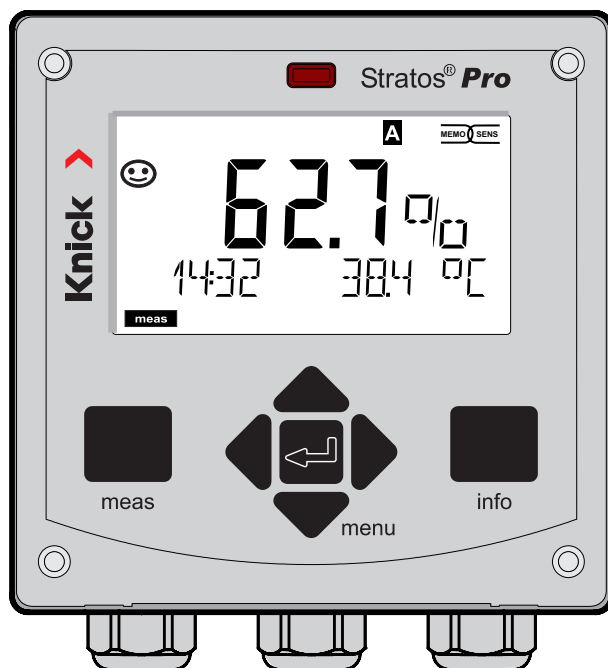


Stratos® Pro A4... MSOXY

User Manual



Latest Product Information:
www.knick.de



Knick >

Warranty. Disposal. About This Manual.

Warranty

Defects occurring within 3 years from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender).
Sensors, fittings and accessories: 1 year.
Subject to change without notice.

Return of products under warranty

Please contact our Service Team before returning a defective device.
Ship the cleaned device to the address you have been given.
If the device has been in contact with process fluids, it must be decontaminated/disinfected before shipment. In that case, please attach a corresponding certificate, for the health and safety of our service personnel.

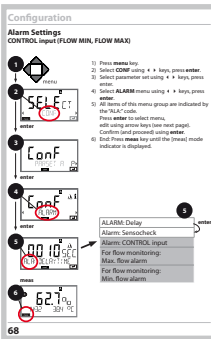
Disposal

Please observe the applicable local or national regulations concerning the disposal of “waste electrical and electronic equipment”.

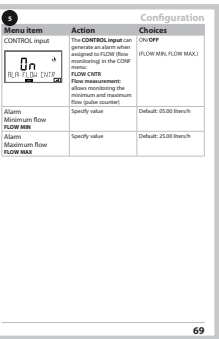
About this manual:

This manual is intended as a reference guide to your device – You don't have to read the book from front to back.
Take a look at the **Table of Contents** or the **Index** to find the function you are interested in. Each topic is explained on a double-page spread with step-by-step instructions on how to configure the desired function. Clearly legible page numbers and headlines help you to quickly find the information:

Left page:
How do I get to the function



Right page:
Which settings are provided for this function



Specific Test Report



CD-ROM

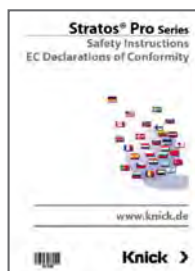
Complete documentation:

- User manuals
- Safety instructions
- Certificates
- Short instructions

Safety Information

In official EU languages and others.

- EC Declarations of Conformity



Certificates

- IECEX
- ATEX
- FM
- CSA
- NEPSI
- GOST



Short Instructions

First steps after installation:

- Operation
- Menu structure
- Calibration
- Error messages and recommended actions

In German, English, French, Russian, Spanish, Portuguese, Italian, Swedish and Dutch.

More languages on CD-ROM and on our website: www.knick.de



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Intended Use

Stratos Pro A4... MSOXY is a 4-wire device for dissolved oxygen and temperature measurement using Memosens sensors in biotechnology, pharmaceutical industry, as well as in the field of industry, environment, food processing and sewage treatment. Optionally, it can be used for measuring oxygen traces.

Enclosure and mounting possibilities

- The sturdy molded enclosure is rated IP 67/NEMA 4X for outdoor use. It is made of glass-reinforced PBT / PC and measures 148 mm x 148 mm x 117 mm (H x W x D). It is provided with knockouts to allow:
 - wall mounting (sealing plugs to seal the enclosure), see page 15
 - post/pipe mounting (Ø 40 ... 60 mm, □ 30 ... 45 mm) see page 17
 - panel mounting (138 mm x 138 mm cutout to DIN 43700), see page 18

Weather protector (accessory)

The weather protector, which is available as accessory, provides additional protection against direct weather exposure and mechanical damage, see page 17.

Connection of sensors, cable glands

For connecting the cables, the enclosure provides

- 3 knockouts for cable glands M20x1.5
- 2 knockouts for NPT 1/2" or rigid metallic conduit

For quasi-stationary installations with Memosens sensors, we recommend using the M12 device socket (accessory ZU 0822) instead of a cable gland – it allows simple replacement of the sensor cable without opening the device.

Sensors

The device has been designed for Memosens standard sensors or Memosens trace sensors (optional).

Introduction

Display

Plain-text messages in a large, backlit LC display allow intuitive operation. You can specify which values are to be displayed in standard measuring mode ("Main Display", see page 32).

Color-coded user interface

The colored display backlighting signals different operating states (e.g. alarm: red, HOLD mode: orange, see page 33).

Diagnostics functions

"Sensocheck" and "Sensoface" monitor the sensor and provide clear information about its status, see page 107.

Data logger

The internal logbook (TAN SW-A002) can handle up to 100 entries – up to 200 with AuditTrail (TAN SW-A003), see page 110.

2 parameter sets A, B

The device provides two parameter sets which can be switched manually or via a control input for different process adaptations or different process conditions.

For overview of parameter sets (table for copy), see page 50.

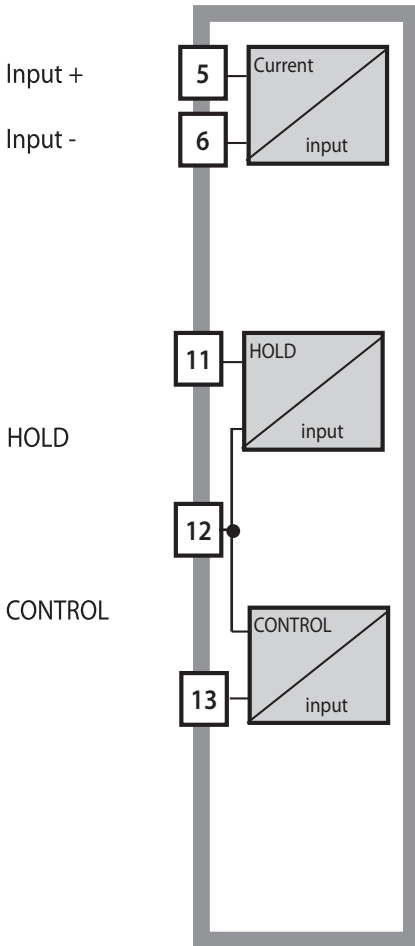
Password protection

Password protection (passcodes) for granting access rights during operation can be configured, see page 115.

Correction

Here, you can adapt the device to the process conditions by means of salinity and pressure correction, either manually or via an external current input (optional, released by TAN), see page 66.

Control inputs



I input

The analog (0) 4 ... 20 mA current input can be used for external pressure compensation (TAN required). See page 67.

HOLD

(floating digital control input)
The HOLD input can be used for external activation of the HOLD mode, see page 38.

CONTROL

(floating digital control input)
The CONTROL input can be used either for parameter set selection (A/B) or for flow monitoring, see page 68.
The "Wash" contact can be used for indicating the active parameter set (see next page).

Power supply

Current is provided through a universal power supply
24 ... 230 V AC/DC, AC: 45 ... 65 Hz.

Options

Additional functions can be activated by entering a TAN (page 115).

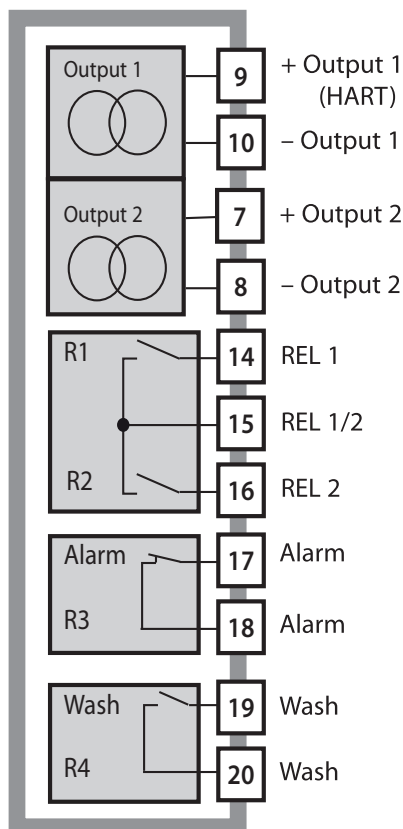
Introduction

Signal outputs

The device provides two current outputs (for transmission of measured value and temperature, for example).

Relay contacts

Four floating relay contacts are available.



Current outputs

The floating current outputs (0) 4 ... 20 mA are used for transmitting measured values. An output filter can be programmed, the fault current value can be specified. See page 58.

Relay contacts

2 relay contacts for limit values. Adjustable for the selected process variable: hysteresis, switching behavior (MIN/MAX limit), contact type (N/O, N/C) and delay (page 74).

Alarm

An alarm can be generated by Sensocheck, flow monitoring or current failure (page 70).

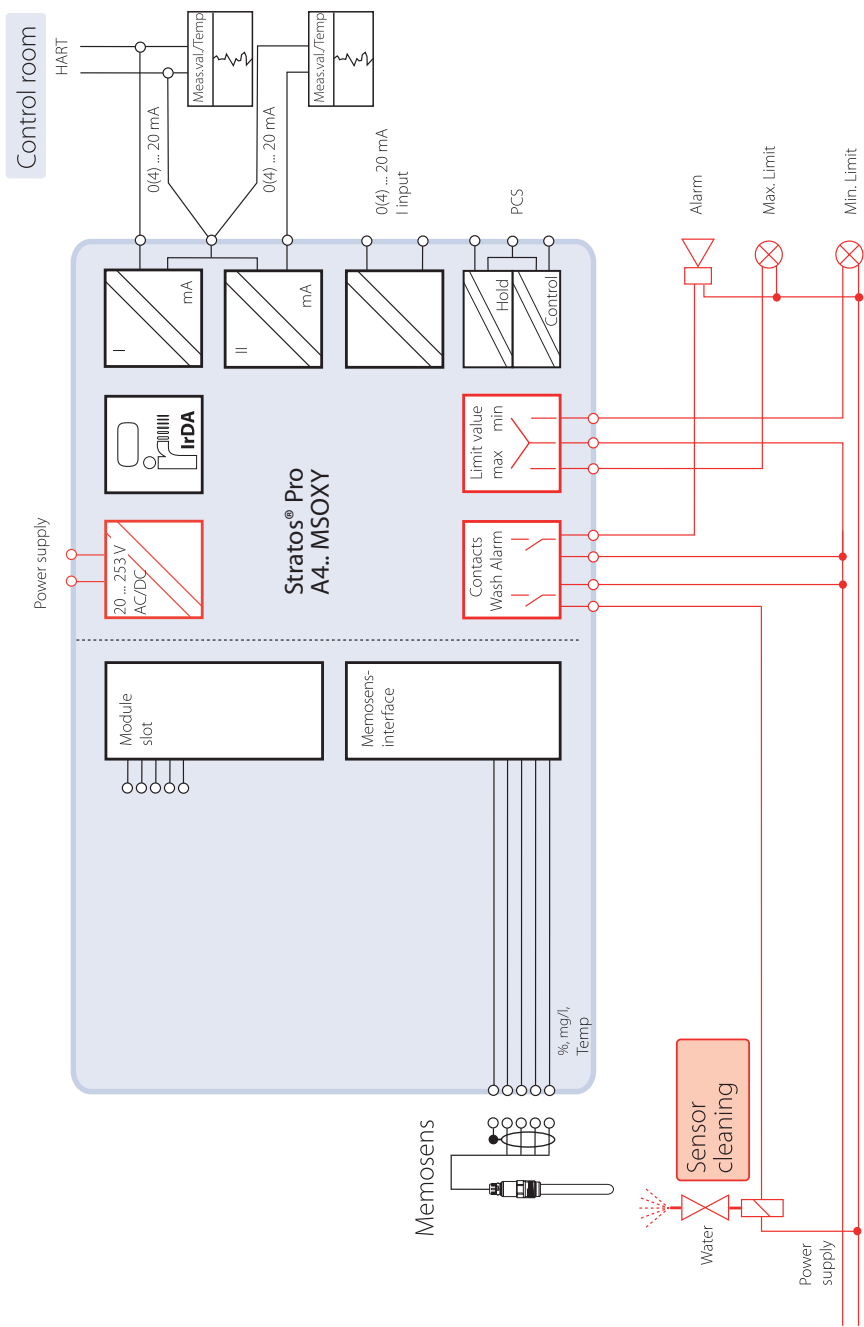
Wash (cleaning function)

This contact can be used for controlling a rinsing probe or for indicating the active parameter set (page 88).

PID controller

Configurable as pulse length or pulse frequency controller (page 84).

Typical Application of Stratos Pro A4... MSOXY



Safety Information

Be sure to read and observe the following safety instructions!

The device has been manufactured using state of the art technology and it complies with applicable safety regulations.

When operating the device, certain conditions may nevertheless lead to danger for the operator or damage to the device.

See also the following documents (page 3):

- "Safety Instructions"
- "Certificates"



CAUTION!

Commissioning must only be performed by trained personnel authorized by the operating company! Whenever it is likely that protection has been impaired, the device shall be made inoperative and secured against unintended operation.

The protection is likely to be impaired if, for example:

- the device shows visible damage
- the device fails to perform the intended measurements
- after prolonged storage at temperatures below -30°C or above 70°C
- after severe transport stresses

Before recommissioning the device, a professional routine test must be performed. This test must be carried out at the manufacturer's factory.

Please note:

Before commissioning you must prove that the device may be connected with other equipment.

Safety Precautions for Installation

- The electrical installation shall conform to the national regulations for electrical installations and/or other applicable national or local codes or regulations.
- The power supply shall be disconnectable from the device by a two-poled circuit breaker.
- Switch and circuit breaker shall be located in close proximity to the equipment and be easily accessible by the OPERATOR. They shall be marked as disconnect switch for the device.
- Be sure to disconnect the mains supply and any relay contacts which are connected to separate current sources before starting maintenance operations.

Approvals for application in hazardous locations:

Stratos Pro A4...B OXY: see Specifications, copies provided in the "Certificates" document: IECEx, ATEX, FM, CSA, NEPSI and GOST.

Terminals:

Screw terminal, suitable for single wires / flexible leads up to 2.5 mm² (AWG 14).

Recommended torque for the terminal screws: 0.5 ... 0.6 Nm.



Important Note:

The operator must indicate the type of protection!

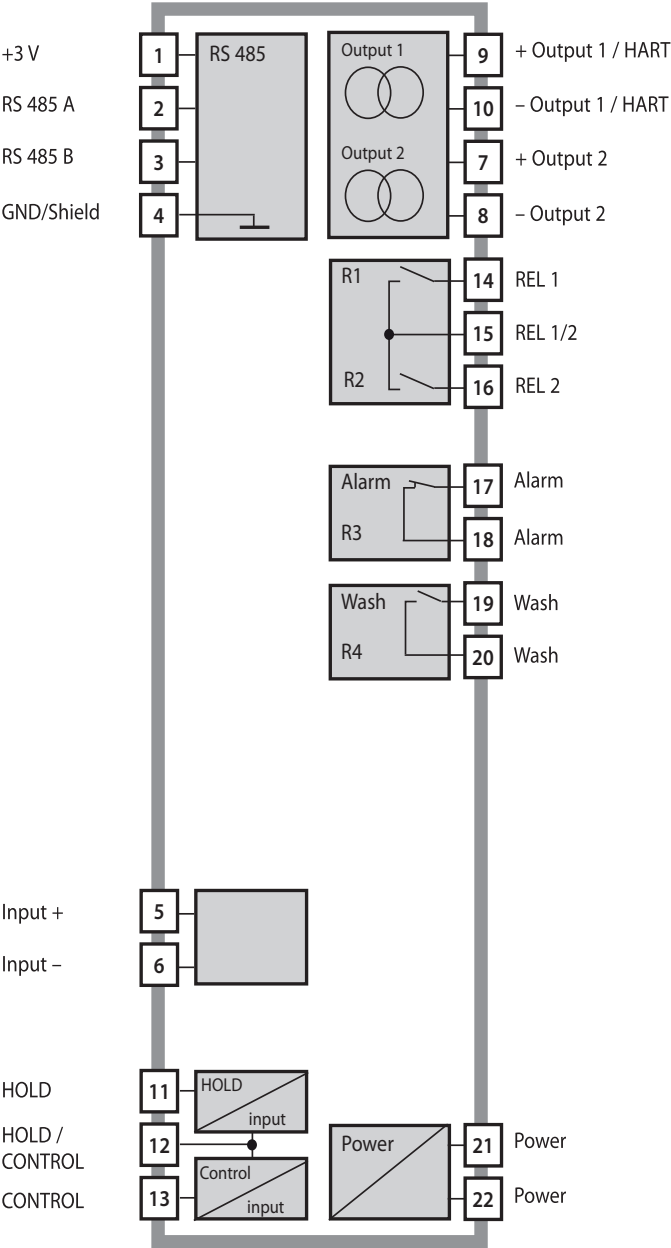
When the device provides different types of protection, the operator must specify the applied type of protection during installation. To do so, use the checkboxes on the rating plate:

Knick >	YY	Knick SC91214A	 Ex KEM 08.0020
A4**B-*/*	☐ II 3 G Ex nA II T4	☐ II 3 D Ex tD A22 IP54 T85°C	☒ Ex nA II T4
No. 12345 / 1234567 / 1006	Electrical data see Knick SC 91214A		see Ctrl. dwg. 212.002-100
-20 ≤ Ta ≤ +55°C	PWR: 24 (-15%) to 230 (+10%) V AC, 45 to 65 Hz, < 12 VA		
Enclosure Type 4X	24 (-15%) to 80 (+10%) V DC, 4 W		
	 FM APPROVED	 C US	 EX NEPSI
D-14163 Berlin Made in Germany	 PCF		
			

Additional rating plate at outside bottom of front with checkboxes for marking the respective application after installation

Overview

Overview of Stratos Pro A4... MSOXY



Package Contents

Check the shipment for transport damage and completeness!

The package should contain:

- Front unit, rear unit, bag containing small parts
- Specific test report
- Documentation (cf p. 3)
- CD-ROM

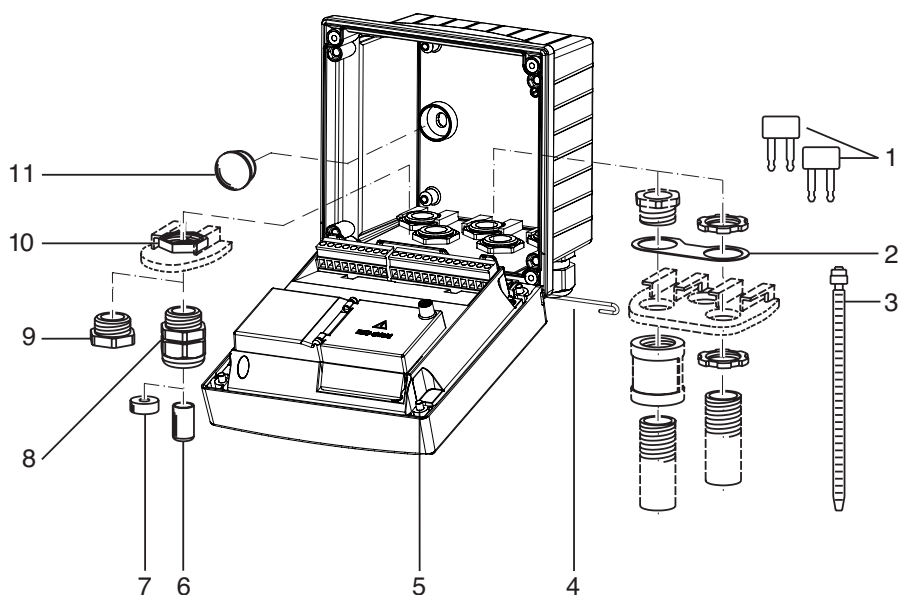


Fig.: Assembling the enclosure

- | | |
|---|--|
| 1) Jumper (3 x) | 6) Sealing insert (1 x) |
| 2) Washer (1 x), for conduit mounting: Place washer between enclosure and nut | 7) Rubber reducer (1 x) |
| 3) Cable tie (3 x) | 8) Cable gland (3 x) |
| 4) Hinge pin (1 x), insertable from either side | 9) Filler plug (3 x) |
| 5) Enclosure screw (4 x) | 10) Hexagon nut (5 x) |
| | 11) Sealing plug (2 x), for sealing in case of wall mounting |

Mounting Plan, Dimensions

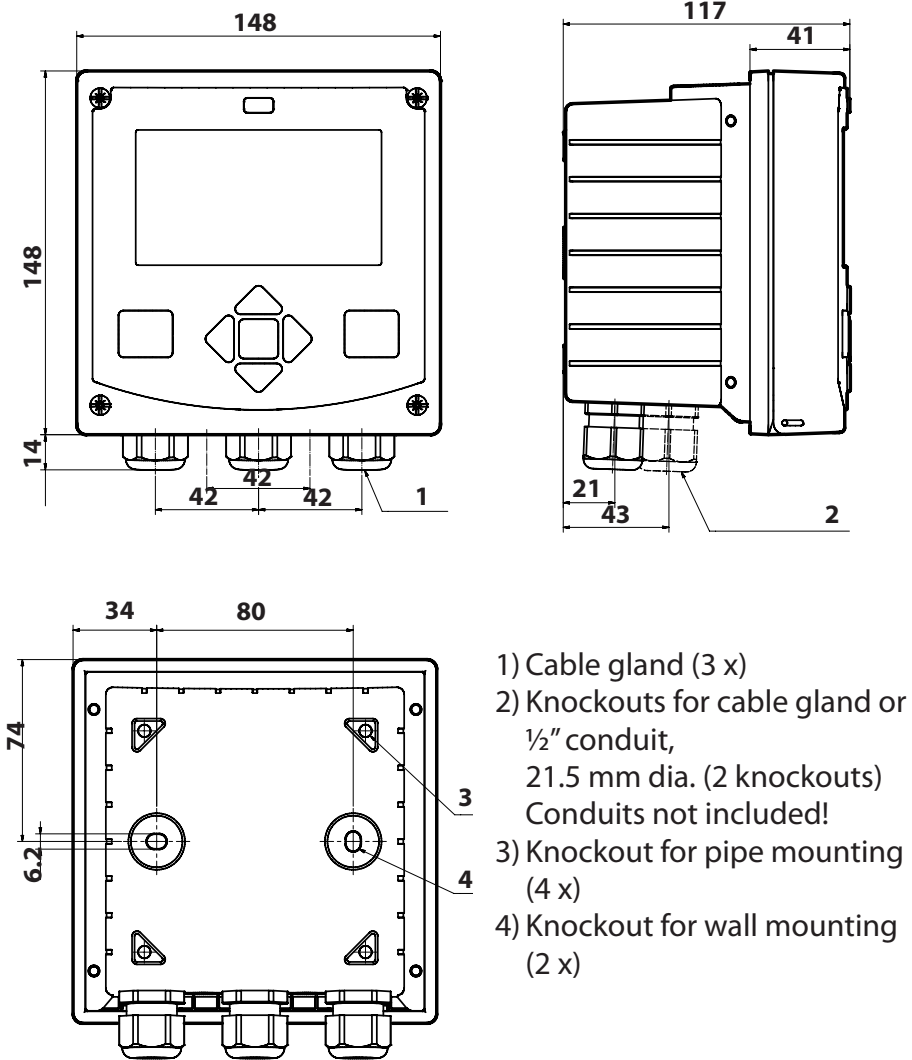
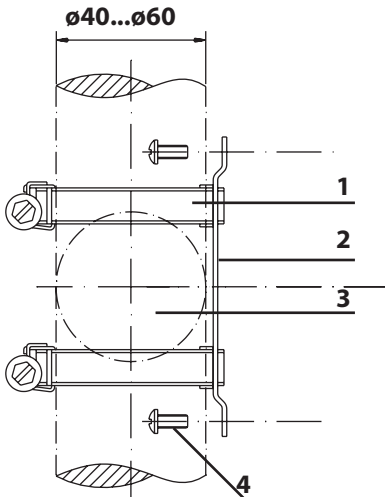


Fig.: Mounting plan (All dimensions in mm!)

