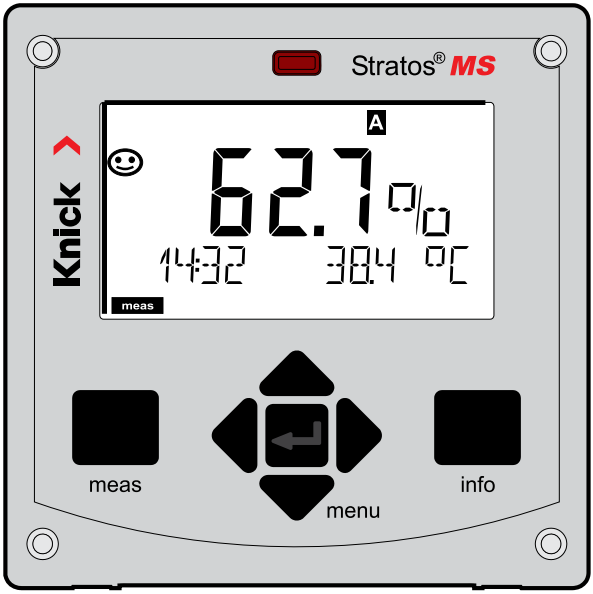
The Art of Measuring. Knick

User Manual
English

Stratos MS A405
O_2 Measurement



Latest Product Information: www.knick.de

Table of Contents

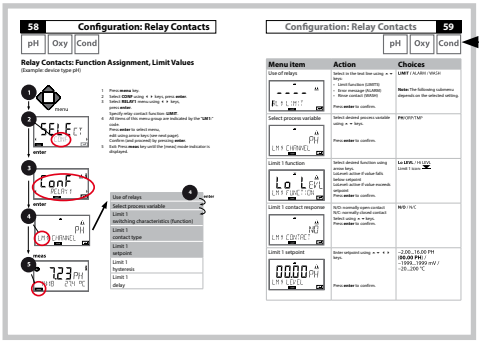
Subject to change without notice

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

6 Documents Supplied

Safety Instructions
In official EU languages and others

Quickstart Guides
Installation and first steps:
- Operation
- Menu structure
- Calibration
- Error messages and recommended actions

Specific Test Report

Electronic Documentation
Manuals + Software

Ex Devices:

Control Drawings

EU Declarations of Conformity

Up-to date documentation available on our website:

www.knick.de

Stratos MS is a 4-wire analyzer for use with Memosens sensors. The Model A405B allows applications in hazardous-area Zone 2. Current is provided through a universal power supply 80 ... 230 V AC, 45 ... 65 Hz / 24 ... 60 V DC.
The analyzer provides two 0 (4) .... 20 mA current outputs for transmission of measured value and temperature, for example.
Two floating relay contacts are available for free configuration.

You can select one of the following measuring functions:
- pH
- ORP
- Dissolved oxygen
- Conductivity measurement (conductive/inductive)

Enclosure and mounting possibilities
- The sturdy molded enclosure is rated IP 67/NEMA 4X outdoor.
  Material of front unit: PBT, rear unit: PC.
  Dimensions: H 148 mm, W 148 mm, D 117 mm.
  It is provided with knockouts to allow:
- panel mounting (138 mm x 138 mm cutout to DIN 43700)
- wall mounting (with sealing plugs to seal the enclosure)
- post/pipe mounting (dia. 40 … 60 mm, □ 30 … 45 mm)

Protective hood (accessory)
The protective hood provides additional protection against direct weather exposure and mechanical damage (available as accessory).

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

Memosens sensors and connecting cables
Please visit our website for more information on our product range: **www.knick.de.**

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

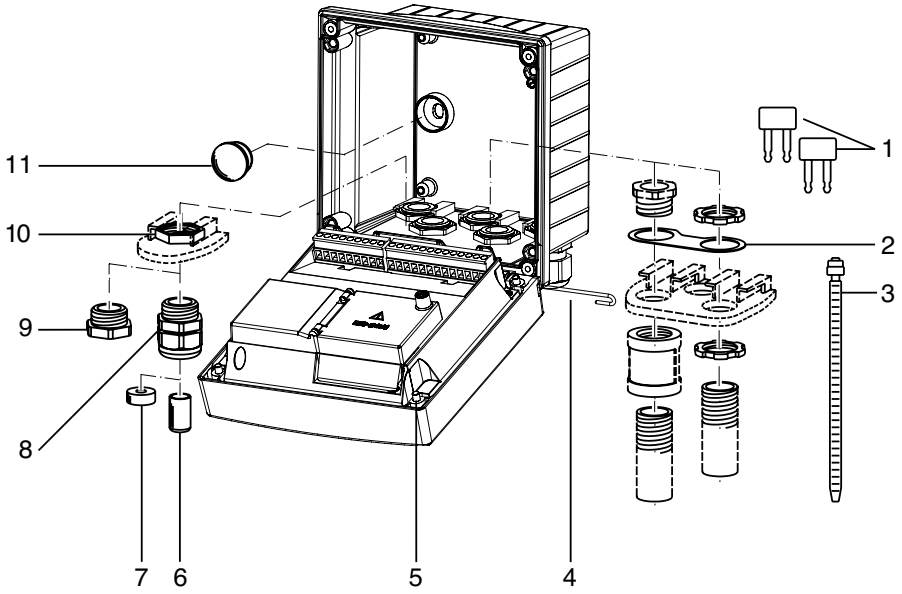
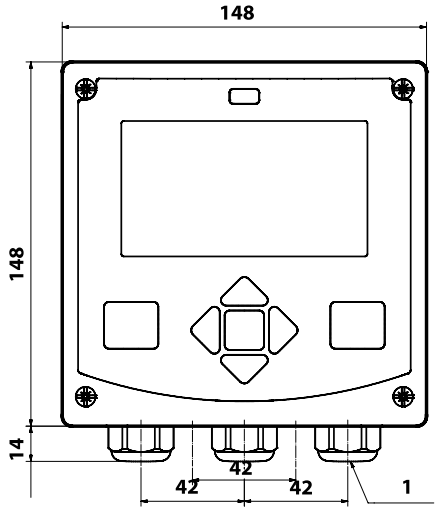
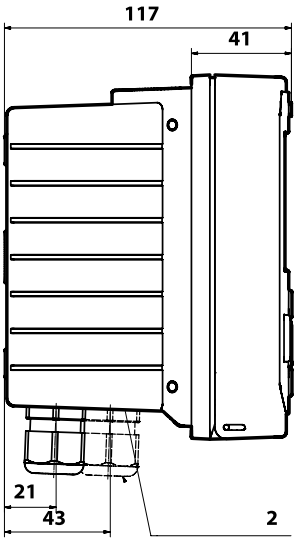


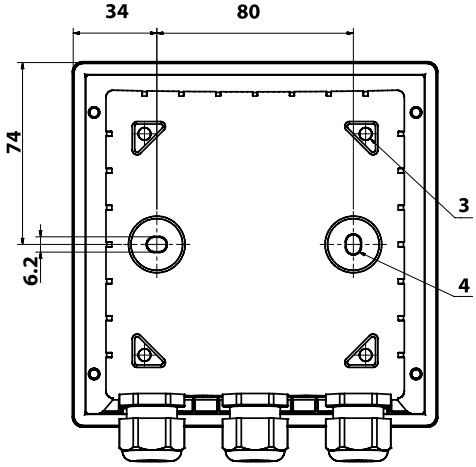
Fig.: Assembling the enclosure

1) Jumper (3 x)
2) Washer (1 x), for conduit mounting: Place washer between enclosure and nut
3) Cable tie (3 x)
4) Hinge pin (1 x), insertable from either side
5) Enclosure screw (4 x)
6) Sealing insert (1 x)
7) Rubber reducer (1 x)
8) Cable gland, M20x1.5 (3 x)
9) Filler plug (3 x)
10) Hexagon nut (5 x)
11) Sealing plug (2 x), for sealing in case of wall mounting