Pipe Mounting, Protective Hood



- 1) Hose clamp with worm gear drive to DIN 3017 (2 x)
- 2) Pipe-mount plate (1 x)
- 3) For vertical or horizontal posts or pipes
- 4) Self-tapping screw (4 x)

Fig.: Pipe-mount kit, accessory ZU 0274 (All dimensions in mm!)

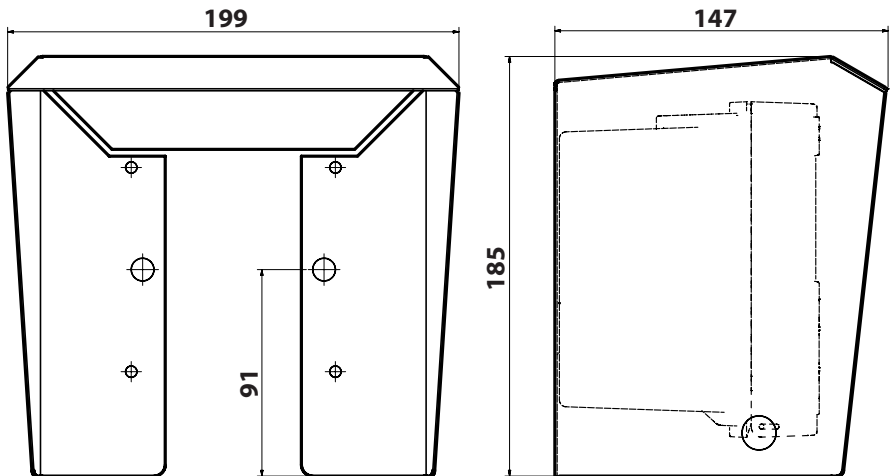
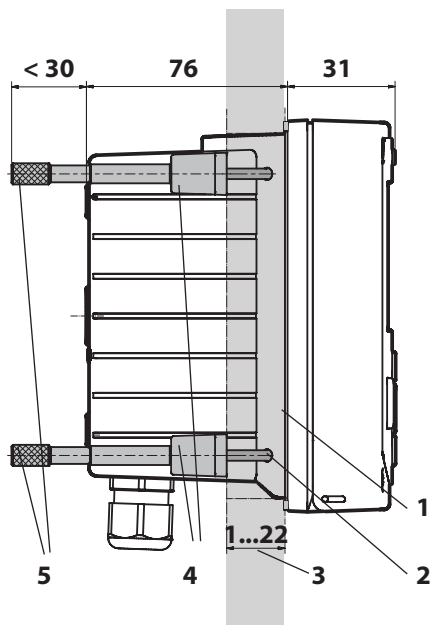


Fig.: Protective hood for wall and pipe mounting, accessory ZU 0737 (All dimensions in mm!)

Panel Mounting



- 1) Circumferential sealing (1 x)
- 2) Screws (4 x)
- 3) Position of control panel
- 4) Span piece (4 x)
- 5) Threaded sleeve (4 x)

Cutout
138 x 138 mm (DIN 43700)

Fig.: Panel-mount kit, accessory ZU 0738 (All dimensions in mm!)

Installation Instructions

- Installation of the device must be carried out by trained experts in accordance with this user manual and as per applicable local and national codes.
- Be sure to observe the technical specifications and input ratings during installation!
- Be sure not to notch the conductor when stripping the insulation!
- Before connecting the device to the power supply, make sure that its voltage lies within the range 20.5 to 253 V AC/DC!
- The supplied current must be galvanically isolated. If not, connect an isolator module.
- All parameters must be set by a system administrator prior to commissioning!

Terminals:

suitable for single wires / flexible leads up to 2.5 mm² (AWG 14)

Application in hazardous locations:

The approvals for Stratos Pro A4... B in Ex Zone 2 refer to the type of protection "nA".

Memosens sensors are approved for type of protection "nL".

Combining Stratos Pro A4... B analyzers with

Memosens in Ex-Zone 2 is therefore not permitted.



For use in hazardous locations, see separate "Certificates" document:

- IECEX
- ATEX
- FM
- CSA
- NEPSI
- GOST

Rating Plates / Terminal Assignments

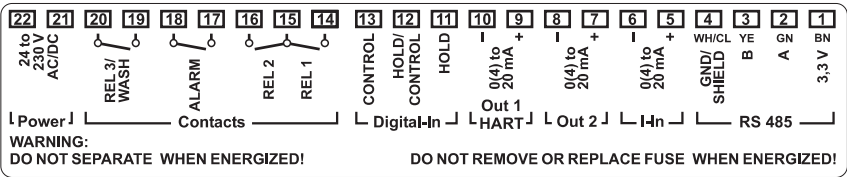


Fig.: Terminal assignments of Stratos Pro A4...

Knick YY **Knicks SC91214A** **IECEX KEM 08.0020**

A4B-*/*** ☐ II 3 G Ex nA II T4 ☐ Ex nA II T4

No. 12345 / 1234567 / 1006 ☐ II 3 D Ex tD A22 IP54 T85°C ☐ Ex tD A22 IP54 T85°C

Electrical data see Knick SC 91214A see Ctrl. dwg. 212.002-100

-20 ≤ Ta ≤ +55°C PWR: 24 (-15%) to 230 (+10%) V AC, 45 to 65 Hz, < 12 VA

Enclosure Type 4X 24 (-15%) to 80 (+10%) V DC, 4 W

D-14163 Berlin Made in Germany

Abb.: Typschild Stratos Pro A4...X außen an der Unterseite der Front

Hinweis: Kennzeichnung der Zündschutzart durch den Betreiber!

Bei Geräten mit unterschiedlichen Zündschutzarten muß der Betreiber die von ihm angewendete Zündschutzart während der Installation festlegen – dazu sind die Auswahlfelder auf dem Typschild zu nutzen. Siehe auch einleitendes Kapitel „Sicherheitshinweise“.

☐ FM 3037411/3037411 C

C/US NI/II/2/ABCD/T4, Ta=55°C

C I/2/Ex nA IIC T4, Ta=55°C / 22/Ex tD T85°C

C DIP/II,III/2/FG/T4, Ta=55°C

US S/II,III/2/FG/T4, Ta=55°C

US I/2/AEx nA IIC T4, Ta=55°C / 22/AEx tD T85°C

Type 4X -20 ≤ Ta ≤ +55°C

CSA.08.2117513

C/US I,II,III/2/ABCDEFGH, T4, Ta=55°C

C Ex nA II T4, Ta=55°C

C DIP/A22/II,III/2/EFEG

US AEx nA II T4, Ta=55°C

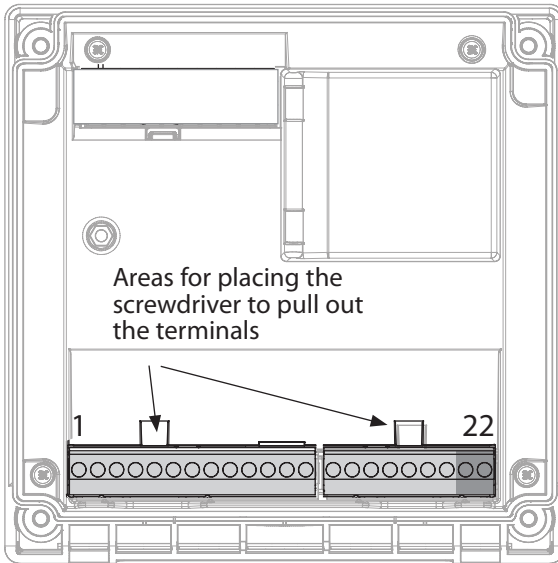
US II,III/22/AEx tD 22, T85°C

Type 4X

Abb.: Beispiel eines zusätzlichen Zulassungsschildes. Die Angaben beziehen sich auf das jeweilige Gerät.

Power Supply, Signal Lines

Connect the power supply for Stratos Pro A4... MSOXY to terminals 21 and 22
(24 ... 230 V AC, 45 ... 65 Hz / 24 ... 80 V DC)

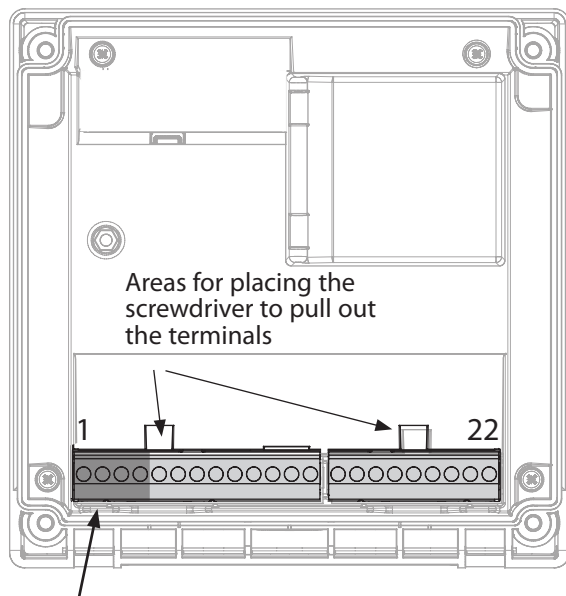


Terminal assignments	
1 (BN)	+3 V
2 (GN)	RS 485 A
3 (YE)	RS 485 B
4 (WH)	GND/shield
5	+ input
6	– input
7	+ out 2
8	– out 2
9	+ out 1/HART
10	– out 1/HART
11	hold
12	hold/control
13	control
14	REL 1
15	REL 1/2
16	REL 2
17	alarm
18	alarm
19	wash
20	wash
21	power
22	power

Fig.: Terminals, device opened, back of front unit

Sensor Connection

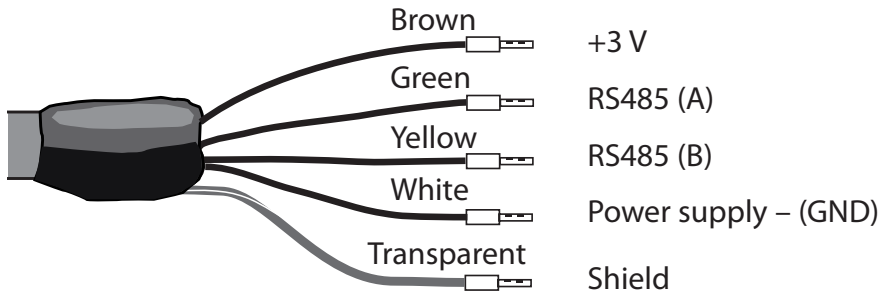
Connect the sensor lines with the sensor connection (RS-485, terminals 1...4).



Sensor connection
RS-485

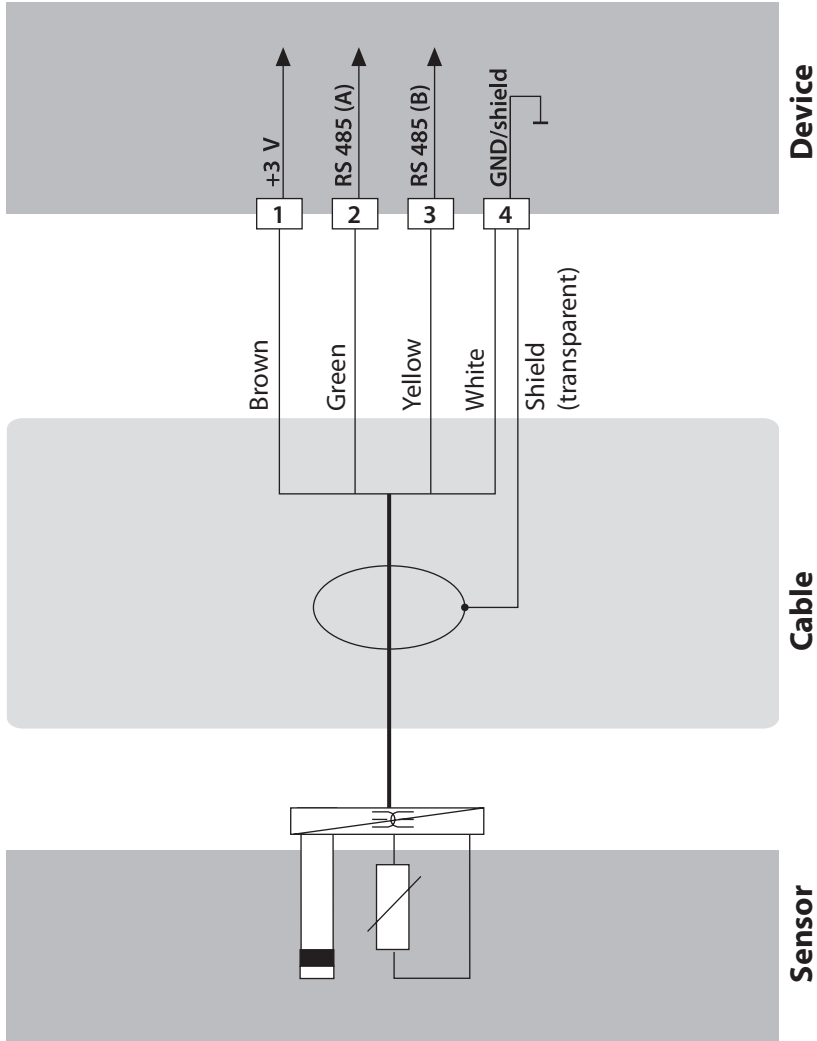
Fig.: Terminals, device opened, back of front unit

Memosens Cable: Wire Colors



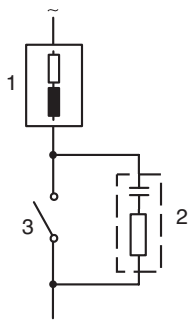
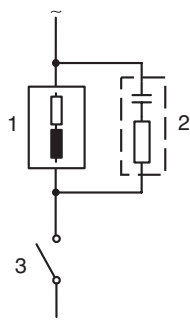
Wiring Example

Measuring task: Oxygen (standard)
Sensors (example): SE 706-NMSN (Knick)
Cable (example): CA/MS-003NAA (Knick)



Protective Wiring of Relay Contacts

Relay contacts are subject to electrical erosion. Especially with inductive and capacitive loads, the service life of the contacts will be reduced. For suppression of sparks and arcing, components such as RC combinations, nonlinear resistors, series resistors and diodes should be used.

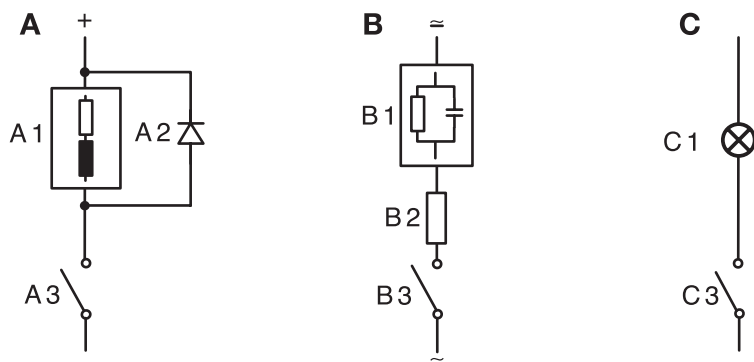


Typical AC applications with inductive load

- 1) Load
- 2) RC combination,
e.g. RIFA PMR 209
Typical RC combinations for
230 V AC:
capacitor 0.1 μF / 630 V,
resistor 100 Ω / 1 W
- 3) Contact

Protective Wiring of Relay Contacts

Typical Protective Wiring Measures



- A:** DC application with inductive load
B: AC/DC applications with capacitive load
C: Connection of incandescent lamps

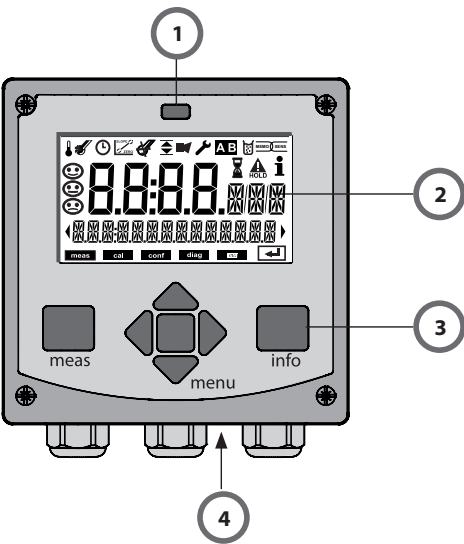
- A1 Inductive load
A2 Free-wheeling diode, e.g. 1N4007 (Observe polarity)
A3 Contact
B1 Capacitive load
B2 Resistor, e.g. $8\ \Omega$ / 1 W at 24 V / 0.3 A
B3 Contact
C1 Incandescent lamp, max 60 W / 230 V, 30 W / 115 V
C3 Contact



WARNING!

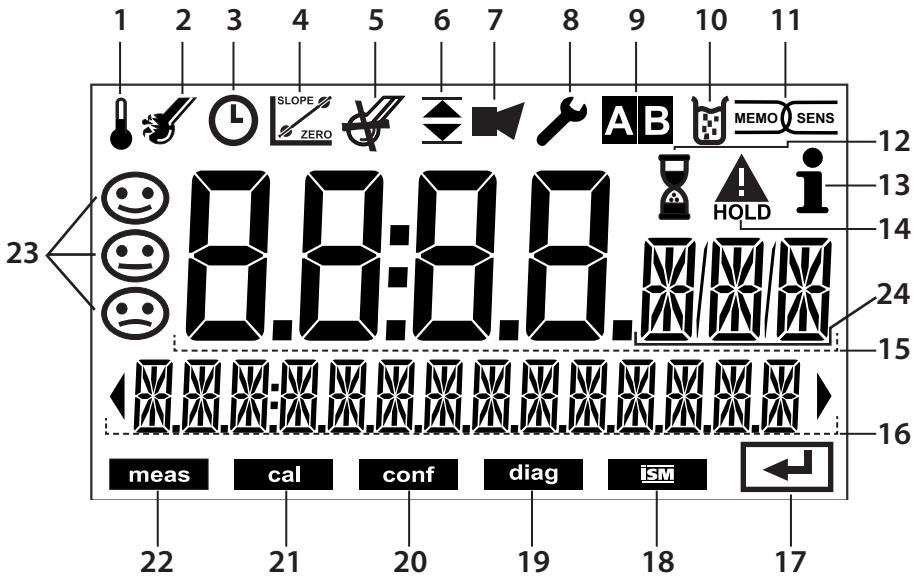
Make sure that the maximum ratings of the relay contacts are not exceeded even during switching!

User Interface, Keypad



- 1 IrDA transmitter/receiver
- 2 Display
- 3 Keypad
- 4 Rating plate
(enclosure bottom)

Key	Function
meas	• Return to last menu level • Directly to measuring mode (press > 2 s) • Measuring mode: other display
info	• Retrieve information • Show error messages
enter	• Configuration: Confirm entries, next configuration step • Calibration: Continue program flow
menu	• Measuring mode: Call menu
Arrow keys up / down	• Menu: Increase/decrease a numeral • Menu: Selection
Arrow keys left / right	• Previous/next menu group • Number entry: Move between digits



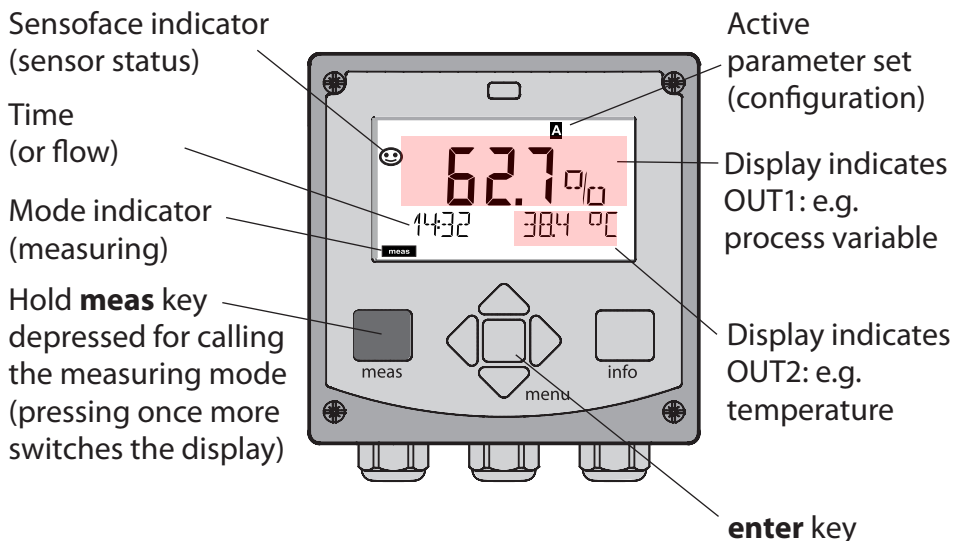
- | | |
|---|------------------------|
| 1 Temperature | 13 Info available |
| 2 Sensocheck | 14 Hold mode active |
| 3 Interval/response time | 15 Main display |
| 4 Sensor data | 16 Secondary display |
| 5 Not used | 17 Proceed using enter |
| 6 Limit message:
Limit 1 or Limit 2 | 18 ISM sensor |
| 7 Alarm | 19 Diagnostics |
| 8 Service | 20 Configuration mode |
| 9 Parameter set | 21 Calibration mode |
| 10 Calibration | 22 Measuring mode |
| 11 Memosens sensor | 23 Sensoface |
| 12 Waiting time running | 24 Unit symbols |

Signal colors (display backlighting)

- | | |
|--------------|---|
| Red | Alarm (in case of fault: display values blink) |
| Red blinking | Input error: illegal value or wrong passcode |
| Orange | HOLD mode (Calibration, Configuration, Service) |
| Turquoise | Diagnostics |
| Green | Info |
| Purple | Sensoface message |

Measuring Mode

After the operating voltage has been connected, the analyzer automatically goes to "Measuring" mode. To call the measuring mode from another operating mode (e.g. Diagnostics, Service): Hold **meas** key depressed (> 2 s).



Depending on the configuration, one of the following displays can be set as standard display for the measuring mode (see page 32):

- Measured value, time and temperature (default setting)
- Measured value and selection of parameter set A/B or flow
- Measured value and tag number ("TAG")
- Time and date
- Output currents
- Controller

Upper display: controller output Y, lower display: setpoint

Note: By pressing the **meas** key in measuring mode you can view the displays for approx. 60 sec.

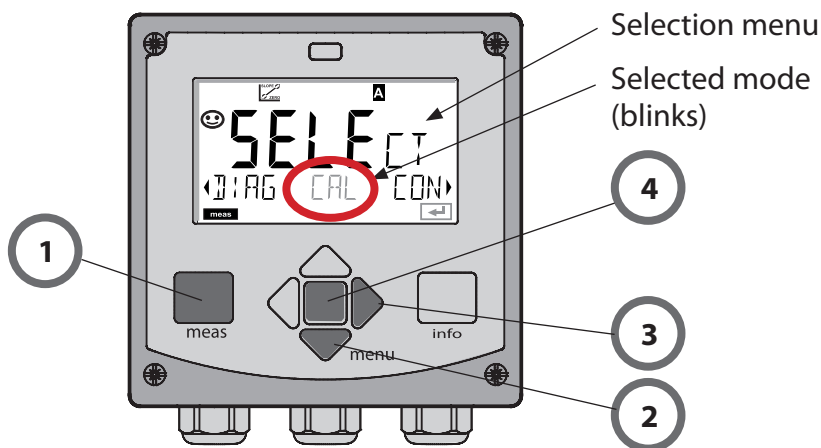


The device must be configured for the respective measurement task!

Selecting the Mode / Entering Values

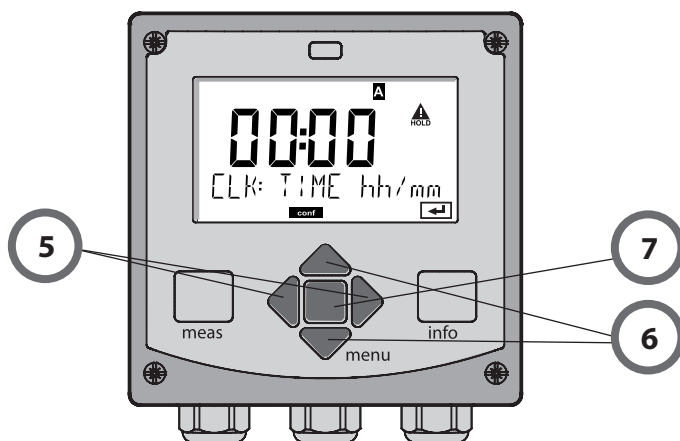
To select the operating mode:

- 1) Hold **meas** key depressed (> 2 s) (directly to measuring mode)
- 2) Press **menu** key: the selection menu appears
- 3) Select operating mode using left / right arrow key
- 4) Press **enter** to confirm the selected mode

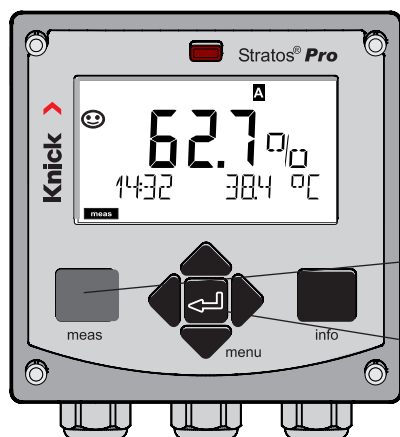


To enter a value:

- 5) Select numeral: left / right arrow key
- 6) Change numeral: up / down arrow key
- 7) Confirm entry by pressing **enter**



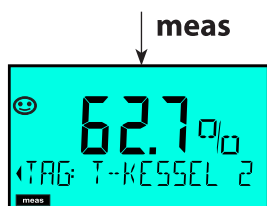
Display in Measuring Mode



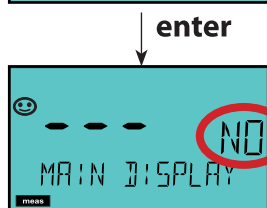
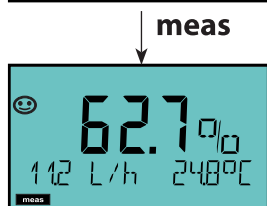
The MAIN DISPLAY is the display which is shown in measuring mode. To call the measuring mode from any other mode, hold the **meas** key depressed for at least 2 sec.

meas key

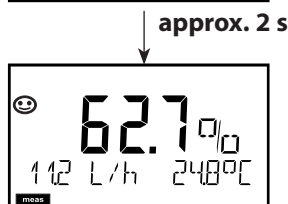
enter key



By pressing **meas** briefly you can step through further displays such as tag number (TAG) or flow (L/h). These displays are turquoise. After 60 sec they switch back to the main display.



Press **enter** to select a display as MAIN DISPLAY – the secondary display shows "MAIN DISPLAY – NO". Use the **UP** / **DOWN** arrow keys to select "MAIN DISPLAY – YES" and confirm by pressing **enter**. The display color changes to white. This display is now shown in measuring mode.



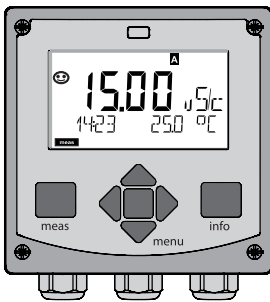
Color-Coded User Interface

The color-coded user interface guarantees increased operating safety. Operating modes are clearly signaled.

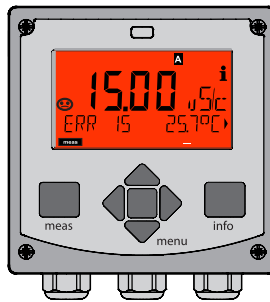
The normal measuring mode is white. Information text appears on a green screen and the diagnostic menu appears on turquoise.

The orange HOLD mode (e.g. during calibration) is quickly visible as is the magenta screen which indicates asset management messages for predictive diagnostics – such as maintenance request, pre-alarm and sensor wear.

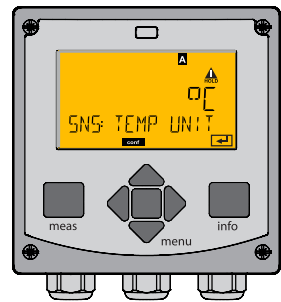
The alarm status has a particularly noticeable red display color and is also signaled by flashing display values. Invalid inputs or false pass-codes cause the entire display to blink red so that operating errors are noticeably reduced.



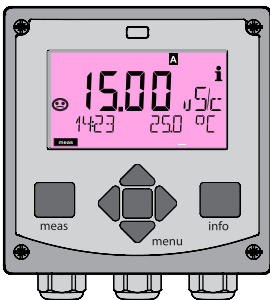
White:
Measuring mode



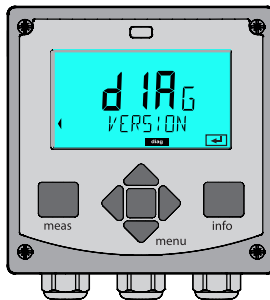
Red blinking:
Alarm, errors



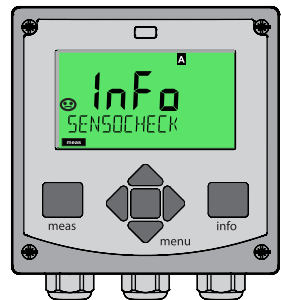
Orange:
HOLD mode



Magenta:
Maintenance request



Turquoise:
Diagnostics



Green:
Information texts

Operating Modes

Diagnostics

Display of calibration data, display of sensor data, performing a device self-test, viewing the logbook entries, display of hardware/software versions of the individual components. The logbook can store 100 events (00...99). They can be displayed directly on the device. The logbook can be extended to 200 entries using a TAN (Option).

HOLD

Manual activation of HOLD mode, e.g. for replacing a digital sensor. The signal outputs adopt a defined state.

Calibration

Every sensor has typical characteristic values, which change in the course of the operating time. Calibration is required to supply a correct measured value. The device checks which value the sensor delivers when measuring in a known solution. When there is a deviation, the device can be "adjusted". In that case, the device displays the "actual" value and internally corrects the measurement error of the sensor. Calibration must be repeated at regular intervals. The time between the calibration cycles depends on the load on the sensor. During calibration the device is in HOLD mode.

During calibration the device remains in the HOLD mode until it is stopped by the operator.

Configuration

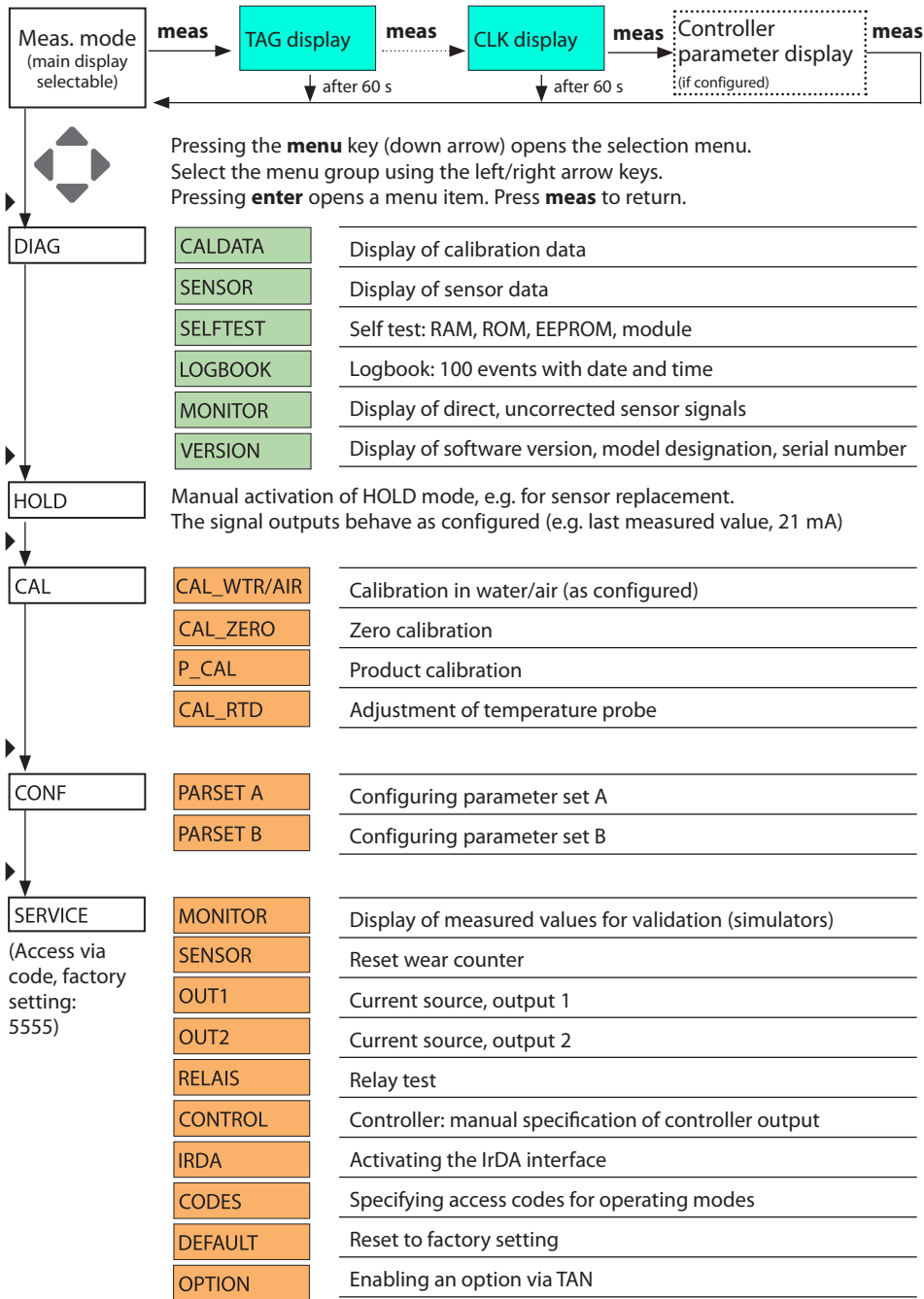
The analyzer must be configured for the respective measurement task. In the "Configuration" mode you select the connected sensor, the measuring range to be transmitted, and the conditions for warning and alarm messages. During configuration the device is in HOLD mode.

Configuration mode is automatically exited 20 minutes after the last keystroke. The device returns to measuring mode.

Service

Maintenance functions (current source, relay test, controller test), IrDA operation, passcode assignment, reset to factory settings, enabling of options (TAN).

Menu Structure of Modes and Functions



The HOLD mode is a safety state during configuration and calibration. Output current is frozen (LAST) or set to a fixed value (FIX). Alarm and limit contacts are disabled.

The HOLD mode is indicated by orange display backlighting.

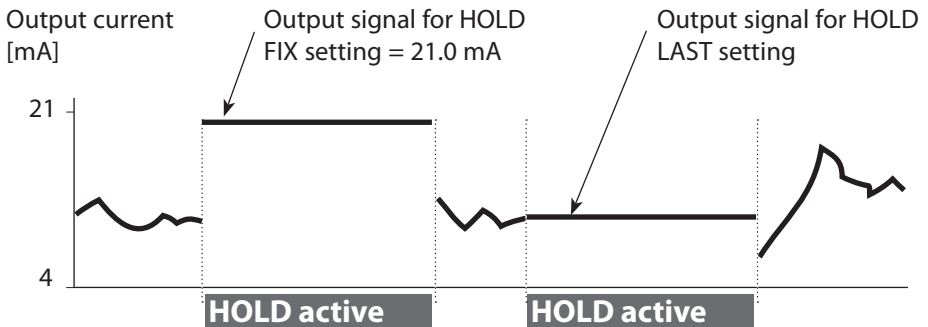
HOLD mode, display icon:



Output signal response

- **LAST:** The output current is frozen at its last value. Recommended for short configuration procedures. The process should not change decisively during configuration. Changes are not noticed with this setting!
- **FIX:** The output current is set to a value that is noticeably different from the process value to signal the control system that the device is being worked at.

Output signal during HOLD:



Terminating the HOLD mode

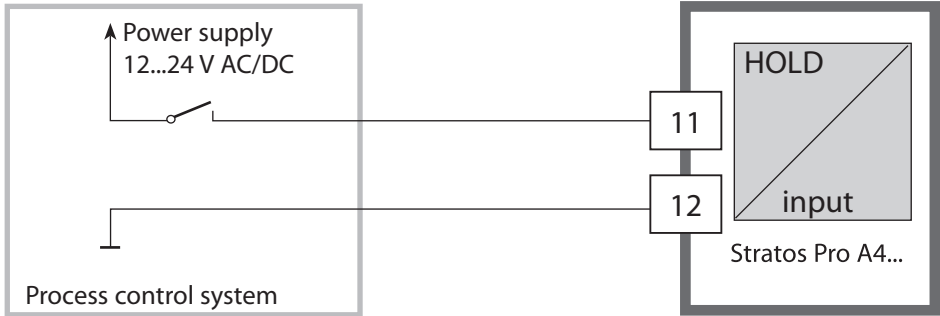
The HOLD mode is ended by switching to measuring mode (hold **meas** key depressed). The display reads "Good Bye", after that, the HOLD mode is exited.

When the calibration mode is exited, a confirmation prompt ensures that the installation is ready for operation (e.g.: sensor reinstalled, located in process).

Alarm

External activation of HOLD

The HOLD mode can be activated from outside by sending a signal to the HOLD input (e.g. from the process control system).



HOLD inactive	0...2 V AC/DC
HOLD active	10...30 V AC/DC

Manual activation of HOLD

The HOLD mode can be activated manually from the HOLD menu. This allows checking or replacing a sensor, for example, without provoking unintended reactions at the outputs or contacts.

Press **meas** key to return to selection menu.

Alarm

When an error has occurred, **Err xx** is displayed immediately.

Only after expiry of a user-defined delay time will the alarm be registered and entered in the logbook.

During an alarm the display blinks, the display backlighting turns **red**.

Error messages can also be signaled by a 22 mA output current (see Configuration).

The alarm contact is activated by alarm and power failure, see also "Configuration / Alarm Settings".

2 sec after the failure event is corrected, the alarm status will be deleted.

Alarm and HOLD Messages

Message	Released by	Cause
Alarm (22 mA) Alarm contact opens	Sensocheck	Polarization / Cable
	Error Messages	Flow (CONTROL input)
HOLD (Last/Fix)	HOLD	HOLD via menu or input
	CONF	Configuration
	CAL	Calibration
	SERVICE	Service

Generating a message via the CONTROL input (min. flow / max. flow)

The CONTROL input can be used for parameter set selection or for flow measurement (pulse principle), depending on its assignment in the "Configuration" menu.

When preset to flow measurement

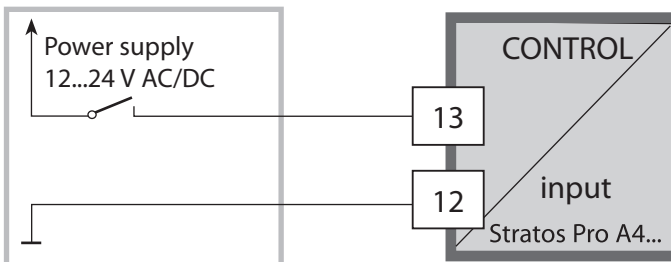
CONF/CNTR_IN/CONTROL = FLOW

an alarm can be generated when the measured flow exceeds a specified range:

CONF/ALA/FLOW CNTR = ON

CONF/ALA/FLOW min (specify value, default: 5 liters/h)

CONF/ALA/FLOW max (specify value, default: 25 liters/h)



Configuration

The configuration steps are assigned to different menu groups. With the left/right arrow keys you can jump between the individual menu groups.

Each menu group contains menu items for setting the parameters. Pressing **enter** opens a menu item. Use the arrow keys to edit a value. Press **enter** to confirm/save the settings. Return to measurement: Hold **meas** key depressed (> 2 s).

Select menu group	Menu group	Code	Display	Select menu item
	Sensor selection	SNS:	Conf[▲] i SENSOR	enter enter enter enter
		Menu item 1	:	
		Menu item ...		
	Current output 1	OT1:	Conf[▲] i OUT 1	
	Current output 2	OT2:	Conf[▲] i OUT 2	
	Compensation	COR:	Conf[▲] i CORRECTION	
	Control input (parameter set or flow measurement)	IN:	0000[▲] OK COR: TEL: QU: 3	
	Alarm mode	ALA:	Conf[▲] i ALARM	
	Relay outputs	REL:	Conf[▲] i REL 1/REL 2	
	Cleaning	WSH:	Conf[▲] i WASH	
	Setting the clock	CLK:	Conf[▲] i CLOCK	
	Tag number	TAG:	Conf[▲] i TAG	

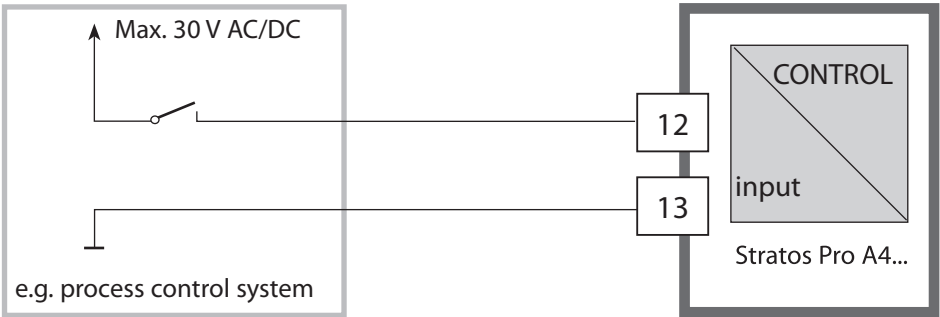
Parameter set A/B: configurable menu groups

The device provides 2 parameter sets "A" and "B". By switching between the parameter sets you can adapt the device to different measurement situations, for example. Parameter set "B" only permits setting of process-related parameters.

Menu group	Parameter set A	Parameter set B
SENSOR	Sensor selection	---
OUT1	Current output 1	Current output 1
OUT2	Current output 2	Current output 2
CORRECTION	Compensation	Compensation
CNTR_IN	Control input	---
ALARM	Alarm mode	Alarm mode
REL 1/REL 2	Relay outputs	Relay outputs
WASH	Cleaning	---
PARSET	Parameter set selection	---
CLOCK	Setting the clock	---
TAG	Tag number	---

External switchover of parameter sets A/B

You can switch between parameter sets A and B by applying a signal to the CONTROL input (parameter setting: CNTR-IN – PARSET).



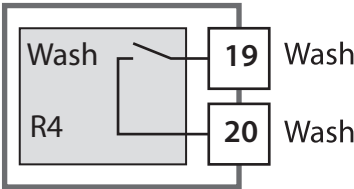
Parameter set A active	0...2 V AC/DC
Parameter set B active	10...30 V AC/DC

Configuration

Parameter Set A/B

Manual selection. Signaling via WASH contact.

Display	Action	Remark
	To switch between parameter sets: Press meas.	Manual selection of parameter sets must have been preset in CONFIG mode. Default setting is a fixed parameter set A. Wrong settings change the measurement properties!
	PARSET blinks in the lower line. Select parameter set using ◀ and ▶ keys	
	Select PARSET A / PARSET B	
	Press enter to confirm. Cancel by pressing meas.	