Mounting Plan, Dimensions







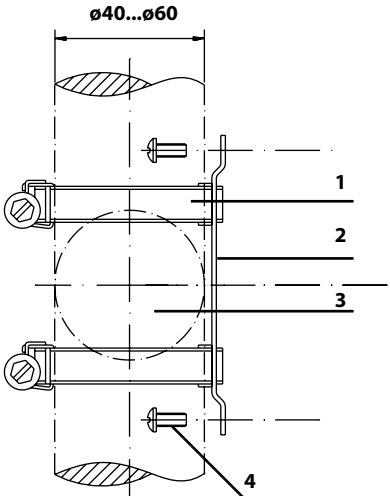
1) Cable gland (3 x)
2) Knockouts for cable gland or ½" conduit, dia. 21.5 mm (2 x) Conduit couplings not included!
3) Knockout for pipe mounting (4 x)
4) Knockout for wall mounting (2 x)

All dimensions in mm

Mounting Accessories

Pipe-mount kit, accessory ZU 0274
Protective hood for wall and pipe mounting, accessory ZU 0737
Panel-mount kit, accessory ZU 0738

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

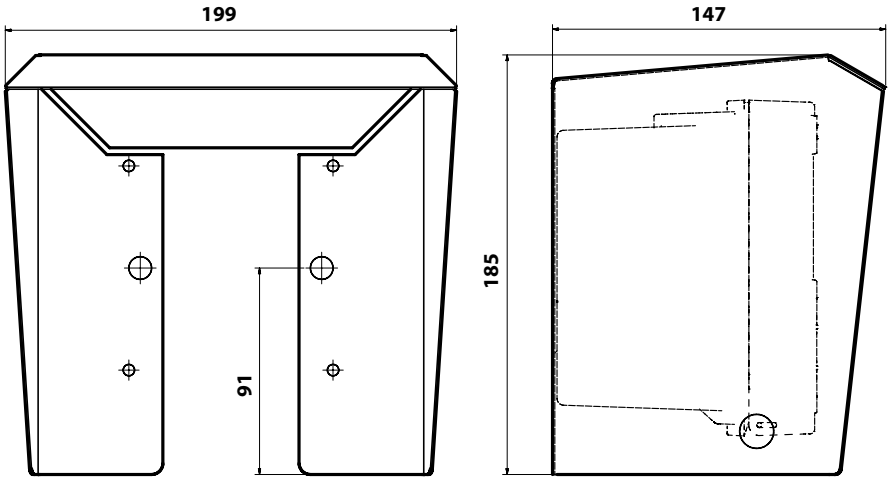
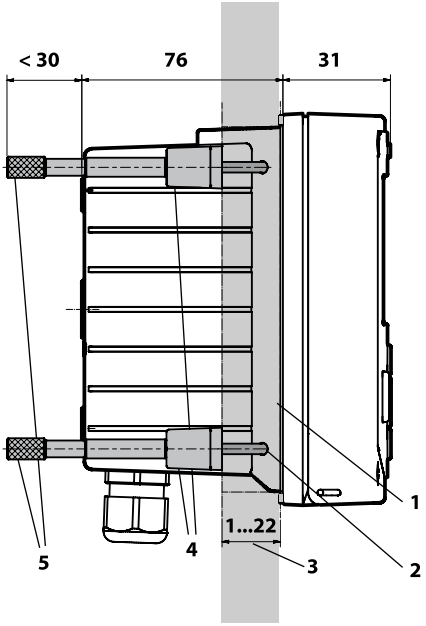