The active parameter set can be signaled using the WASH contact:

If configured correspondingly, the WASH contact signals:
"Parameter set A" (open contact)
"Parameter set B" (closed contact)

Configuration		Choices	Default
Sensor (SENSOR)			
SNS:	(Select text line)	MEMOSENS STANDARD*) TRACES*) (TAN)	MEMOSENS
	*) These sensors appear in the menu selection but can only be used with a measuring module installed. Stratos Pro A4... MSOXY is intended for connecting a Memosens sensor via RS-485 interface. It does not provide a measuring module. For information on retrofitting and the respective costs, please contact the manufacturer (see back of this manual).		
	MEAS MODE	dO % dO mg/l dO ppm GAS %	dO %
	TEMP UNIT	°C / °F	°C
	CAL MODE	CAL AIR CAL WTR	CAL AIR
	CAL TIMER	ON/OFF	OFF
	ON CAL-CYCLE	0...9999 h	0168 h

Configuration

Configuration		Choices	Default
Output 1 (OUT1, no trace measurement)			
OT1:	RANGE		0–20 mA 4–20 mA
	CHANNEL		OXY/TMP
	OXY dO %	BEGIN 4mA (0 mA)	000.0...600.0 %
		END 20 mA	0.000...600.0 %
	OXY dO mg/l	BEGIN 4mA (0 mA)	00.00...99.99 mg/l
		END 20 mA	00.00...99.99 mg/l
	OXY dO ppm	BEGIN 4mA (0 mA)	00.00...99.99 ppm
		END 20 mA	00.00...99.99 ppm
	OXY GAS %	BEGIN 4mA (0 mA)	00.00...99.99 %
		END 20 mA	00.00...99.99 %
	TMP °C	BEGIN 4mA (0 mA)	–20...150 °C
		END 20 mA	–20...150 °C
	TMP °F	BEGIN 4mA (0 mA)	–4...302 °F
		END 20 mA	–4...302 °F
	FILTERTIME		0...120 SEC
	22mA-FAIL		ON/OFF
	HOLD MODE		LAST/FIX
	FIX	HOLD-FIX	(0) 4...22 mA
			021.0 mA

Configuration		Choices	Default
Output 1 (OUT1)			
Trace measurement, sensor type 01, TAN required			
OT1:	RANGE		0–20 mA 4–20 mA
	CHANNEL		OXY/TMP
	OXY dO %	BEGIN 4mA (0 mA)	000.0...150.0 %
		END 20 mA	000.0...150.0 %
	OXY dO mg/l	BEGIN 4mA (0 mA)	0000 µg/l...20.00 mg/l
		END 20 mA	0000 µg/l...20.00 mg/l
	OXY dO ppm	BEGIN 4mA (0 mA)	0000 ppb...20.00 ppm
		END 20 mA	0000 ppb...20.00 ppm
	OXY GAS %	BEGIN 4mA (0 mA)	0000 ppm... 50.00 %
		END 20 mA	0000 ppm... 50.00 %
	TMP °C	BEGIN 4mA (0 mA)	–20...150 °C
		END 20 mA	–20...150 °C
	TMP °F	BEGIN 4mA (0 mA)	–4...302 °F
		END 20 mA	–4...302 °F
	FILTERTIME		0...120 SEC
	22mA-FAIL		ON/OFF
	HOLD MODE		LAST/FIX
	FIX	HOLD-FIX	(0) 4...22 mA
			021.0 mA

Configuration

Configuration		Choices	Default
Output 1 (OUT1)			
Trace measurement, sensor type 001, TAN required			
OT1:	RANGE		0–20 mA 4–20 mA
	CHANNEL		OXY/TMP
	OXY dO %	BEGIN 4mA (0 mA)	000.0...150.0 %
		END 20 mA	000.0...150.0 %
	OXY dO mg/l	BEGIN 4mA (0 mA)	000.0 µg/l... 20.00 mg/l
		END 20 mA	000.0 µg/l... 20.00 mg/l
	OXY dO ppm	BEGIN 4mA (0 mA)	000.0 ppb... 20.00 ppm
		END 20 mA	000.0 ppb... 20.00 ppm
	OXY GAS %	BEGIN 4mA (0 mA)	0000 ppb...50 %
		END 20 mA	0000 ppb...50 %
	TMP °C	BEGIN 4mA (0 mA)	–20...150 °C
		END 20 mA	–20...150 °C
	TMP °F	BEGIN 4mA (0 mA)	–4...302 °F
		END 20 mA	–4...302 °F
	FILTERTIME		0...120 SEC
	22mA-FAIL		ON/OFF
	HOLD MODE		LAST/FIX
	FIX	HOLD-FIX	(0) 4...22 mA
			021.0 mA

Configuration				Choices	Default
Output 2 (OUT2)					
OT2:	CHANNEL			OXY/TMP	TMP
	... other steps like output 1				
Temperature compensation (CORRECTION)					
COR:	SALINITY			00.00...45.00 ppt	00.00 ppt
	PRESSURE UNIT			BAR/KPA/PSI	BAR
	PRESSURE			MAN/EXT *)	
	MAN	BAR		0.000...9.999 BAR	1.013 BAR
		KPA		000.0...999.9 KPA	
		PSI		000.0...145.0 PSI	
	EXT	I-Input		OFF/4(0)...20 mA	4...20 mA
		BAR	BEGIN 4mA (0 mA)	0.000...9.999 BAR	0.000 BAR
			END 20 mA	0.000...9.999 BAR	9.999 BAR
		KPA	BEGIN 4mA (0 mA)	000.0...999.9 KPA	
			END 20 mA	000.0...999.9 KPA	
		PSI	BEGIN 4mA (0 mA)	000.0...145.0 PSI	
			END 20 mA	000.0...145.0 PSI	
		Control input (CNTR_IN)			
IN:	CONTROL			PARSET, FLOW	PARSET
	FLOW	FLOW ADJUST		12000 pulses/liter	0 ... 20000 pulses/liter
Alarm (ALARM)					
ALA:	DELAYTIME			0...600 SEC	0010 SEC
	SENSOCHECK			ON/OFF	OFF
	FLOW CNTR **)			ON/OFF	OFF
	ON	FLOW MIN **)		005.0 L/h	0 ... 99.9 L/h
		FLOW MAX**)		025.0 L/h	0 ... 99.9 L/h

*) only displayed if enabled

**) Hysteresis fixed at 5% of threshold value

Configuration

Configuration			Choices	Default
Relay 1/2 (REL1/REL2)				
REL:	(Selected in text line)		LIMITS CONTROLLER	LIMITS
	RL1:	CHANNEL	OXY/TMP/FLOW	OXY
		FUNCTION	Lo LEVEL Hi LEVEL	Lo LEVEL
		CONTACT	N/O, N/C	N/O
		LEVEL	Within meas. range	
		HYSTERESIS	0...50 % full scale	
		DELAYTIME	0...9999 SEC	0010 SEC
	RL2:	CHANNEL	OXY/TMP/FLOW	OXY
		FUNCTION	Lo LEVEL Hi LEVEL	Hi LEVEL
		CONTACT	N/O, N/C	N/O
		LEVEL	Within meas. range	
		HYSTERESIS	0...50 % full scale	
		DELAYTIME	0...9999 SEC	0010 SEC
	CTR:	CHANNEL	OXY/TMP	OXY
		TYPE	PLC/PFC	PLC
		PLC	PULSE LEN	0...0600 SEC
		PFC	PULSE FREQ	0...0180 P/Min
		SETPOINT	Within meas. range	
		DEAD BAND	0...50 % full scale	
		P-GAIN	10...9999%	0100%
		I-TIME	0...9999 SEC	0000 SEC
		D-TIME	0...9999 SEC	0000 SEC
		HOLD MODE	Y LAST/Y OFF	Y LAST

Configuration			Choices	Default
Wash contact (WASH)				
WSH:	(Select text line)		WASH PARSET A/B	WASH
	WASH	WASH CYCLE	0.0...999.9 h	000.0 h
		WASH TIME	0...9999 SEC	0060 SEC
		CONTACT	N/O, N/C	N/O
Parameter set (PARSET)				
PAR:	Select fixed parameter set (A) or switch between A/B via control input or manually in measuring mode		PARSET FIX A/ CNTR INPUT / MANUAL	PARSET FIX A (fixed parameter set A)
Real-time clock (CLOCK)				
CLK:	FORMAT		24 h / 12 h	
	24 h	TIME hh/mm	00..23:00...59	
	12 h	TIME hh/mm	00...11 AM/PM: 00...59	
	DAY/MONTH		01...31/01...12	
	YEAR		2000...2099	
Tag number (TAG)				
TAG:	(Input in text line)			—

Parameter Sets (Original for Copy)

Two complete parameter sets are stored in the EEPROM.
As delivered, the two sets are identical but can be edited.

Note:

Fill in your configuration data on the following pages or use them as original for copy.

Parameter	Parameter set A	Parameter set B
SNS: Measuring mode		--- *)
SNS: Sensor type		--- *)
SNS: Temperature unit		--- *)
SNS: Calibration mode		--- *)
SNS: Calibration timer		--- *)
SNS: Calibration cycle		--- *)
SNS: CIP counter		--- *)
SNS: CIP cycles		--- *)
SNS: SIP counter		--- *)
SNS: SIP cycles		--- *)
OT1: Current range		
OT1: Process variable		
OT1: Current start		
OT1: Current end		
OT1: Filter time		
OT1: 22 mA error current		
OT1: HOLD mode		
OT1: HOLD-FIX current		

*) These parameters cannot be adjusted in parameter set B,
the values are the same as in parameter set A.

(Original for Copy) Parameter Sets

Parameter	Parameter set A	Parameter set B
OT2: Current range		
OT2: Process variable		
OT2: Current start		
OT2: Current end		
OT2: Filter time		
OT2: 22 mA error current		
OT2: HOLD mode		
OT2: HOLD-FIX current		
COR: Salinity (ppt)		
COR: Pressure unit (BAR, KPA, PSI)		
COR: Pressure (MAN/EXT)		
COR: Ext. current input (Option)		
IN: Parameter set A/B or flow		
IN: (Flow meter) Adjusting pulses/liter		
ALA: Delay		
ALA: Sensocheck on/off		
ALA: Flow control FLOW CNTR on/off		
ALA: Minimum flow (hysteresis fixed at 5 %)		
ALA: Maximum flow (hysteresis fixed at 5 %)		

Parameter Sets (Original for Copy)

Parameter	Parameter set A	Parameter set B
REL: Usage		
RL1: Process variable		
RL1: Function		
RL1: Contact response		
RL1: Setpoint		
RL1: Hysteresis		
RL1: Delay		
RL2: Process variable		
RL2: Function		
RL2: Contact response		
RL2: Setpoint		
RL2: Hysteresis		
RL2: Delay		
CTR: Process variable		
CTR: Controller type		
CTR: Pulse length		
CTR: Pulse frequency		
CTR: Setpoint		
CTR: Neutral zone		
CTR: P gain		
CTR: I time		
CTR: D time		
CTR: HOLD mode		
WSH: Usage		--- *)
WSH: Wash cycle		--- *)
WSH: Wash duration		--- *)
WSH: Contact response		--- *)

(Original for Copy) Parameter Sets

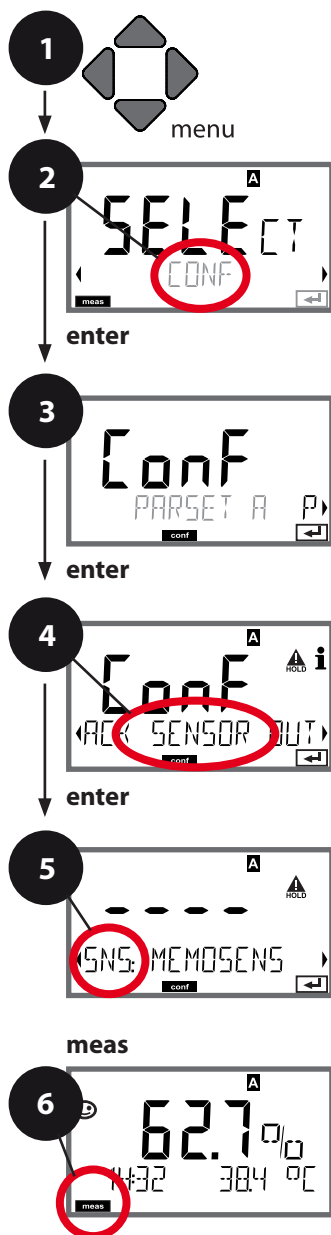
Parameter	Parameter set A	Parameter set B
PAR: Parameter set selection		--- *)
CLK: Time format		--- *)
CLK: Time hh/mm		--- *)
CLK: Day/month		--- *)
CLK: Year		--- *)
TAG: Tag number		--- *)

*) These parameters cannot be adjusted in parameter set B, the values are the same as in parameter set A.

Configuration

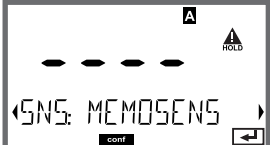
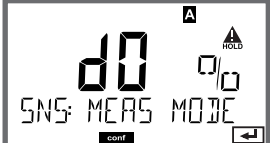
Sensor

Select: Sensor type, measuring mode, temperature unit



- 1) Press **menu** key.
- 2) Select **CONF** using ◀ ▶ keys, press **enter**.
- 3) Select parameter set using ◀ ▶, press **enter**.
- 4) Select **SENSOR** menu using ◀ ▶ keys, press **enter**.
- 5) All items of this menu group are indicated by the "SNS:" code.
Press **enter** to select menu,
edit using arrow keys (see next page).
Confirm (and proceed) by pressing **enter**.
- 6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

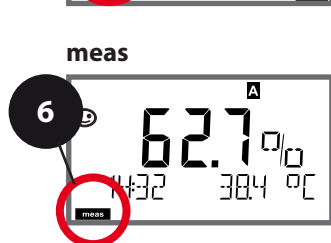
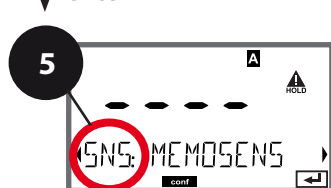
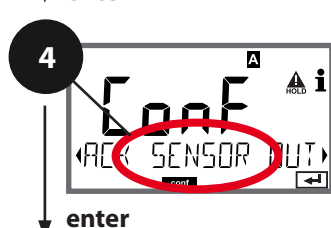
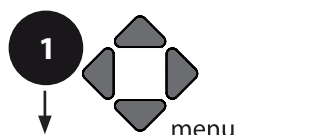
5	Select sensor type	enter
	Select measuring mode	enter
	Temperature unit	enter
	Calibration medium water/air	
	Calibration timer	

Menu item	Action	Choices
Select sensor type 	Select sensor type using ▲ ▼ keys. Press enter to confirm.	MEMOSENS STANDARD TRACES (with TAN)
Select measuring mode 	Select measuring mode using ▲ ▼ keys. DO: Measurement in liquids GAS: Measurement in gases Press enter to confirm.	dO %, dO mg/l dO ppm GAS %
Temperature unit 	Select temperature unit using ▲ ▼ keys. Press enter to confirm.	°C °F

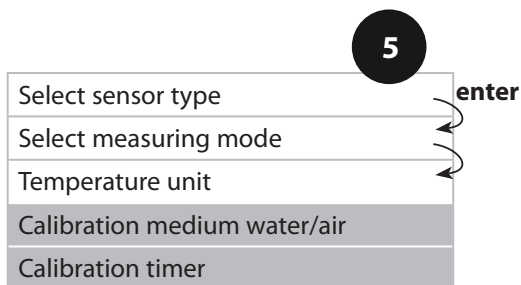
Configuration

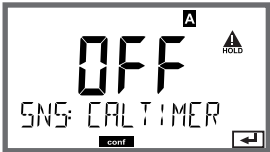
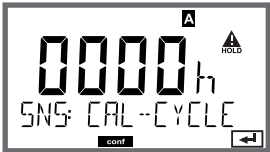
Sensor

Select: Air/water as cal medium, calibration timer



- 1) Press **menu** key.
- 2) Select **CONF** using ◀ ▶ keys, press **enter**.
- 3) Select parameter set using ◀ ▶, press **enter**.
- 4) Select **SENSOR** menu using ◀ ▶ keys, press **enter**.
- 5) All items of this menu group are indicated by the "SNS:" code.
Press **enter** to select menu,
edit using arrow keys (see next page).
Confirm (and proceed) by pressing **enter**.
- 6) Exit: Press **meas** key until the [meas] mode indicator is displayed.



Menu item	Action	Choices
Air/water as cal medium 	Select calibration medium using ▲ ▼ keys. AIR: Air as cal medium WTR: Air-saturated water as cal medium Press enter to confirm.	CAL_AIR CAL_WTR
Calibration timer 	Select/deselect calibration timer using ▲ ▼ keys. Press enter to confirm.	OFF ON
(ON: Calibration cycle) 	Enter calibration cycle in hours using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	0...9999 h 0168 h

Note for the calibration timer:

When Sensocheck has been activated in the Configuration – Alarm menu, the expiration of the calibration interval is indicated by Sensoface:

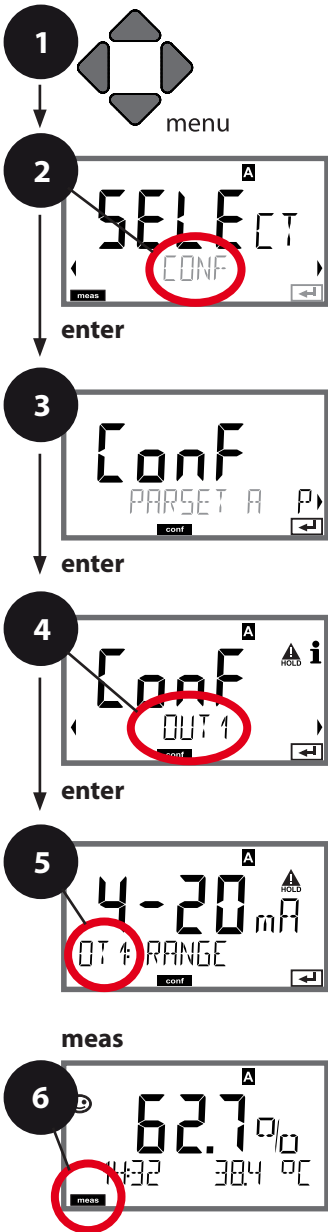
Display	Status
 + 	Over 80 % of the calibration interval has already past.
 + 	The calibration interval has been exceeded.

The calibration timer settings apply to both parameter sets A and B. The time remaining until the next due calibration can be seen in the diagnostics menu (see “Diagnostics”).

Configuration

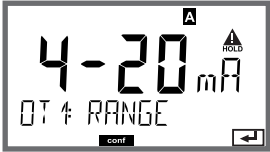
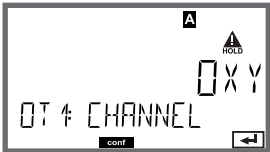
Current Output 1

Output current range. Current start. Current end.



- 1) Press **menu** key.
- 2) Select **CONF** using ◀ ▶ keys, press **enter**.
- 3) Select parameter set using ◀ ▶ keys, press **enter**.
- 4) Select **OUT1** menu using ◀ ▶ keys, press **enter**.
- 5) All items of this menu group are indicated by the "OT1:" code.
Press **enter** to select menu, edit using arrow keys (see next page). Confirm (and proceed) by pressing **enter**.
- 6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

5	enter
Current range	
Process variable	
Current start	
Current end	
Time averaging filter	
Output current during error message	
Output current during HOLD	
Output current for HOLD FIX	

Menu item	Action	Choices
Current range 	Select 4-20 mA or 0-20 mA range using $\blacktriangle$ $\blacktriangledown$ keys. Press enter to confirm.	4-20 mA / 0-20 mA
Process variable 	Select using $\blacktriangle$ $\blacktriangledown$ keys: OXY: Oxy value TMP: Temperature Press enter to confirm.	OXY /TMP
Current start, current end 	Modify digit using $\blacktriangle$ $\blacktriangledown$ keys, select next digit using $\blacktriangleleft$ $\blacktriangleright$ keys. Press enter to confirm.	000.0...0600% (OXY) 0.000...0150% (OXY, Traces option) -20...150 °C / -4...302 °F (TMP)

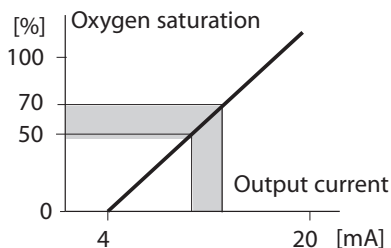
For **process variables comprising several decades**, decimal point and dimension can be shifted using the $\blacktriangleleft$ $\blacktriangleright$ cursor keys.

Then, the desired number is entered using (up / down) and $\blacktriangleleft$ $\blacktriangleright$.

For measurement in gases (GAS), this method is used to switch between ppm and % for volume concentration (10000 ppm = 1 %).

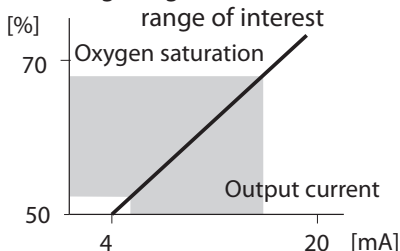
Assignment of measured values: Current start and current end

Example 1: Range 0...100%



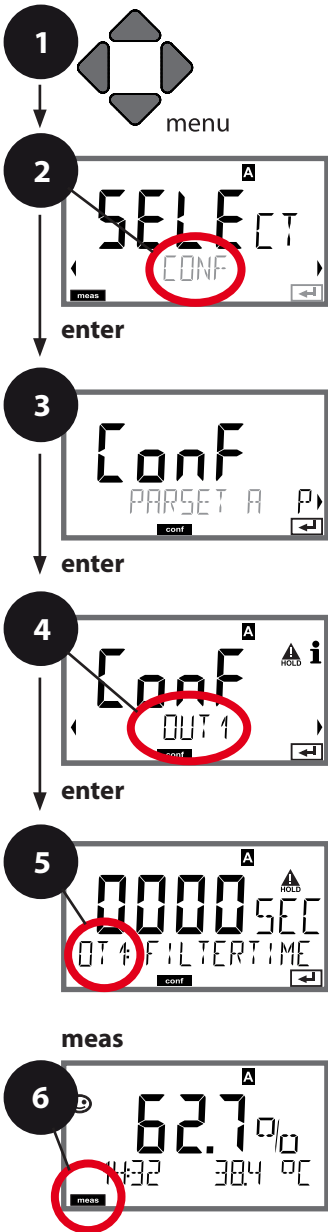
Example 2: Range 50...70%

Advantage: Higher resolution in



Configuration

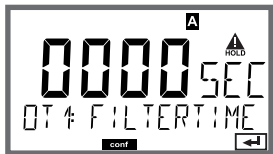
Current Output 1 Adjust time interval of output filter



- 1) Press **menu** key.
- 2) Select **CONF** using ◀ ▶ keys, press **enter**.
- 3) Select parameter set using ◀ ▶ keys, press **enter**.
- 4) Select **OUT1** menu using ◀ ▶ keys, press **enter**.
- 5) All items of this menu group are indicated by the "OT1:" code.
Press **enter** to select menu, edit using arrow keys (see next page). Confirm (and proceed) by pressing **enter**.
- 6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

Current range	enter
Process variable	enter
Current start	
Current end	
Time averaging filter	
Output current during error message	
Output current during HOLD	
Output current for HOLD FIX	

Menu item	Action	Choices
Time averaging filter	Enter value using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	0...120 SEC (0000 SEC)



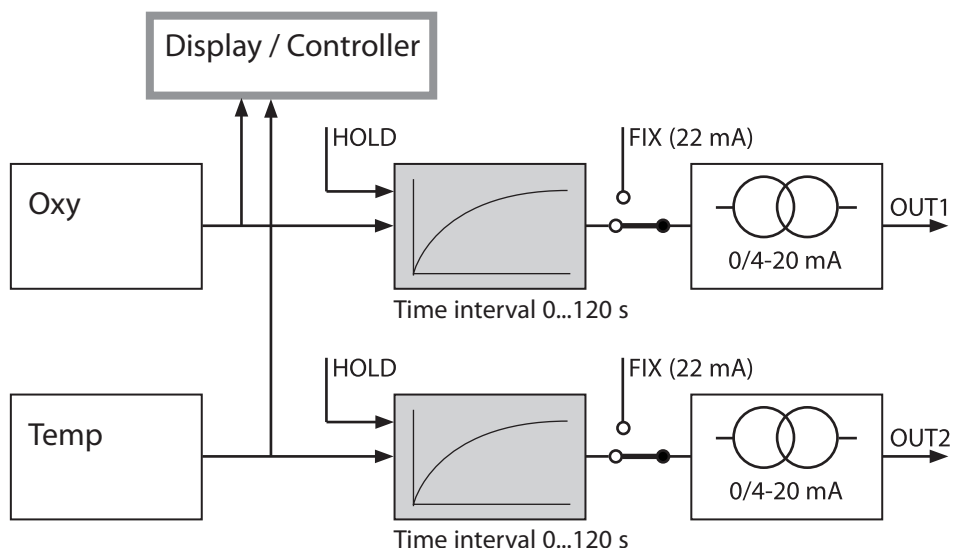
Time averaging filter

To smoothen the current output, a low-pass filter with adjustable filter time constant can be switched on. When there is a jump at the input (100 %), the output level is at 63 % after the time interval has been reached. The time interval can be set from 0 to 120 sec. If the time interval is set to 0 sec, the current output directly follows the input.

Please note:

The filter only acts on the current output, not on the display, the limit values, or the controller!

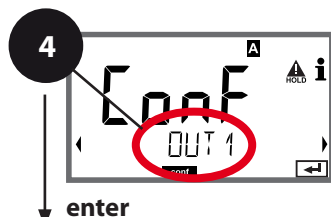
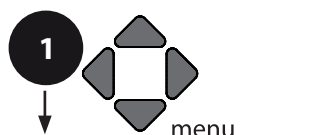
During HOLD the filter is not applied. This prevents a jump at the output.



Configuration

Current Output 1

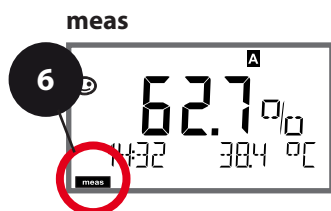
Output current during Error and HOLD



- 1) Press **menu** key.
- 2) Select **CONF** using ◀ ▶ keys, press **enter**.
- 3) Select parameter set using ◀ ▶ keys, press **enter**.
- 4) Select **OUT1** menu using ◀ ▶ keys, press **enter**.
- 5) All items of this menu group are indicated by the "OT1:" code.
Press **enter** to select menu, edit using arrow keys (see next page). Confirm (and proceed) by pressing **enter**.
- 6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

5

Current range	enter
Process variable	enter
Current start	
Current end	
Time averaging filter	
Output current during error message	
Output current during HOLD	
Output current for HOLD FIX	



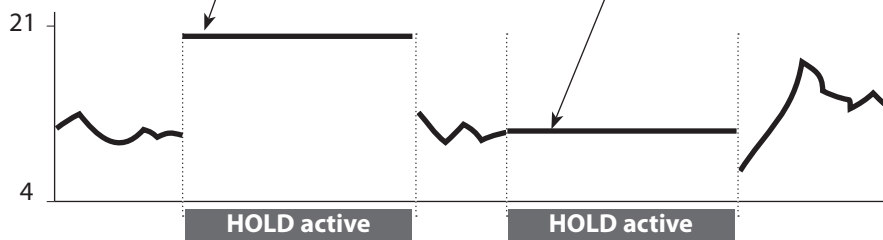
Menu item	Action	Choices
Output current during error message	Select ON (22 mA for error message) or OFF using $\blacktriangle$ $\blacktriangledown$ keys. Press enter to confirm.	ON/OFF
Output current during HOLD	LAST: During HOLD the last measured value is maintained at the output. FIX: During HOLD a value (to be entered) is maintained at the output. Select using $\blacktriangle$ $\blacktriangledown$ keys. Press enter to confirm.	LAST/FIX
Output current for HOLD FIX	Only with FIX selected: Enter current which is to flow at the output during HOLD Enter value using $\blacktriangle$ $\blacktriangledown$ $\blacktriangleleft$ $\blacktriangleright$ keys. Press enter to confirm.	00.00...22.00 mA 21.00 mA

Output signal during HOLD:

Output current
[mA]

Output signal for HOLD
FIX setting = 21.0 mA

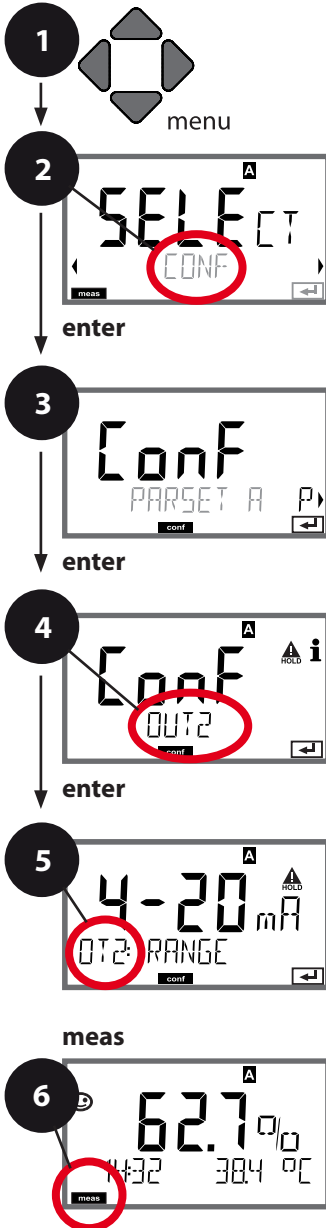
Output signal for HOLD
LAST setting



Configuration

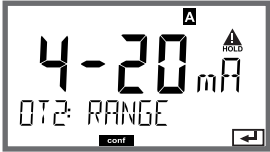
Current Output 2

Output current range. Current start. Current end.



- 1) Press **menu** key.
- 2) Select **CONF** using ◀ ▶ keys, press **enter**.
- 3) Select parameter set using ◀ ▶ keys, press **enter**.
- 4) Select **OUT2** menu using ◀ ▶ keys, press **enter**.
- 5) All items of this menu group are indicated by the "OT2:" code.
Press **enter** to select menu, edit using arrow keys (see next page). Confirm (and proceed) by pressing **enter**.
- 6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

5	Current range	enter
	Process variable	enter
	Current start	
	Current end	
	Time averaging filter	
	Output current during error message	
	Output current during HOLD	
	Output current for HOLD FIX	

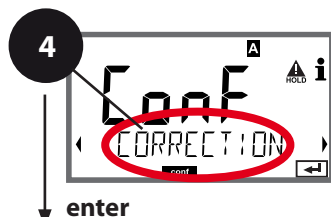
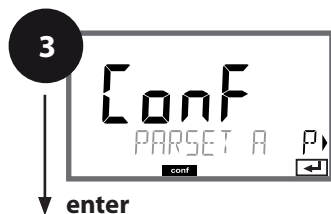
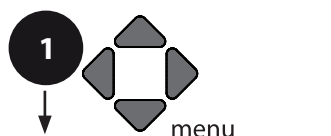
Menu item	Action	Choices
Current range 	Select 4-20 mA or 0-20 mA range using ▲ ▼ keys. Press enter to confirm.	4-20 mA / 0-20 mA
Process variable 	Select using ▲ ▼ keys: OXY: Oxy value TMP: Temperature Press enter to confirm.	OXY/TMP
• • •		

All the following adjustments are made as for current output 1 (see there)!

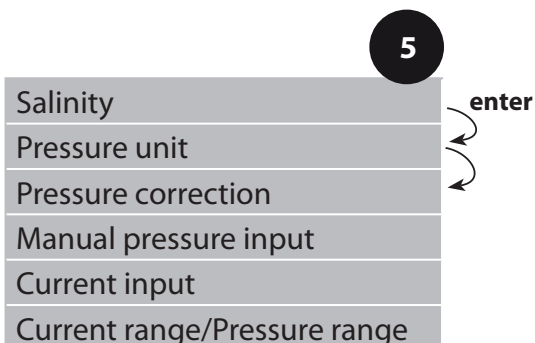
Configuration

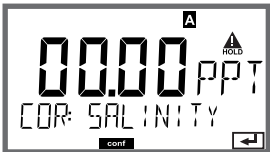
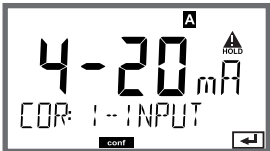
Correction

Salinity correction. Pressure correction. Current input



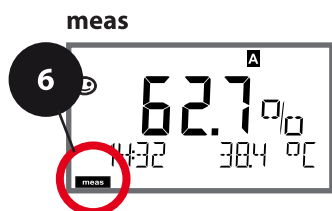
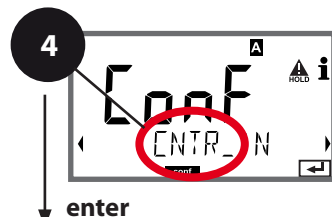
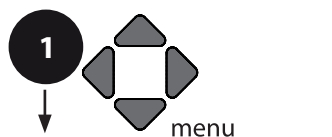
- 1) Press **menu** key.
- 2) Select **CONF** using ◀ ▶ keys, press **enter**.
- 3) Select parameter set using ◀ ▶ keys, press **enter**.
- 4) Select **CORRECTION** menu using ◀ ▶ keys, press **enter**.
- 5) All items of this menu group are indicated by the "COR:" code.
Press **enter** to select menu, edit using arrow keys (see next page). Confirm (and proceed) by pressing **enter**.
- 6) Exit: Press **meas** key until the [meas] mode indicator is displayed.



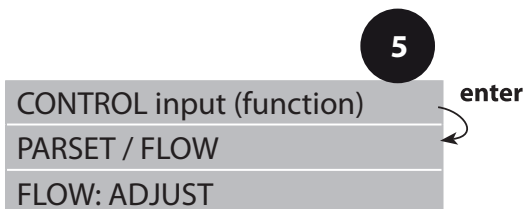
Menu item	Action	Choices
Enter salinity 	Enter salinity of the process medium. Enter value using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	00.00...45.00 ppt
Enter pressure unit 	Select desired pressure unit using ▲ ▼ keys. Press enter to confirm.	Bar /kPa/PSI
Enter pressure correction 	Select desired procedure for pressure correction using ▲ ▼ keys: MAN: Manual specification EXT: External pressure correction via current input Press enter to confirm.	MAN / EXT
(Manual pressure input) 	Enter value using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	Input range: 0.000...9.999 BAR / 000.0...999.9 KPa / 000.0...145.0 PSI 1.013 BAR
Current input/ Pressure range 	With external pressure input, select current input 0/4 ... 20 mA and the pressure parameters for current start and end using ▲ ▼ ◀ ▶ keys.	0(4)...20 mA 0.000...9.999 Bar / 000.0...999.9 kPa / 000.0...999.9 PSI

CONTROL Input

Parameter set selection via external signal or flow measurement



- 1) Press **menu** key.
- 2) Select **CONF** using ◀ ▶ keys, press **enter**.
- 3) Select parameter set using ◀ ▶ keys, press **enter**.
- 4) Select **CNTR_IN** menu using ◀ ▶ keys, press **enter**.
- 5) All items of this menu group are indicated by the "IN:" code.
Press **enter** to select menu, edit using arrow keys (see next page). Confirm (and proceed) using **enter**.
- 6) End: Press **meas** key until the [meas] mode indicator is displayed.



Menu item	Action	Choices
Select function of CONTROL input 	Select using ▲ ▼ keys. Press enter to confirm.	PARSET (selecting parameter set A/B via signal at CONTROL input)
		Flow (for connecting a pulse-output flow meter)
Adjust to flow meter: 	With "Flow" selected, you must adjust the device to the flow meter used. Enter value using arrow keys. Press enter to confirm.	12000 pulses/liter

In the alarm menu you can configure flow monitoring. When you have set CONTROL to FLOW, you can specify 2 additional limit values for maximum and minimum flow.

If the measured value lies outside this range, an alarm message and a 22-mA error signal (if configured) will be generated.

Display

Flow measurement in measuring mode



Display

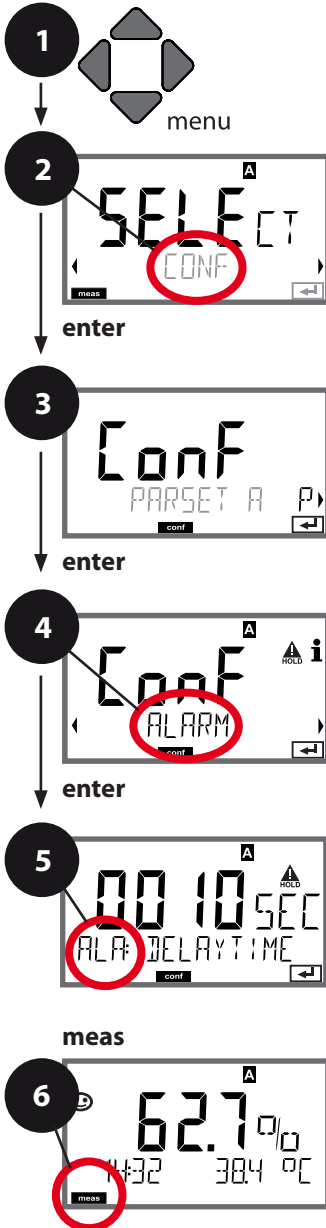
Flow measurement (sensor monitor)



Configuration

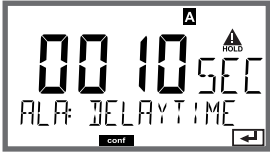
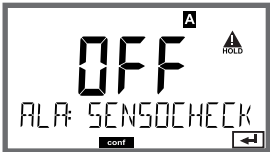
Alarm

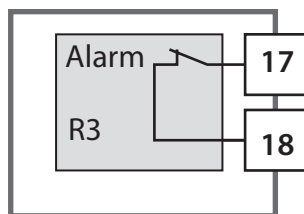
Alarm delay. Sensocheck.



- 1) Press **menu** key.
- 2) Select **CONF** using ◀ ▶ keys, press **enter**.
- 3) Select parameter set using ◀ ▶ keys, press **enter**.
- 4) Select **ALARM** menu using ◀ ▶ keys, press **enter**.
- 5) All items of this menu group are indicated by the "ALA:" code.
Press **enter** to select menu, edit using arrow keys (see next page). Confirm (and proceed) by pressing **enter**.
- 6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

Delay	5	enter
Sensocheck		
Alarm: CONTROL input		
For flow monitoring: Max. flow alarm		
For flow monitoring: Min. flow alarm		

Menu item	Action	Choices
Alarm delay 	Enter alarm delay using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	0...600 SEC (010 SEC)
Sensocheck 	Select Sensocheck (continuous monitoring of sensor membrane and lines). Select ON or OFF using ▲ ▼ keys. Confirm with enter . (At the same time, Sensoface is activated. With OFF, Sensoface is also switched off.)	ON/OFF



Alarm contact

The alarm contact is closed during normal operation (N/C). It opens in the case of alarm or power outage. As a result, a failure message is output even in the case of line breakage (fail-safe behavior). For contact ratings, see Specifications.

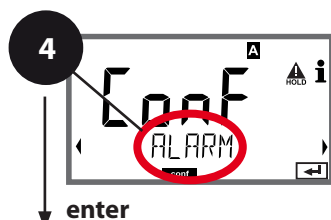
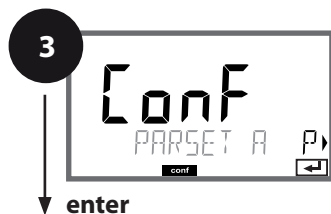
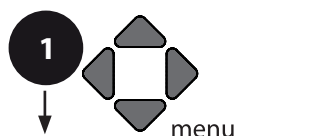
Error messages can also be signaled by a 22 mA output current (see Error messages and Configuration Output 1/Output 2).

Operating behavior of the alarm contact: see Operating States table.

The **alarm delay time** delays the color change of the display backlighting to red, the 22-mA signal (if configured) and the alarm contact switching.

Alarm Settings

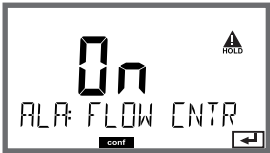
CONTROL input (FLOW MIN, FLOW MAX)



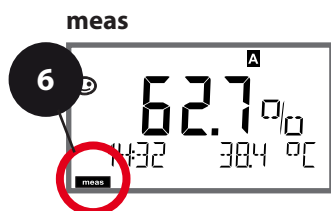
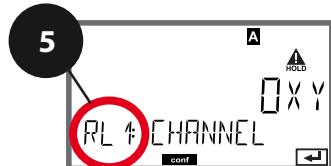
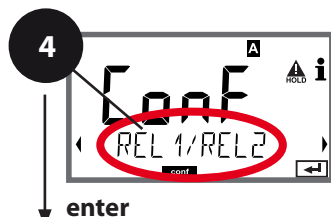
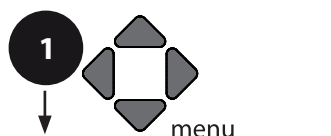
- 1) Press **menu** key.
- 2) Select **CONF** using ◀ ▶ keys, press **enter**.
- 3) Select parameter set using ◀ ▶ keys, press **enter**.
- 4) Select **ALARM** menu using ◀ ▶ keys, press **enter**.
- 5) All items of this menu group are indicated by the "ALA:" code.
Press **enter** to select menu, edit using arrow keys (see next page). Confirm (and proceed) using **enter**.
- 6) End: Press **meas** key until the [meas] mode indicator is displayed.

5

ALARM: Delay	enter
Alarm: Sensocheck	
Alarm: CONTROL input	
For flow monitoring: Max. flow alarm	
For flow monitoring: Min. flow alarm	

Menu item	Action	Choices
CONTROL input 	The CONTROL input can generate an alarm when assigned to FLOW (flow monitoring) in the CONF menu: FLOW CNTR Flow measurement: allows monitoring the minimum and maximum flow (pulse counter)	ON/OFF (FLOW MIN, FLOW MAX.)
Alarm Minimum flow FLOW MIN	Specify value	Default: 05.00 liters/h
Alarm Maximum flow FLOW MIN	Specify value	Default: 25.00 liters/h

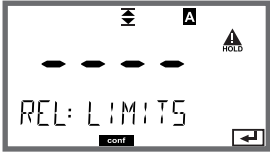
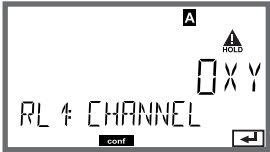
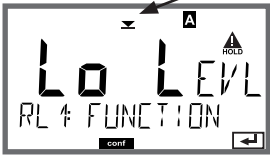
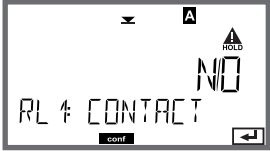
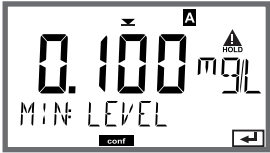
Limit Function Relay 1



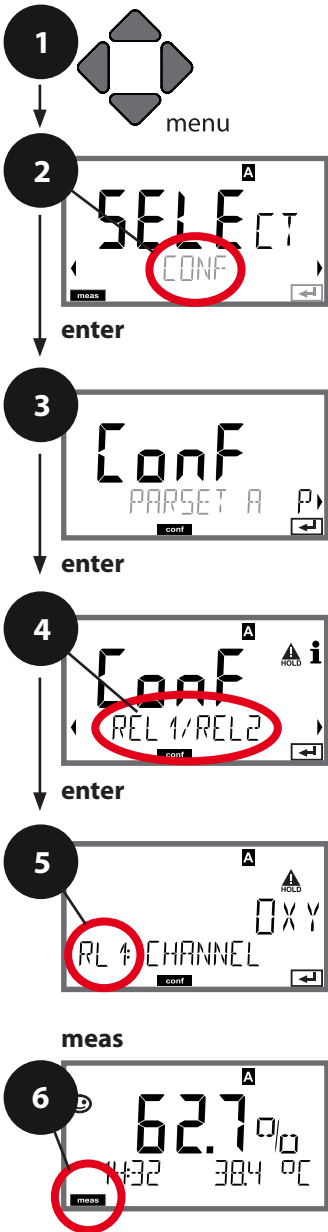
- 1) Press **menu** key.
- 2) Select **CONF** using ◀ ▶ keys, press **enter**.
- 3) Select parameter set using ◀ ▶ keys, press **enter**.
- 4) Select **REL1/REL2** menu using ◀ ▶ keys, press **enter**.
- 5) All items of this menu group are indicated by the "RL1:" code.
Press **enter** to select menu, edit using arrow keys (see next page). Confirm (and proceed) by pressing **enter**.
- 6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

5

Use of relays	enter
Select process variable	↺
Limit 1 function	↺
Limit 1 contact type	
Limit 1 setpoint	
Limit 1 hysteresis	
Limit 1 delay	