Fig.: Protective hood for wall and pipe mounting, accessory ZU 0737

Panel Mounting



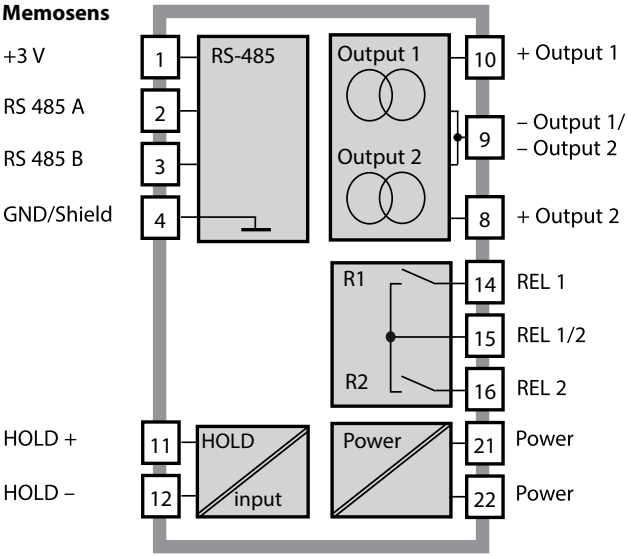
1) Circumferential sealing (1 x)
2) Screw (4 x)
3) Position of control panel
4) Span piece (4 x)
5) Threaded sleeve (4 x)

Cutout
138 x 138 mm (DIN 43700)

Fig.: Panel-mount kit, accessory ZU 0738

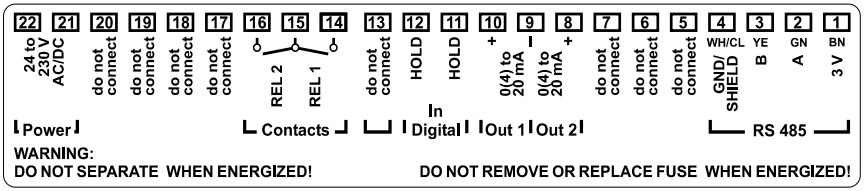
All dimensions in mm

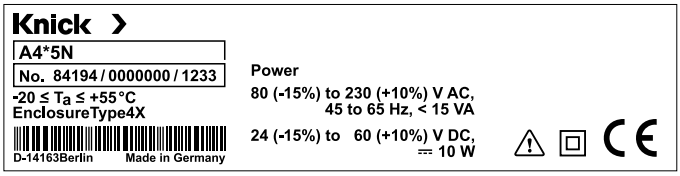
Overview of the Stratos MS



Terminal Assignments, Rating Plates

The terminals are suitable for single or stranded wires up to 2.5 mm² (AWG 14).



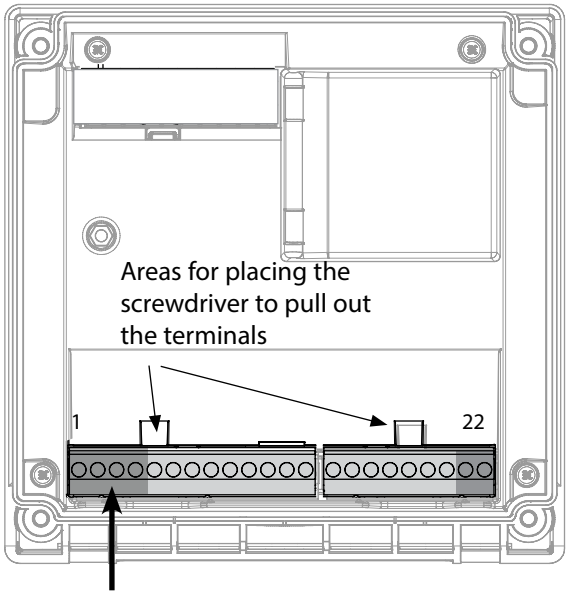


Application in Hazardous Locations

When using the device in a hazardous location, observe the specifications of the Control Drawing.