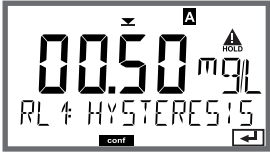
Menu item	Action	Choices
Use of relays 	Select in the text line using ▲ ▼ keys: • Limit function (LIMITS) • Controller (CONTROLLER) Press enter to confirm.	LIMITS / CONTROLLER Note: Selecting CONTROLLER leads to Controller menu group CTR.
Select process variable 	Select desired process variable using ▲ ▼ keys. Press enter to confirm.	OXY /TMP/FLOW
Limit 1 function 	Select desired function using ▲ ▼ keys. Lo Level: active if value falls below setpoint / Hi Level: active if value exceeds setpoint Press enter to confirm.	Lo LEVEL / Hi LEVEL Limit1 icon: ▼
Limit 1 contact response 	N/O: normally open contact N/C: normally closed contact Select using ▲ ▼ keys. Press enter to confirm.	N/O / N/C
Limit 1 setpoint 	Enter setpoint using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	Within meas. range

Limit Function Relay 1



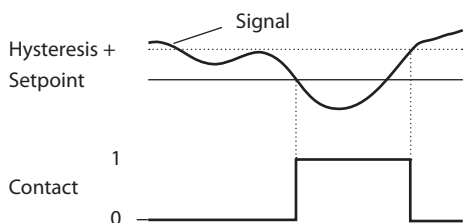
- 1) Press **menu** key.
- 2) Select **CONF** using ◀ ▶ keys, press **enter**.
- 3) Select parameter set using ◀ ▶ keys, press **enter**.
- 4) Select **REL1/REL2** menu using ◀ ▶ keys, press **enter**.
- 5) All items of this menu group are indicated by the "RL1:" code.
Press **enter** to select menu, edit using arrow keys (see next page). Confirm (and proceed) by pressing **enter**.
- 6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

5	Use of relays	enter
	Select process variable	↩
	Limit 1 function	↩
	Limit 1 contact type	
	Limit 1 setpoint	
	Limit 1 hysteresis	
	Limit 1 delay	

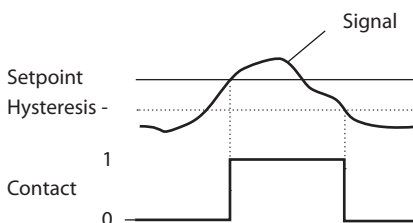
Menu item	Action	Choices
Limit 1 hysteresis 	Select hysteresis using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	0 ... 50 % full scale
Limit 1 delay 	The contact is activated with delay (deactivated without delay) Adjust delay using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	0...9999 SEC (0010 SEC)

Application of hysteresis:

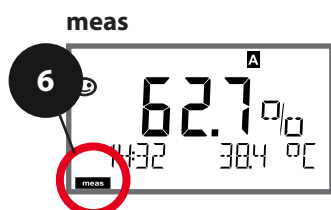
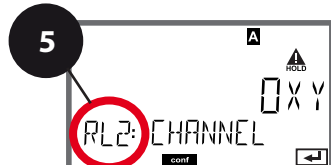
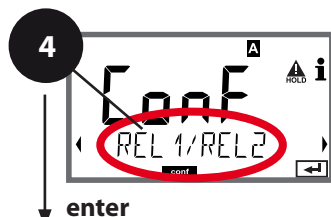
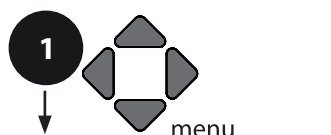
Limit Lo



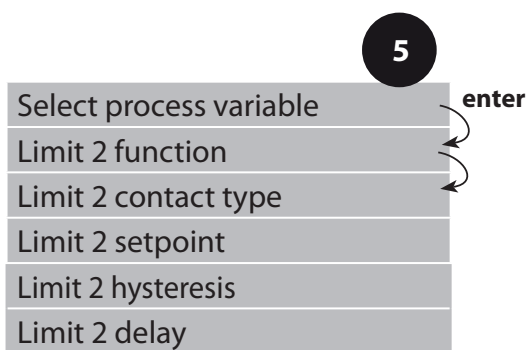
Limit Hi



Limit Function Relay 2



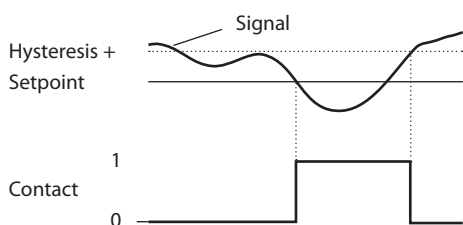
- 1) Press **menu** key.
- 2) Select **CONF** using ◀ ▶ keys, press **enter**.
- 3) Select parameter set using ◀ ▶ keys, press **enter**.
- 4) Select **REL1/REL2** menu using ◀ ▶ keys, press **enter**.
- 5) All items of this menu group are indicated by the "RL2:" code.
Press **enter** to select menu, edit using arrow keys (see next page). Confirm (and proceed) by pressing **enter**.
- 6) Exit: Press **meas** key until the [meas] mode indicator is displayed.



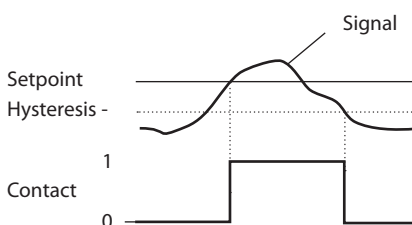
Menu item	Action	Choices
Select process variable (CHANNEL)	Select desired process variable using ▲ ▼ keys. Press enter to confirm.	OXY/TMP/FLOW
Limit 2 function (FUNCTION)	Select desired function using ▲ ▼ keys. Press enter to confirm.	Lo LEVEL / Hi LEVEL Limit2 icon: ▲
Limit 2 contact type (CONTACT)	N/O: normally open contact N/C: normally closed contact Select using ▲ ▼ keys. Press enter to confirm.	N/O / N/C
Limit 2 setpoint (LEVEL)	Enter setpoint using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	Within meas. range
Limit 2 hysteresis (HYSTERESIS)	Select hysteresis using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	0 ... 50 % full scale
Limit 1 delay (DELAYTIME)	The contact is activated with delay (deactivated without delay) Adjust delay using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	0...9999 SEC (0010 SEC)

Application of hysteresis:

Limit Lo



Limit Hi



Typical applications

P controller

Application for integrating control systems
(e.g. closed tank, batch processes).

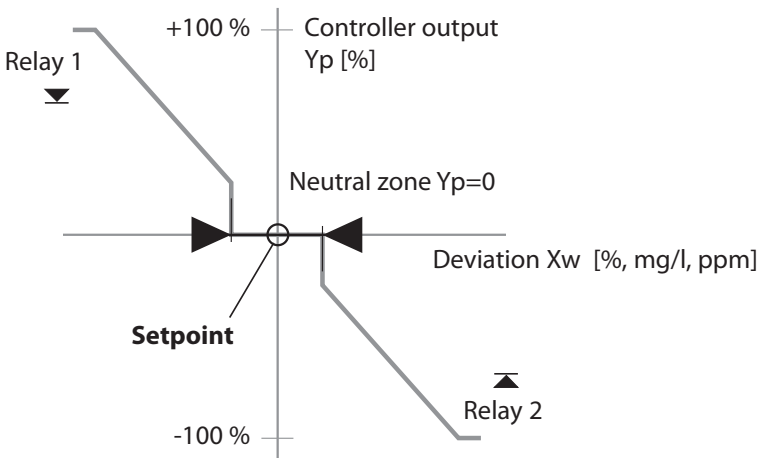
PI controller

Application for non-integrating control systems (e.g. drains).

PID controller

The additional derivative action compensates for measurement peaks.

Controller characteristic



Controller Functions

Controller equations

Controller output Y =

Y_P

+

$\frac{1}{T_R} \int Y_P dt$

+

$T_D \frac{dY_P}{dt}$

P action

I action

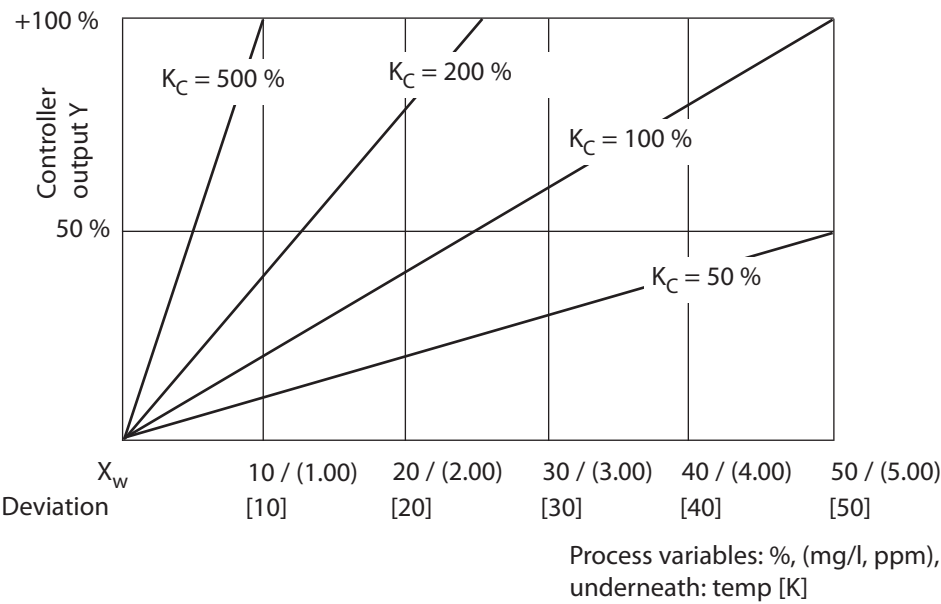
D action

with:	
Y_P	Proportional action
T_R	Reset time [s]
T_D	Rate time [s]
K_C	Controller gain [%]
Constant	50 % (for % O ₂ or % Air)
	5.00 mg/l (for mg/l)
	5.00 ppm (for ppm)

Neutral zone

Tolerated deviation from desired value.
With the setting "010%", for example, a deviation of ± 5% from the desired value does not activate the controller.

Proportional action (Gradient K_C [%])

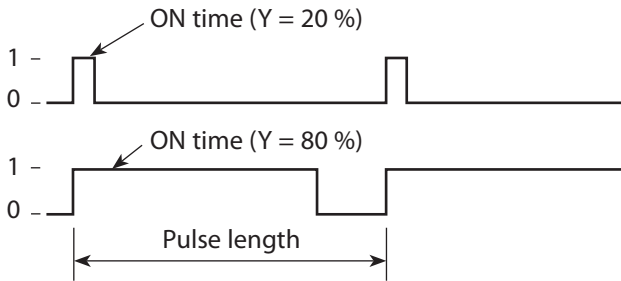


Pulse Length / Pulse Frequency Controller

Pulse length controller (PLC)

The pulse length controller is used to operate a valve as an actuator. It switches the contact on for a time that depends on the controller output. The period (pulse length) is constant. A minimum ON time of 0.5 sec is maintained even if the controller output takes corresponding values ($Y=0$: Off).

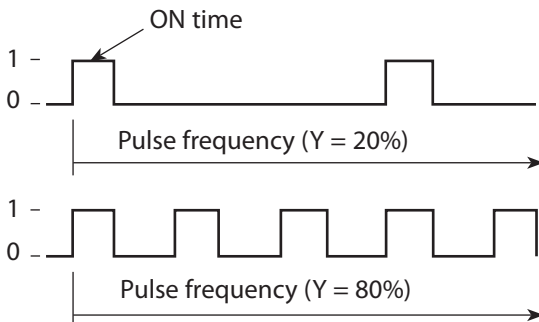
Output signal (relay contact) of pulse length controller



Pulse frequency controller (PFC)

The pulse frequency controller is used to operate a frequency-controlled actuator (metering pump). It varies the frequency with which the contacts are switched on. The maximum pulse frequency [pulses/min] can be defined. It depends on the actuator. The contact ON time is constant. It is automatically calculated from the user-defined maximum pulse frequency:

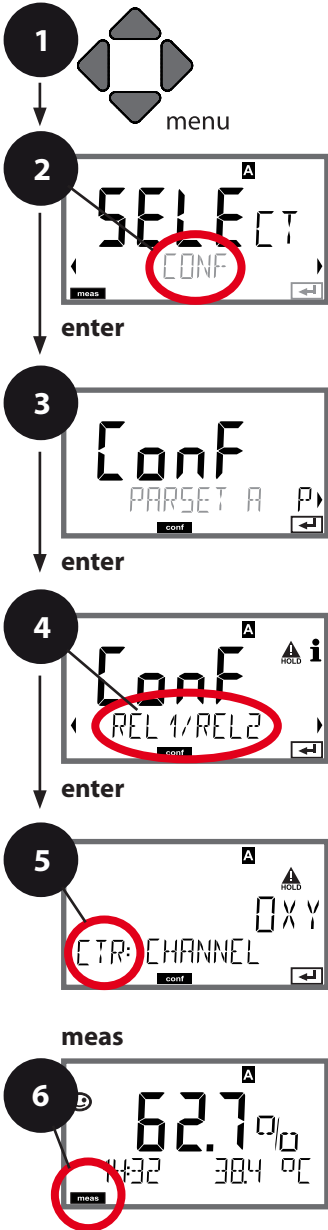
Output signal (relay contact) of pulse frequency controller



Controller

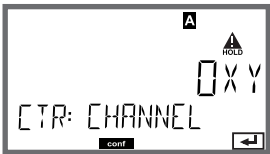
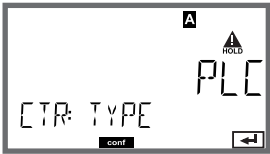
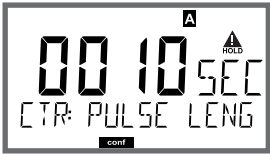
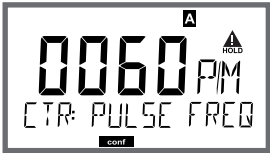
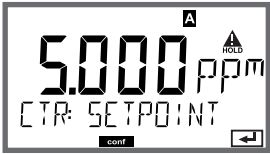
(For description, see Controller Functions)

Process variable. Controller type. Setpoint.



- 1) Press **menu** key.
- 2) Select **CONF** using ◀ ▶ keys, press **enter**.
- 3) Select parameter set using ◀ ▶ keys, press **enter**.
- 4) Select **REL1/REL2** menu using ◀ ▶ keys, press **enter**.
- 5) All items of this menu group are indicated by the "CTR:" code.
Press **enter** to select menu, edit using arrow keys (see next page). Confirm (and proceed) by pressing **enter**.
- 6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

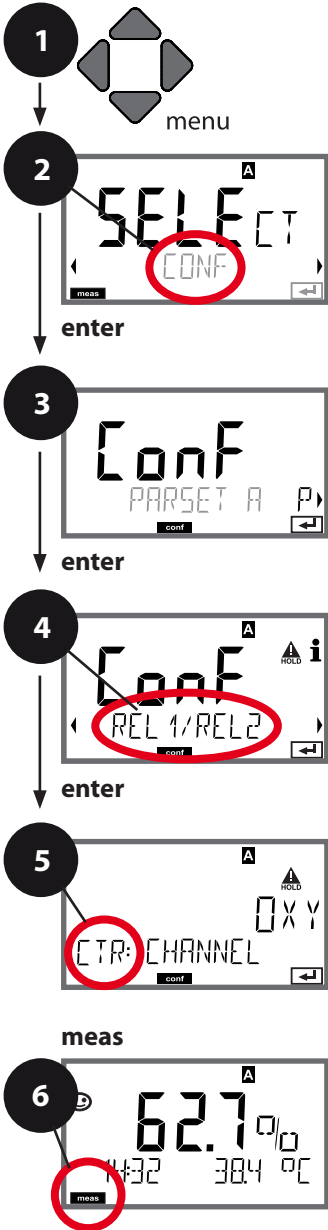
5	Use of relays	enter
	Select process variable	↩
	Controller type	↩
	Pulse length	
	Pulse frequency	
	Setpoint	
	Neutral zone	
	Controller: P action	
	Controller: I action	
	Controller: D action	
	Behavior during HOLD	

Menu item	Action	Choices
Use of relays	Select in the text line using ▲ ▼ keys: • CONTROLLER Press enter to confirm.	LIMITS / CONTROLLER Selecting CONTROLLER leads to Controller menu group CTR.
Select process variable 	Select desired process variable using ▲ ▼ keys. Press enter to confirm.	OXY /TMP
Controller type 	Pulse length controller (PLC) or pulse frequency controller (PFC) Select using ▲ ▼ keys. Press enter to confirm.	PLC /PFC
Pulse length 	Only with PLC: Pulse length Adjust using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	0...0600 SEC (0010 SEC)
Pulse frequency 	Only with PFC: Pulse frequency Adjust using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	0...0180 P/M (0060 P/M) (pulses per minute)
Setpoint 	Adjust setpoint using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	Within meas. range

Controller

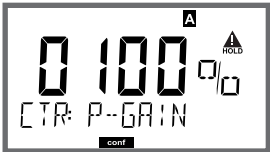
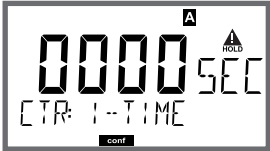
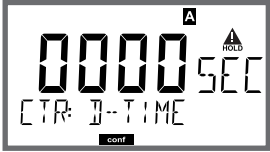
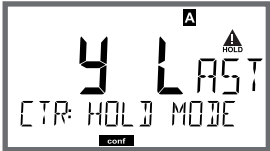
(For description, see Controller Functions)

Neutral zone. P, I, D actions. Behavior during HOLD



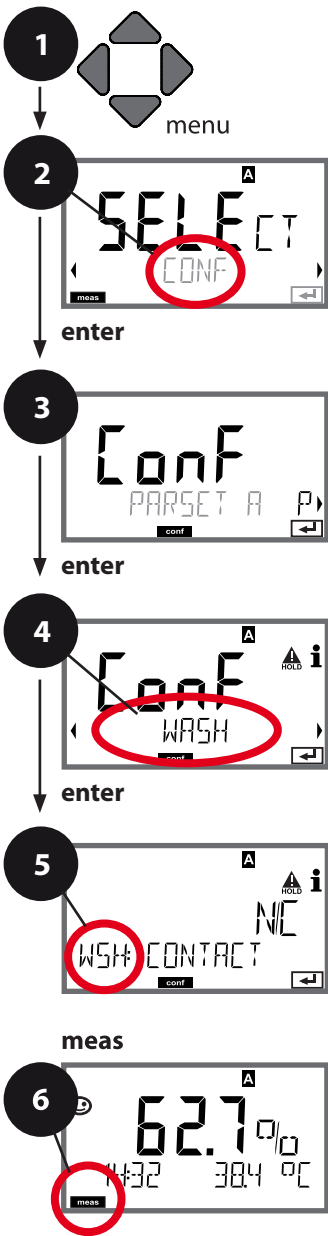
- 1) Press **menu** key.
- 2) Select **CONF** using ◀ ▶ keys, press **enter**.
- 3) Select parameter set using ◀ ▶ keys, press **enter**.
- 4) Select **REL1/REL2** menu using ◀ ▶ keys, press **enter**.
- 5) All items of this menu group are indicated by the "CTR:" code.
Press **enter** to select menu, edit using arrow keys (see next page). Confirm (and proceed) by pressing **enter**.
- 6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

	5
Use of relays	enter
Select process variable	
Controller type	
Pulse length	
Pulse frequency	
Setpoint	
Neutral zone	
Controller: P action	
Controller: I action	
Controller: D action	
Behavior during HOLD	

Menu item	Action	Choices
Neutral zone 	Adjust neutral zone using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	0 ... 50 % full scale
Controller: P action 	Adjust P action using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	10...9999% (0100%)
Controller: I action 	Adjust I action using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	0...9999 SEC (0000 SEC)
Controller: D action 	Adjust D action using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	0...9999 SEC (0000 SEC)
Behavior during HOLD 	Select response using ▲ ▼ keys. Press enter to confirm.	Y LAST / Y OFF

WASH Contact

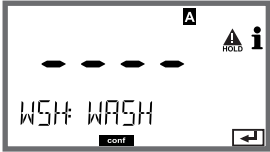
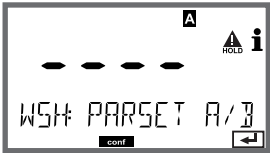
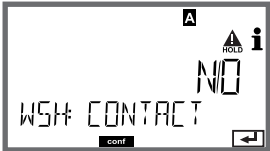
Control of rinsing probes or signaling the parameter set

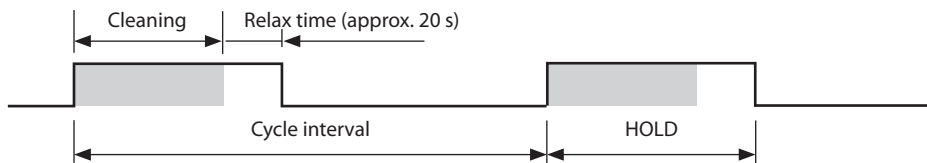


- 1) Press **menu** key.
- 2) Select **CONF** using ◀ ▶ keys, press **enter**.
- 3) Select parameter set A using ◀ ▶ keys, press **enter**.
- 4) Select **WASH** menu using ◀ ▶ keys, press **enter**.
- 5) All items of this menu group are indicated by the "WSH:" code.
Press **enter** to select menu, edit using arrow keys (see next page). Confirm (and proceed) using **enter**.
- 6) End: Press **meas** key until the [meas] mode indicator is displayed.

5

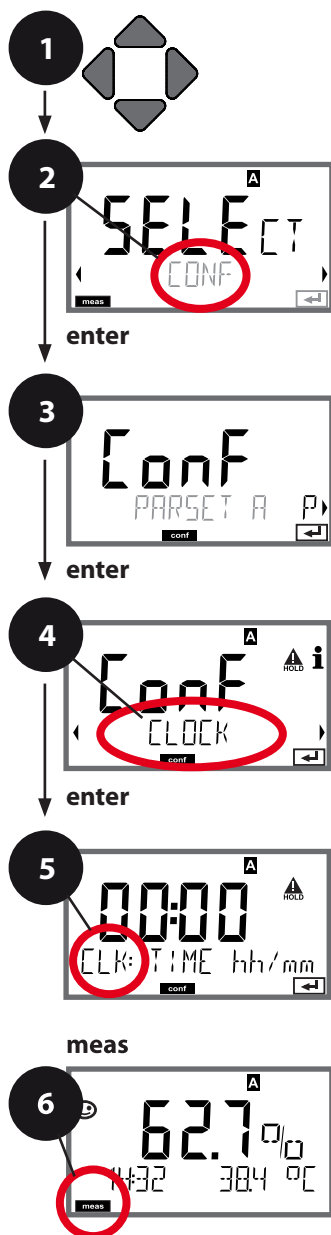
Function	enter
Cleaning interval	↩
Cleaning duration	↩
Contact type	

Menu item	Action	Choices
Function  	Select WASH contact function using ▲ ▼ keys. Press enter to confirm.	WASH / PARSET A/B WASH: Control of rinsing probes With PARSET A/B selected, the contact signals: "Parameter set A" (open contact) "Parameter set B" (closed contact)
Cleaning interval 	Only with WASH: Adjust value using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	0.0...999.9 h (000.0 h)
Cleaning duration 	Only with WASH: Adjust value using ▲ ▼ ◀ ▶ keys. Press enter to confirm.	0...9999 SEC (0060 SEC)
Contact type 	Only with WASH: N/O: normally open contact N/C: normally closed contact Select using ▲ ▼ keys. Press enter to confirm.	N/O / N/C



Configuration

Time and Date Tag Number



- 1) Press any arrow key.
- 2) Select **CONF** using ◀ ▶ keys, press **enter**.
- 3) Select parameter set A using ◀ ▶ keys, press **enter**.
- 4) Select **CLOCK** or **TAG** using ◀ ▶ keys, press **enter**.
- 5) All items of this menu group are indicated by the "CLK:" or "TAG" code. Press **enter** to select menu, edit using arrow keys (see next page). Confirm (and proceed) using **enter**.
- 6) End: Press **meas** key until the [meas] mode indicator is displayed.

5

Time format	enter
Time	
Day and month	
Year	
Tag number	

Time and Date

Control of the calibration and cleaning cycles is based on the time and date of the integrated real-time clock.

In measuring mode the time is shown in the lower display.

When using digital sensors, the calibration data is written in the sensor head.

In addition, the logbook entries (cf Diagnostics) are provided with a time stamp.

Please note:

- After prolonged power outage (> 5 days) the time display is replaced by dashes and cannot be used for processing.
Enter the correct time.
- There is no automatic switchover from winter to summer time!
Be sure to manually adjust the time!

Tag Number ("TAG")

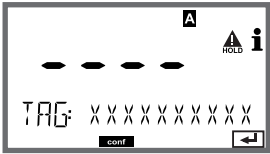
You can enter a designation for the point of measurement (tag number) in the lower display line. Up to 32 digits are possible.

Pressing **meas** (repeatedly) in the measuring mode indicates the tag number.

Being part of the device configuration, the "TAG" can be read out via IrDA.

A standardized tag number helps, for example, to correctly re-install a device after repair.

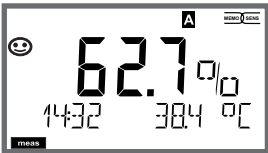
5

Menu item	Action	Choices
Tag number 	Select character using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press enter to confirm.	A...Z, 0...9, - + < > ? / @ The first 10 characters are seen in the display with- out scrolling.

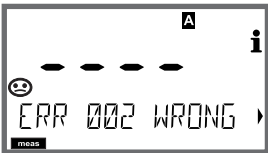
Digital Sensors

Operation

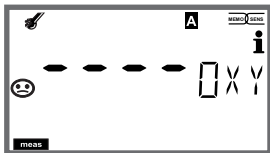
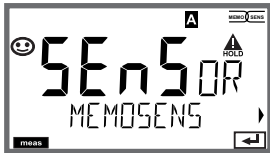
The device only switches to measuring mode when the Memosens sensor is connected and operational (Sensoface is happy):



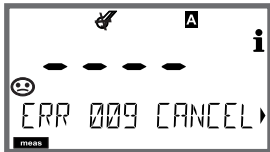
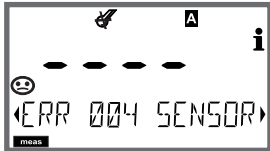
Otherwise, an error message is released. The **info** icon is displayed. You can display the error text in the bottom line using the ◀ ▶ keys. Sensoface is sad (see table of error messages and Sensoface in the Appendix):



Connecting a Digital Sensor

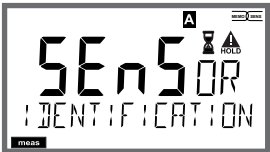
Step	Action/Display	Remark
Connect sensor		Before a Memosens sensor is connected, the error message "NO SENSOR" is displayed.
Wait until the sensor data are displayed.		The hourglass in the display blinks.
Check sensor data	 View sensor information using ◀ ▶ keys, confirm using enter .	Display color changes to green . Sensoface is friendly when the sensor data are okay.
Go to measuring mode	Press meas , info or enter	After 60 sec the device automatically returns to measuring mode (time-out).

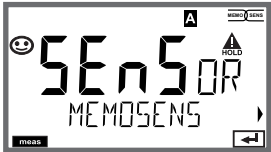
Possible error messages

ISM sensor devaluated. Replace sensor		When this error message appears, the sensor cannot be used any more. Sensoface is sad.
Sensor defective. Replace sensor		When this error message appears, the sensor cannot be used. Sensoface is sad.

Sensor Replacement

A sensor should only be replaced during HOLD mode to prevent unintended reactions of the outputs or contacts. When you first want to calibrate the new sensor, it can also be replaced in calibration mode.

Step	Action/Display	Remark
Select HOLD mode	Press menu key to call the selection menu, select HOLD using the ◀ ▶ keys, press enter to confirm.	Now the device is in HOLD mode. The HOLD mode can also be activated externally via the HOLD input. During HOLD the output current is frozen at its last value or set to a fixed value.
Disconnect and remove old sensor		
Install and connect new sensor.		Temporary messages which are activated during the replacement are indicated but not output to the alarm contact and not entered in the log-book.
Wait until the sensor data are displayed.		

Step	Action/Display	Remark
Check sensor data	 View sensor information using ◀ ▶ keys, confirm using enter.	You can view the sensor manufacturer and type, serial number and last calibration date.
Check measured values		
Exit HOLD	Hit meas key: Return to selection menu. Hold meas key depressed: Device switches to measuring mode	The sensor replacement is entered in the extended logbook.

Calibration

Calibration adapts the device to the individual sensor characteristics. It is always recommended to calibrate in air.

Compared to water, air is a calibration medium which is easy to handle, stable, and thus safe. In the most cases, however, the sensor must be removed for a calibration in air.

When dealing with biotechnological processes which require sterile conditions, the sensor cannot be removed for calibration. Here, calibration must be performed with aeration directly in the process medium (e.g. after sterilization).

In the field of biotechnology, for example, often saturation is measured and calibration is performed in the medium for reasons of sterility.

For other applications where concentration is measured (water control etc.), calibration in air has proved to be useful.

Please note:

- All calibration procedures must be performed by trained personnel. Incorrectly set parameters may go unnoticed, but change the measuring properties.
- If a 2-point calibration is prescribed, the zero calibration should be performed prior to slope calibration.

**Common combination:
process variable / calibration medium**

Process variable		Calibration	Default rel. humidity	Default cal pressure
Saturation (%)	SAT	Water	+100 %	Process pressure
Concentration (mg/l, ppm)	Conc	Air	50 %	1.013 bars

The calibration procedures for these two common applications are described on the following pages. Of course, other combinations of process variable and calibration medium are possible.

Selecting a Calibration Mode

Calibration is used to adapt the device to the individual sensor characteristics, namely zero and slope.

Access to calibration can be protected with a passcode (SERVICE menu).

First, you open the calibration menu and select the calibration mode:

CAL_WTR /	Calibration in air-saturated water / air
CAL_AIR	(as configured)
CAL_ZERO	Zero calibration
P_CAL	Product calibration (calibration with sampling)
CAL-RTD	Temperature probe adjustment

Zero Calibration

The Memosens sensors have very low zero currents. Therefore, a zero calibration is only recommended for measurement of oxygen traces.

When a zero calibration is performed, the sensor should remain for at least 10 to 30 minutes in the calibration medium in order to obtain stable, non-drifting values.

During zero calibration, a drift check is not performed. Zero current of a properly functioning sensor is notably less than 0.5 % of air current. The display (bottom: measured value, top: entered value) does not change until an input current is entered for the zero point.

When measuring in an oxygen-free medium, the displayed current can be taken directly.

Display	Action	Remark
	Select calibration, proceed by pressing enter	
	Ready for calibration. Hourglass blinks. Place sensor in oxygen-free medium	Display (3 sec) Now the device is in HOLD mode.
	Main display: Zero current. Press enter to save this value or correct using arrow keys and then save by pressing enter . Secondary display: Sensor current measured	
	Display of slope Display of new zero current. End calibration by pressing enter key, place sensor in process	Sensoface display
	The oxygen value is shown in the main display, "enter" blinks. Stop Hold by pressing enter .	New calibration: Select REPEAT, press enter key.
	Quit by pressing enter .	After end of calibration, the outputs remain in HOLD mode for a short time.

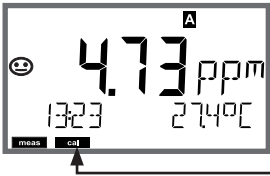
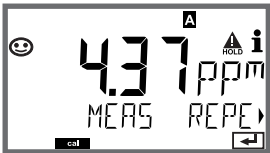
Product Calibration

Calibration with sampling

During product calibration the sensor remains in the process.
The measurement process is only interrupted briefly.

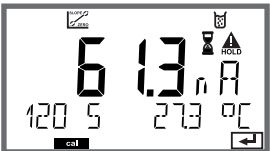
Procedure: During sampling the currently measured value is stored in the device. The device immediately returns to measuring mode. The cal mode indicator blinks and reminds you that calibration has not been terminated. The reference value is measured on the site, e.g. using a portable DO meter in a bypass. This value is then entered in the device. The new value for slope or zero is calculated from the stored value and the reference value. From the measured value, the device automatically recognizes whether a new slope or zero must be calculated (above approx. 5 % saturation: slope, below: zero). If the sample is invalid, you can take over the measured value saved during sampling instead of the reference value. In that case the old calibration values remain stored. Afterwards, you can start a new product calibration. The following describes a product calibration with slope correction – a product calibration with zero correction is performed correspondingly.

Display	Action	Remark
	Select calibration, then product calibration P_CAL. Press enter to proceed.	
	Ready for calibration. Hourglass blinks.	Display (3 sec) Now the device is in HOLD mode.
	Take sample and save value. Press enter to proceed.	Now the sample can be measured. If the value is already available, press info+enter to proceed to step 2.

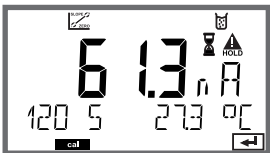
Display	Action	Remark
	The device returns to measuring mode.	From the blinking CAL mode indicator you see that product calibration has not been terminated.
	Product calibration step 2: When the sample value has been determined, open the product calibration once more	Display (3 sec) Now the device is in HOLD mode.
	The stored value is displayed (blinking) and can be overwritten with the lab value. Press enter to proceed.	
	Display of new slope and zero. Sensoface is active. Press enter to proceed.	Related to 25 °C and 1013 mbars
	Display of new oxy value. Sensoface is active. To end calibration: Select MEAS, then enter	Repeat calibration: Select REPEAT, then enter
	End of calibration	After end of calibration, the outputs remain in HOLD mode for a short time.

Slope Calibration (Medium: Water)

(air-saturated)

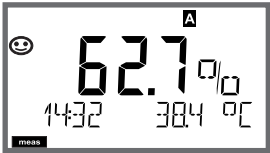
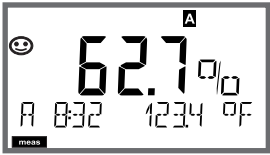
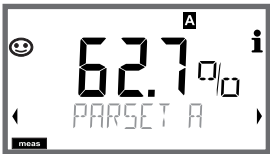
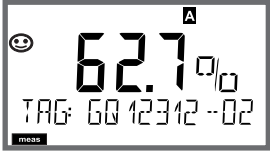
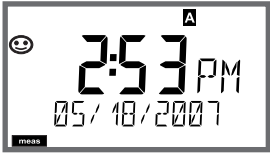
Display	Action	Remark
	Select calibration (SLOPE). Immerse sensor in cal medium, start by pressing enter	"Medium water" or "Medium air" is selected in the configuration.
	Enter cal pressure Press enter to proceed.	Default: 1.000 bar Unit bar/kpa/PSI
	Drift check: Display of: Sensor current (nA) Response time (s) Temperature (°C/°F)	Device goes to HOLD mode. The drift check might take some time.
	Display of calibration data (slope and zero) and Sensoface Press enter to proceed.	Related to 25 °C and 1013 mbars
	Display of selected process value. To end calibration: Select MEAS using ◀ ▶, then enter	To repeat calibration: Select REPEAT using ◀ ▶, then enter
	Place sensor in process. End of calibration	After end of calibration, the outputs remain in HOLD mode for a short time.

Slope Calibration (Medium: Air)

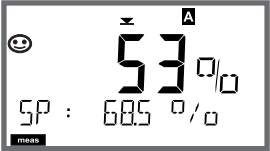
Display	Action	Remark
 The display shows 'CAL' in large letters, 'MEDIUM AIR' below it, and a small 'cal' indicator at the bottom left. A HOLD icon is at the top right.	Select calibration. Place sensor in air, press enter to start. Device goes to HOLD mode.	"Medium water" or "Medium air" is selected in the con- figuration.
 The display shows '050.0' in large digits, 'REL HUMIDITY' below it, and a small 'cal' indicator at the bottom left. A HOLD icon is at the top right.	Enter relative humidity using arrow keys Press enter to proceed.	Default for relative humidity in air: rH = 50%
 The display shows '1.000' in large digits, 'BAR' to the right, and 'PRESSURE' below it. A small 'cal' indicator is at the bottom left. A HOLD icon is at the top right.	Enter cal pressure using arrow keys Press enter to proceed.	Default: 1.000 bar Unit bar/kpa/PSI
 The display shows '6.13' in large digits, 'nA' to the right. Below it are '120 S' and '27.3 °C'. A small 'cal' indicator is at the bottom left. A HOLD icon is at the top right.	Drift check: Display of: Sensor current (nA) Response time (s) Temperature (°C/°F) Press enter to proceed.	The drift check can take some minutes.
 The display shows '-59.3' in large digits, 'nA' to the right. Below it are 'ZERO' and '-003 nA'. A small 'cal' indicator is at the bottom left. A HOLD icon is at the top right.	Display of calibration data (slope and zero). Press enter to proceed.	
 The display shows '20.93' in large digits. Below it are 'MEAS' and 'REPEAT'. A small 'cal' indicator is at the bottom left. A HOLD icon is at the top right.	Display of selected process variable (here: %vol). Now the device is in HOLD mode: Reinstall the sensor and check whether the message is OK. MEAS ends calibration, REPEAT permits repetition.	After end of calibra- tion, the outputs re- main in HOLD mode for a short time.

Temp Probe Adjustment

Display	Action	Remark
	Select temp adjustment. Press enter to proceed.	Wrong settings change the measurement properties!
	Measure the temperature of the process medium using an external thermometer.	Display (3 sec) Now the device is in HOLD mode.
	Enter the measured temperature value. Maximum difference: 10 K. Press enter to proceed.	Display of actual temperature (un- compensated) in the lower display.
	The corrected temperature value is displayed. Sensoface is active. To end calibration: Select MEAS, then enter To repeat calibration: Select REPEAT, then enter	After end of calibration, the outputs remain in HOLD mode for a short time.
	After calibration is ended, the device will switch to measuring mode.	

Display	Remark
 or AM/PM and °F: 	From the configuration or calibration menus, you can switch the device to measuring mode by pressing the meas key. (Waiting time for signal stabilization approx. 8 sec). In the measuring mode the main display shows the configured process variable (Oxy [%] or temperature), the secondary display shows the time and the second configured process variable (Oxy [%] or temperature). The [meas] mode indicator lights and the active parameter set (A/B) is indicated.
By pressing the meas key you can step through the following displays. When no key has been pressed for 60 sec, the device returns to the MAIN DISPLAY.	
	1) Selecting the parameter set (if set to "manual" in the configuration). Select the desired parameter set using the ◀ ▶ arrow keys (PARSET A or PARSET B blinks in the lower display line). Press enter to confirm.
	Further displays (each by pressing meas).
	2) Display of tag number ("TAG") 3) Display of time and date

Measurement

Display	Remark
With activated controller, you can also step through the following displays by pressing the meas key. When no key has been pressed for 60 sec, the device returns to the standard display.	
	Main display: Controller output Y Secondary display: Setpoint Depending on configuration setting: %, mg/l, ppm, or temperature.

Please note:

- After prolonged power outage (> 5 days) the time display is replaced by dashes and cannot be used for processing.
Enter the correct time.

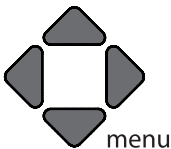
In the Diagnostics mode you can access the following menus without interrupting the measurement:

CALDATA	Viewing the calibration data
SENSOR	Viewing the sensor data
SELFTEST	Starting a device self-test
LOGBOOK	Viewing the logbook entries
MONITOR	Displaying currently measured values
VERSION	Displaying device type, software version, serial number

Access to diagnostics can be protected with a passcode (SERVICE menu).

Please note:

HOLD is not active during Diagnostics mode!

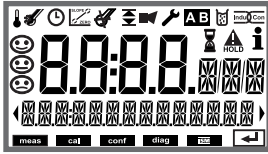
Action	Key	Remark
Activate Diagnostics		Press menu key to call the selection menu. (Display color changes to turquoise.) Select DIAG using ◀ ▶ keys, confirm by pressing enter .
Select diagnostics option		Use ◀ ▶ keys to select from: CALDATA SENSOR SELFTEST LOGBOOK MONITOR VERSION See next pages for further proceeding.
Exit	meas	Exit by pressing meas .

Diagnostics

Display	Menu item
	Displaying the calibration data Select CALDATA using ◀ ▶ , confirm by pressing enter. Use the ◀ ▶ keys to select the desired parameter from the bottom line of the display (LAST_CAL ZERO SLOPE NEXT_CAL). The selected parameter is shown in the main display. Press meas to return to measurement.
	
	
	
	
	Displaying the sensor data For analog sensors, the type is displayed, for digital sensors, the manufacturer, type, serial number, last calibration date and sensor wear. In each case Sensoface is active. Display data using ◀ ▶ keys, press enter or meas to return.

Display

Menu item



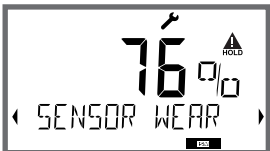
Device self-test

(To abort, you can press **meas.**)

- 1) **Display test:** Display of all segments with changing background colors (white/green/red). Press **enter** to proceed.
- 2) **RAM test:** Hourglass blinks, then display of --PASS-- or --FAIL--
Press **enter** to proceed.
- 3) **EEPROM test:** Hourglass blinks, then display of --PASS-- or --FAIL--
Press **enter** to proceed.
- 4) **FLASH test:** Hourglass blinks, then display of --PASS-- or --FAIL--
Press **enter** to proceed.
- 5) **Module test:** Hourglass blinks, then display of --PASS-- or --FAIL--
Press **enter** or **meas** to return to measuring mode.

Diagnostics

Display	Menu item
	Displaying the logbook entries Select LOGBOOK using ◀ ▶, press enter to confirm. Using the ▲ ▼ keys, you can scroll backwards and forwards through the logbook (entries -00-...-99-), -00- being the last entry.
	If the display is set to date/time, you can search for a particular date using the ▲ ▼ keys. Press ◀ ▶ to view the corresponding message text.
	If the display is set to the message text, you can search for a particular message using the ▲ ▼ keys. Press ◀ ▶ to display the date and time. Press meas to return to measurement.
	Extended logbook / Audit Trail (via TAN) Using the ▲ ▼ keys, you can scroll backwards and forwards through the extended logbook (entries -000-...-199-), -000- being the last entry. Display: CFR Audit Trail also records function activations (CAL CONFIG SERVICE), some Sensoface messages (cal timer, wear) and opening of the enclosure.

Display	Menu item
 Display example:  	Displaying the currently measured values (sensor monitor) Select MONITOR using ◀ ▶, press enter to confirm. Use the ◀ ▶ keys to select the desired parameter from the bottom line of the display: I-OXY, I-INPUT, OPERATION TIME, SENSOR WEAR. The selected parameter is shown in the main display. Press meas to return to measurement. Display of directly measured value (for validation, sensor can be immersed in a calibration solution, for example, or the device is checked by using a simulator) Display of sensor operating time
	Display of sensor wear (Memosens only) When Sensocheck is activated, Sensoface will remind you to check the sensor and replace electrolyte and membrane. Info text: "Sensor wear - change membrane and electrolyte". After having carried out the servicing, reset the sensor wear counter in the Service menu.
	Version Display of device type, software/hardware version and serial number for all device components. Use the ▲ ▼ keys to switch between software and hardware version. Press enter to proceed to next device component.

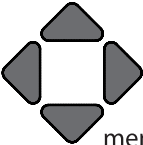
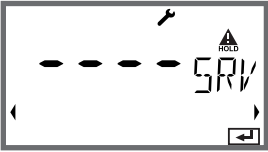
Service

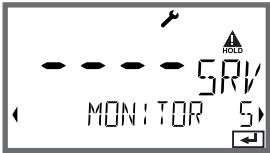
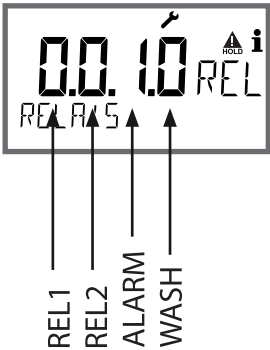
In the Service mode you can access the following menus:

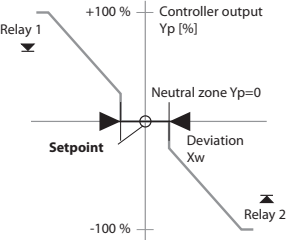
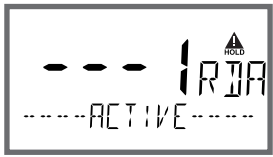
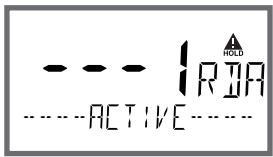
MONITOR	displaying currently measured values
SENSOR	displaying the sensor data, with MEMOSENS also resetting the sensor wear counter after replacement of electrolyte/membrane
OUT1	testing current output 1
OUT2	testing current output 2
RELAIS	testing the function of the 4 relays
CONTROL	testing the controller function
IRDA	activating and communicating via the IrDA interface
CODES	assigning and editing passcodes
DEFAULT	resetting the device to factory settings
OPTION	enabling options via TAN.

Note:

HOLD is active during Service mode!

Action	Key/Display	Remark
Activate Service	 menu	Press menu key to call the selection menu. Select SERVICE using ◀ ▶ keys, press enter to confirm.
Passcode		Enter passcode "5555" for service mode using the ▲ ▼ ◀ ▶ keys. Press enter to confirm.
View		In service mode the following icons are displayed: • HOLD triangle • Service (wrench)
Exit	meas	Exit by pressing meas .