Power Supply

Connect the power supply for Stratos MS to terminals 21 and 22
(80 ... 230 V AC, 45 ... 65 Hz / 24 ... 60 V DC)



Connection of Memosens sensor		
1	Brown	+3 V
2	Green	RS 485 A
3	Yellow	RS 485 B
4	White/Transp.	GND/shield

Figure:
Terminals, device opened,
back of front unit

Terminal assignments		
Memosens connection		
1 (BN)	+3 V	Brown
2 (GN)	RS 485 A	Green
3 (YE)	RS 485 B	Yellow
4 (WH/CL)	GND/ shield	White / Transp.
5	do not connect	
6	do not connect	
7	do not connect	
Current outputs OUT1, OUT2		
8	+ Out 2	
9	– Out 1 / Out 2	
10	+ Out 1	
11	HOLD	
12	HOLD	
13	do not connect	
Relay contacts REL1, REL2		
14	REL 1	
15	REL 1/2	
16	REL 2	
17	do not connect	
18	do not connect	
19	do not connect	
20	do not connect	
Power supply		
21	power	
22	power	

Start-Up

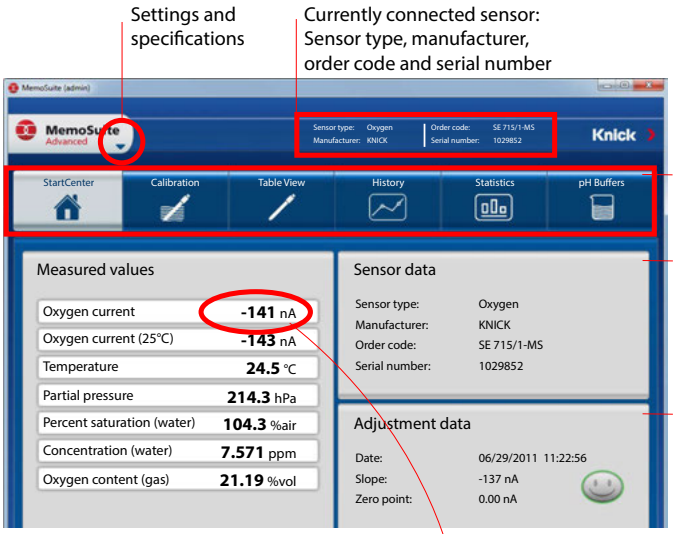
When a Memosens sensor is connected, the appropriate measuring function (device type) is automatically loaded.

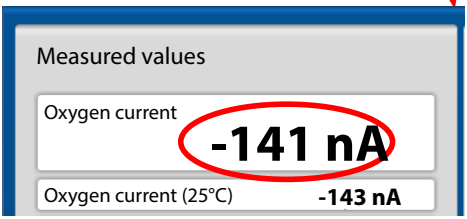
Changing the Measuring Function

In the "Service" menu you can select another measuring function at any time.

Calibration and Maintenance in the Lab

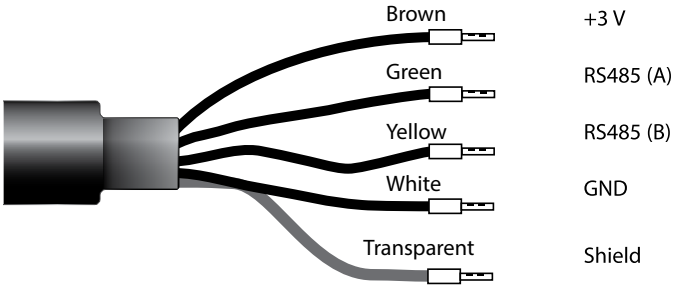
The "MemoSuite" software allows calibrating Memosens sensors under reproducible conditions at a PC in the lab. The sensor parameters are registered in a database. Documenting and archiving meet the demands of FDA CFR 21 Part 11. Detailed reports can be output as csv export for Excel. MemoSuite is available as accessory and comes in the versions "Basic" and "Advanced": www.knick.de.