Menu item	Remark
	Displaying currently measured values (sensor monitor) with HOLD mode activated: Select MONITOR using ◀ ▶, press enter to confirm. Select variable in the bottom text line using ◀ ▶. The selected parameter is shown in the main display. As the device is in HOLD mode, you can perform validations using simulators without influencing the signal outputs. Hold meas depressed for longer than 2 sec to return to Service menu. Press meas once more to return to measurement.
	Specifying the current at outputs 1 and 2: Select OUT1 or OUT2 using the ◀ ▶ keys, press enter to confirm. Enter a valid current value for the respective output using ▲ ▼ ◀ ▶ keys. Press enter to confirm. For checking purposes, the actual output current is shown in the bottom right corner of the display. Exit by pressing enter or meas.
	Relay test (manual test of contacts): Select RELAIS using ◀ ▶, press enter to confirm. Now the status of the 4 relays is "frozen". The 4 digits of the main display represent the respective states (from left to right: REL1, REL2, ALARM, WASH). The digit for the selected relay blinks. Select one of the 4 relays using the ◀ ▶ keys, close (1) or open (0) using the ▲ ▼ keys. Exit by pressing enter. The relays will be re-set corresponding to the measured value. Press meas to return to measurement.

Menu item	Remark				
 Controller characteristic  The arrows indicate which relay (valve) is active: ▲ Relay 2 active (meas. value > setpoint) ▼ Relay 1 active (meas. value < setpoint)	Controller test (manual specification of controller output): This function is used to start up control loops or check the actuators. For bumpless changeover to automatic operation (exiting this function), configure an I-action component (reset time). The lower display shows the currently adjusted controller output Yp. Specify new value for controller output Yp: Enter sign and value in the main display using the ▲ ▼ ◀ ▶ keys. Press enter to confirm. The new value is taken into the lower display. Return to Service menu: Press meas. Return to measurement: Hold meas depressed for longer than 2 sec. <table><tr><td>Controller output -100...0%</td><td>Relay 2 active</td></tr><tr><td>Controller output 0...+100%</td><td>Relay 1 active</td></tr></table>	Controller output -100...0%	Relay 2 active	Controller output 0...+100%	Relay 1 active
Controller output -100...0%	Relay 2 active				
Controller output 0...+100%	Relay 1 active				
	IrDA communication: Select IRDA using ◀ ▶ , press enter to confirm.				
 	When IrDA communication is active, the device remains in the HOLD mode for reasons of safety. Further operation is performed via IrDA. End communication by pressing meas. Exception: Firmware update (must not be interrupted!)				

Menu item	Remark
	Assigning passcodes: In the "SERVICE - CODES" menu you can assign passcodes to DIAG, HOLD, CAL, CONF and SERVICE modes (Service preset to 5555). When you have lost the Service passcode, you have to request an "Ambulance TAN" from the manufacturer specifying the serial number of your device. To enter the "Ambulance TAN", call the Service function and enter passcode 7321. After correct input of the ambulance TAN the device signals "PASS" for 4 sec and resets the Service passcode to 5555.
	Reset to factory settings: In the "SERVICE - DEFAULT" menu you can reset the device to factory settings. Caution! After a reset to factory setting the device must be reconfigured completely, including the sensor parameters!
	Option request: Communicate the serial number and hardware/software version of your device to the manufacturer. These data can be viewed in the Diagnostics/Version menu. The "transaction number" (TAN) you will then receive is only valid for the device with the corresponding serial number. Releasing an option: Options come with a "transaction number" (TAN). To release the option, enter this TAN and confirm by pressing enter.
	Sensor: Resetting the wear counter When you have replaced the electrolyte or the membrane of the OXY sensor, you should reset the wear counter. Default setting is "NO". Select "YES" and press enter to reset the wear counter.

Operating States

Operating status	OUT 1	OUT 2	REL1/2 (Limit)	REL1/2 (Control)	ALARM contact	WASH contact	Time out
Measuring							-
DIAG							60 s
CAL_ZERO Zero point							No
CAL_SLOPE Slope							No
P_CAL Product cal S1							No
P_CAL Product cal S2							No
CAL_RTD Temp adjustm.							No
CONF_A ParSet A							20 min
CONF_B ParSet B							20 min
SERVICE 5555 MONITOR							20 min
SERVICE OUT 1							20 min
SERVICE OUT 2							20 min
SERVICE RELAIS							20 min
SERVICE CONTROL							20 min
SERVICE IRDA							20 min
SERVICE CODES							20 min

Operating status	OUT 1	OUT 2	REL1/2 (Limit)	REL1/2 (Control)	ALARM contact	WASH contact	Time out
SERVICE DEFAULT							20 min
SERVICE OPTION							20 min
Cleaning fct							No
HOLD input							No

Explanation:  as configured (Last/Fix or Last/Off)

 active

 manual

Product Line and Accessories

Order Code Stratos Pro A 4...

						Channel 1	Channel 2	TAN
Example	A	4	0	1	N	- PH	/ 0	
4-wire / 20...254 V AC/DC	A	4						B,C,E
Communication								
Without (HART retrofittable via TAN)		0						A
Version number								
Version			1					
Approvals								
General Safety				N				
ATEX / IECEx / FM / CSA Zone 2 / CI 1 Div 2				B				
Meas. channel 1 / Meas. channel 2								
Memosens pH (ORP)			Digital			MSPH	0	
Memosens pH (ORP) / pH (ORP)			Digital			MSPH	MSPH	
Memosens pH (ORP) / Oxy			Digital			MSPH	MSOXY	
Memosens COND			Digital			MSCOND	0	
Memosens COND / COND			Digital			MSCOND	MSCOND	
Memosens Oxy			Digital			MSOxy	0	
Dual COND (2x2-electrode, analog)			Module			CC	0	
pH / ORP value (ISM digital: TAN)			Module			PH	0	F
Cond, 2-/4-electrode			Module			COND	0	
Conductivity, electrodeless			Module			CONDI	0	
Oxygen (ISM digital/Traces: TAN)			Module			OXY	0	D, F
TAN options								
HART						SW-A001		(A)
Logbook						SW-A002		(B)
Extended logbook (Audit Trail)						SW-A003		(C)
Trace oxygen measurement						SW-A004		(D)
Current input + 2 digital inputs						SW-A005		(E)
ISM digital						SW-A006		(F)
Mounting accessories								
Pipe-mount kit						ZU 0274		
Protective hood						ZU 0737		
Panel-mount kit						ZU 0738		

Oxy input	Input for Memosens sensors	
Operating modes	GAS	Measurement in gases
	DO	Measurement in liquids
	Temperature measurement	-20 ... +150.0 °C
Display ranges Standard	Saturation (-10 ... 80°C)	0.0 ... 600.0 %
	Concentration (-10 ... 80°C) (dissolved oxygen)	0.00 ... 99.99 mg/l
		0.00 ... 99.99 ppm
	Volume concentration in gas	0.00 ... 99.99 %vol
Display ranges Traces (option)	Saturation (-10 ... 80°C)	0.000 ... 150.0 %
	Concentration (-10 ... 80°C) (dissolved oxygen)	0000 ... 9999 µg/l / 10.00 ... 20.00 mg/l
		0000 ... 9999 ppb / 10.00 ... 20.00 ppm
	Volume concentration in gas	0000 ... 9999 ppm / 1.000 ... 50.00 %vol
Input correction	Pressure correction *	0.000 ... 9.999 bars / 999.9 kPa / 145.0 PSI manually or through current input 0(4) ... 20 mA
	Salinity correction	0.0 ... 45.0 g/kg
Sensor standardization *		
Operating modes *	AIR Automatic calibration in air	
	WTR Automatic calibration in air-saturated water	
	Product calibration	
	Zero calibration	
Calibration range Standard	Zero point	± 2 nA
	Slope	25 ... 130 nA (at 25°C, 1013 mbars)
Calibration range Traces	Zero point	± 2 nA
	Slope	200 ... 550 nA (at 25°C, 1013 mbars)
Calibration timer *	Interval 0000 ... 9,999 h	
Pressure correction *)	Manual 0.000 ... 9.999 bars / 999.9 kPa / 145.0 PSI	
Sensocheck/ Sensoface	Provides information on the sensor condition, evaluation of zero/slope, response time, calibration interval, wear, can be disabled	

Specifications

I input (TAN)	Current input 0/4 ... 20 mA / 50 Ω for external pressure compensation		
Start/end of scale	Configurable 0 ... 9.999 bars		
Characteristic	Linear		
Measurement error ^{1,3)}	< 1% current value + 0.1 mA		
HOLD input	Galvanically separated (OPTO coupler)		
Function	Switches device to HOLD mode		
Switching voltage	0 ... 2 V (AC/DC)	HOLD inactive	
	10 ... 30 V (AC/DC)	HOLD active	
CONTROL input	Galvanically separated (OPTO coupler)		
Function	Selecting parameter set A/B or flow measurement		
Parameter set A/B	Control input	0 ... 2 V (AC/DC) 10 ... 30 V (AC/DC)	Parameter set A Parameter set B
FLOW	Pulse input for flow measurement 0 ... 100 pulses/s		
Message	via 22 mA, alarm contact or limit contacts		
Display	00.0 ... 99.9 l/h		
Output 1	0/4 ... 20 mA, max. 10 V, floating (galv. connected to output 2)		
Process variable *	O ₂ saturation / O ₂ concentration / Temperature		
Characteristic	Linear		
Overrange *	22 mA in the case of error messages		
Output filter *	PT ₁ filter, time constant 0 ... 120 s		
Measurement error ¹⁾	< 0.25 % current value + 0.025 mA		
Start/end of scale *	Configurable within selected range		
Minimum span	Standard: 5 % / 0.5 mg/l (ppm) / 2 %vol		
	Traces: 0.2 % / 20 µg/l (ppb) / 100 ppm		
	Temperature: 20 K / 36 °F		

Output 2	0/4 ... 20 mA, max. 10 V, floating (galv. connected to output 1)	
Process variable *	O ₂ saturation / O ₂ concentration / Temperature	
Characteristic	Linear	
Overrange *	22 mA in the case of error messages	
Output filter *	PT ₁ filter, time constant 0 ... 120 s	
Measurement error ¹⁾	< 0.25 % current value + 0.025 mA	
Start/end of scale *	Configurable within selected range	
Minimum span	Standard: 5 % / 0.5 mg/l (ppm) / 2 %vol Traces: 0.2 % / 20 µg/l (ppb) / 100 ppm Temperature: 20 K / 36 °F	
Alarm contact	Relay contact, floating	
Contact ratings	AC	< 250 V / < 3 A / < 750 VA
	DC	< 30 V / < 3 A / < 90 W
Contact response	N/C (fail-safe type)	
Response delay	000.0 ... 0600 s	
Wash contact	Relay contact, floating For controlling a cleaning system	
Contact ratings	AC	< 250 V / < 3 A / < 750 VA
	DC	< 30 V / < 3 A / < 90 W
Contact response *	N/C or N/O	
Interval *	000.0 ... 999.9 h (000.0 h = cleaning function switched off)	
Cleaning duration *	0000 ... 1,999 s	
or		
Parameter set A/B	For signaling parameter set A/B	
Contact ratings	AC	< 250 V / < 3 A / < 750 VA
	DC	< 30 V / < 3 A / < 90 W
Contact response *	Contact open:	Parameter set A active
	Contact closed:	Parameter set B active

Specifications

Limit values Rel1/Rel2	Rel1/Rel2 contacts, floating, but inter-connected	
Contact ratings	AC	< 250 V / < 3 A / < 750 VA
	DC	< 30 V / < 3 A / < 90 W
Contact response *	N/C or N/O	
Response delay *	0000 ... 9999 s	
Setpoints *	As desired within range	
Hysteresis *	User-defined	
PID process controller	Output via Rel1/Rel2 relay contacts (see limit values)	
Setpoint specification*	Within selected range	
Neutral zone *	0 ... 50 % / 0 ... 5 mg/l / 0 ... 5 ppm / 0 ... 5 %vol / 0 ... 50 K	
Proportional action*	Controller gain	Kp: 0010 ... 9999 %
Integral action*	Reset time	Tr: 0000 ... 9999 s (0000 s = no integral action)
Derivative action*	Rate time	Td: 0000 ... 9999 s (0000 s = no derivative action)
Controller type *	Pulse length controller or pulse frequency controller	
Pulse period *	0001 ... 0600 s, min. ON time 0.5 s (pulse length controller)	
Max. pulse frequency *	0001 ... 0180 min ⁻¹ (pulse frequency controller)	
Real-time clock	Different time and date formats selectable	
Power reserve	> 5 days	
Display	LC display, 7-segment with icons	
Main display	Character height approx. 22 mm, unit symbols approx. 14 mm	
Secondary display	Character height approx. 10 mm	
Text line	14 characters, 14 segments	
Sensoface	3 status indicators (friendly, neutral, sad face)	
Mode Indicators	meas, cal, conf, diag	
	Further icons for configuration and messages	
Alarm indication	Display blinks, red backlighting	

Keypad	Keys: meas, menu, info, 4 cursor keys, enter
HART communication	HART version 6 Digital communication by FSK modulation of output current 1 Device identification, measured values, status and messages, parameter setting, calibration, records
Conditions	Output current ≥ 3.8 mA and load resistance $\geq 250 \Omega$
IrDA interface	Infrared interface for firmware update
FDA 21 CFR Part 11	Access control by editable passcodes Logbook entry and flag via HART in the case of configuration changes Message and logbook entry when enclosure is opened
Diagnostics functions	
Calibration data	Calibration date, zero, slope
Device self-test	Display test, automatic memory test (RAM, FLASH, EEPROM), module test
Logbook	100 events with date and time
Extended logbook (TAN)	Audit Trail: 200 events with date and time
Service functions	
Sensor monitor	Display of direct sensor signals
Current source	Current specifiable for output 1 and 2 (00.00 ... 22.00 mA)
Relay test	Manual control of the four switching contacts
Manual controller	Controller output entered directly (start of control process)
IrDA	Activating the IrDA function
Passcodes	Assigning passcodes for menu access
Factory setting	Resetting all parameters to factory setting
TAN	Enabling optionally available additional functions
Data retention	Parameters, calibration data, logbook > 10 years (EEPROM)

Specifications

EMC	EN 61326-1 (General Requirements)	
Emitted interference	Class B (residential area)	
Immunity to interference	Industry EN 61326-2-3	
Explosion protection	IECEX	Ex nA II T4 / Ex tD A22 IP5X T 85 °C
Stratos Pro A4...B OXY	ATEX	II 3 G Ex nA II T4 / II 3 D Ex tD A22 IP54 T85 °C
	FM	C/US NI/I/2/ABCD/T4 / S/II,III/2/FG/T4, Type 4X
		C I/2/Ex nA IIC T4 / 22/Ex tD T85 °C, Type 4X
		US I/2/AEx nA IIC T4 / 22/AEx tD T85 °C, Type 4X
	CSA	C/US Class I,II,III Div 2, GP A,B,C,D,E,F,G T4, Type 4X
		C Ex nA II T4 / DIP/II,III/2/EFG, Type 4X
		US AEx nA II T4 / II, III/22/AEx tD 22, T85 °C, Type 4X
	NEPSI	Ex nA II T4 / DIP A22 TA,T6
	GOST	2ExnAII T4 / DIP A22 TA 85 °C
Power supply	24 (–15%) ... 230 (+10%) V AC/DC ⁴⁾ ; < 12 VA, < 4 W AC: 45 ... 65 Hz Overvoltage category II, protection class II	
Nominal operating conditions		
Ambient temperature	–20 ... +55 °C	
Transport/Storage temperature	–30 ... +70 °C	
Relative humidity	10 ... 95% not condensing	
Power supply	24 (–15%) ... 230 (+10%) V AC/DC (DC ≤ 80V)	
Frequency for AC	45 ... 65 Hz	

Enclosure	Molded enclosure made of glass-reinforced PBT, PC
Mounting	Wall, pipe/post or panel mounting
Color	Gray, RAL 7001
Ingress protection	IP 67, NEMA 4X
Flammability	UL 94 V-0
Dimensions	148 mm x 148 mm
Control panel cutout	138 mm x 138 mm to DIN 43 700
Weight	Approx. 1200 g
Cable glands	3 knockouts for M20 x 1.5 cable glands 2 knockouts for NPT ½" or rigid metallic conduit
Connections	Terminals, conductor cross-section max. 2.5 mm ²

- *) User-defined

1) Acc. to EN 60746, at nominal operating conditions
- 2) ± 1 count

3) Plus sensor error
- 4) DC ≤ 80 V

Error Handling

Alarm condition:

- The display backlighting turns **red**
- The alarm icon  is displayed
- The complete measured-value display blinks
- **"ERR xxx"** is displayed in the lower menu line

Press the [**info**] key to view a short error text:

- The error text appears in the lower menu line
- The main display reads **"InFo"**.

Parameter errors:

Configuration data such as current range, limit values, etc are checked during the input.

If they are out of range,

- **"ERR xxx"** is displayed for 3 sec,
- the display backlighting flashes red,
- the respective maximum or minimum value is shown,
- input must be repeated.

If a faulty parameter arrives through the interface (IrDA, HART),

- an error message will be displayed: **"ERR 100...199"**
- the faulty parameter can be localized by pressing the [**info**] key

Calibration errors:

If errors occur during calibration,

- an error message will be displayed

Sensoface:

If the Sensoface becomes sad,

- the display backlighting will turn purple
- the cause can be seen by pressing the **info** key
- the calibration data can be seen in the Diagnostics menu

Error Messages

Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
ERR 99	DEVICE FAILURE	Error in factory settings EEPROM or RAM defective This error message only occurs in the case of a total defect. The device must be repaired and recalibrated at the factory.
ERR 98	CONFIGURATION ERROR	Error in configuration or calibration data Memory error in device program Configuration or calibration data defective; completely reconfig- ure and recalibrate the device.
ERR 97	NO MODULE INSTALLED	No module Please have the module replaced in the factory.
ERR 96	WRONG MODULE	Wrong module Please have the module replaced in the factory.
ERR 95	SYSTEM ERROR	System error Restart required. If error still persists, send in the device for repair.
ERR 01	NO SENSOR	O₂ sensor * Sensor defective Sensor not connected Break in sensor cable
ERR 02	WRONG SENSOR	Wrong sensor *
ERR 03	CANCELED SENSOR	ISM sensor devaluated *

Error Messages

Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
ERR 04	SENSOR FAILURE	Failure in sensor *
ERR 05	CAL DATA	Error in cal data *
ERR 11	RANGE DO SATURATION	Display range violation SAT saturation CONC concentraton or GAS volume concentration
ERR 12	SENSOR CURRENT RANGE	Measuring range of sensor exceeded
ERR 13	TEMPERATURE RANGE	Temperature range violation
ERR 15	SENSOCHECK	Sensocheck
ERR 60	OUTPUT LOAD	Load error
ERR 61	OUTPUT 1 TOO LOW	Output current 1 < 0 (3.8) mA
ERR 62	OUTPUT 1 TOO HIGH	Output current 1 > 20.5 mA
ERR 63	OUTPUT 2 TOO LOW	Output current 2 < 0 (3.8) mA
ERR 64	OUTPUT 2 TOO HIGH	Output current 2 > 20.5 mA

* Memosens or ISM sensors

Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
ERR 72	FLOW TOO LOW	Flow too low
ERR 73	FLOW TOO HIGH	Flow too high
ERR 100	INVALID SPAN OUT1	Span Out1 configuration error Selected span too small
ERR 101	INVALID SPAN OUT2	Span Out2 configuration error Selected span too small
ERR 104	INVALID PARAMETER CONTROLLER	Controller configuration error (A4... only)
ERR 105	INVALID SPAN I-INPUT	I-Input configuration error

Sensoface

(Sensocheck must have been activated during configuration.)



The smiley in the display (Sensoface) alerts to sensor problems (defective sensor, sensor wear, defective cable, maintenance request). The permitted calibration ranges and the conditions for a friendly, neutral, or sad Sensoface are summarized in the following table. Additional icons refer to the error cause.

Sensocheck

Continuously monitors the sensor and its wiring.

Critical values make the Sensoface “sad” and the corresponding icon blinks:



The Sensocheck message is also output as error message Err 15. The alarm contact (A4... only) is active, the display backlighting turns red, output current 1 is set to 22 mA (when configured correspondingly). Sensocheck can be switched off during configuration (then Sensoface is also disabled).

Exception:

After a calibration a smiley is always displayed for confirmation.

Please note:

The worsening of a Sensoface criterion leads to the devaluation of the Sensoface indicator (Smiley becomes “sad”). An improvement of the Sensoface indicator can only take place after calibration or removal of the sensor defect.

Display	Problem	Status
	Zero and slope	 Zero and slope of the sensor are still okay. The sensor should be replaced soon.
		 Zero and/or slope of the sensor have reached values which no longer ensure proper calibration. Replace sensor.
	Calibration timer	 Over 80 % of the calibration interval has already past.
		 The calibration interval has been exceeded.
	Sensor defect	 Check the sensor and its connections (see also Err 15, Error Messages).
	Response time	 Sensor response time has increased. The sensor should be replaced soon. To achieve an improvement, clean the sensor and check the electrolyte and membrane.
		 Sensor response time has significantly increased (> 600 s, calibration aborted after 720 s) Check electrolyte and membrane, replace sensor if required.

Display	Problem	Status
	Sensor wear (for digital sensors only)	 Wear is over 80%. Check electrolyte and membrane.
		 Wear is at 100%. Check electrolyte and mem- brane, replace if required. Please note: Reset the wear counter in the SERVICE - SENSOR menu when you have replaced the membrane or electrolyte.

Conformity with FDA 21 CFR Part 11

In their directive “Title 21 Code of Federal Regulations, 21 CFR Part 11, Electronic Records; Electronic Signatures” the American health agency FDA (Food and Drug Administration) regulates the production and processing of electronic documents for pharmaceutical development and production. This results in requirements for measuring devices used for corresponding applications. The following features ensure that the measuring devices of this Series meet the demands of FDA 21 CFR Part 11:

Electronic Signature – Passcodes

Access to the device functions is regulated and limited by individually adjustable codes – “Passcodes” (see SERVICE). This prevents unauthorized modification of device settings or manipulation of the measurement results. Appropriate use of these passcodes makes them suitable as electronic signature.

Audit Trail

Every (manual) change of device settings can be automatically documented. Each change is tagged with a “Configuration Change Flag”, which can be interrogated and documented using HART communication. Altered device settings or parameters can also be retrieved and documented using HART communication.

Extended logbook

Audit Trail also records function activations (CAL, CONFIG, SERVICE), some Sensoface messages (cal timer, wear) and opening of the enclosure.

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Passcodes

In the SERVICE – CODES menu you can assign passcodes to protect the access to certain functions.

Operating mode	Passcode
Service (SERVICE)	5555
Diagnostics (DIAG)	
HOLD mode	
Calibration (CAL)	
Configuration (CONF)	

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