Display size of measured values
When the cursor moves over a measured value, it changes to a magnifying glass, allowing to magnify the measured-value display at a mouse click.

Memosens Cable



Specifications

Material	TPE
Cable diameter	6.3 mm
Length	up to 100 m
Process temperature	–20 °C … +135 °C / –4 … +275 °F
Ingress protection	IP 68

Order Codes

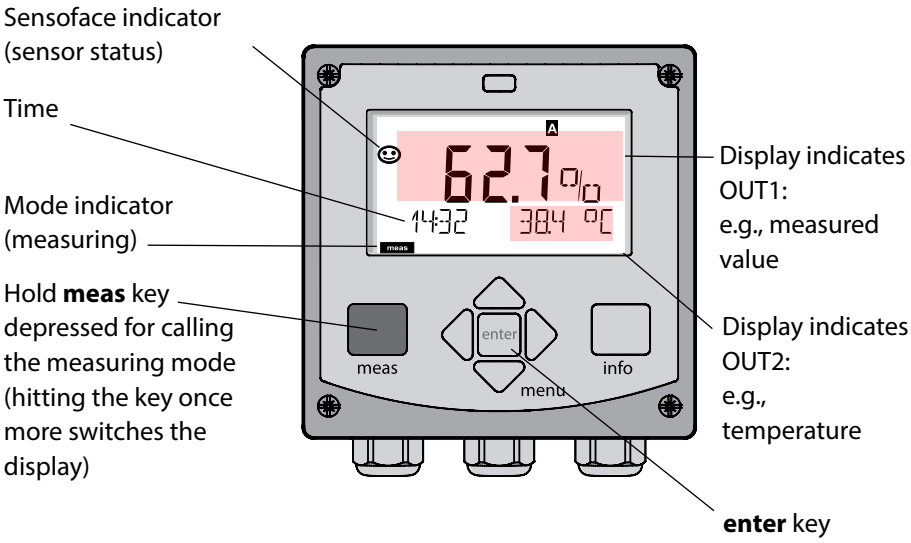
	Cable type	Cable length	Order number
Memosens	Ferrules	3 m	CA/MS-003NAA
		5 m	CA/MS-005NAA
		10 m	CA/MS-010NAA
		20 m	CA/MS-020NAA
	M12 plug, 8-pin	3 m	CA/MS-003NCA
		5 m	CA/MS-005NCA
Memosens Ex*	Ferrules	3 m	CA/MS-003XAA
		5 m	CA/MS-005XAA
		10 m	CA/MS-010XAA
		20 m	CA/MS-020XAA
	M12 plug, 8-pin	3 m	CA/MS-003XCA
		5 m	CA/MS-005XCA

Other cable lengths or cable types are available on request.

* Ex-certified ATEX II 1G Ex ia IIC T3/T4/T6 Ga

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, you can set various displays as standard display for the measuring mode (see page 20).

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

NOTICE:
You must configure the analyzer for the respective measurement task.

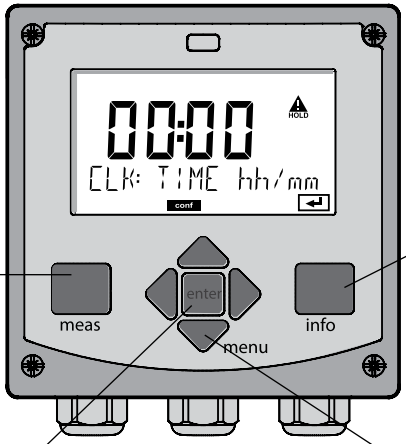
The Keys and Their Functions

Up / Down arrows

- Menu: Increase/decrease a numeral
- Menu: Selection

Left / Right arrows

- Menu: Previous/next menu group
- Number entry: Move between digits



meas

- Return to last menu level
- Directly to measuring mode (press > 2 s)
- Measuring mode: other display (temporarily for approx. 60 s)

info

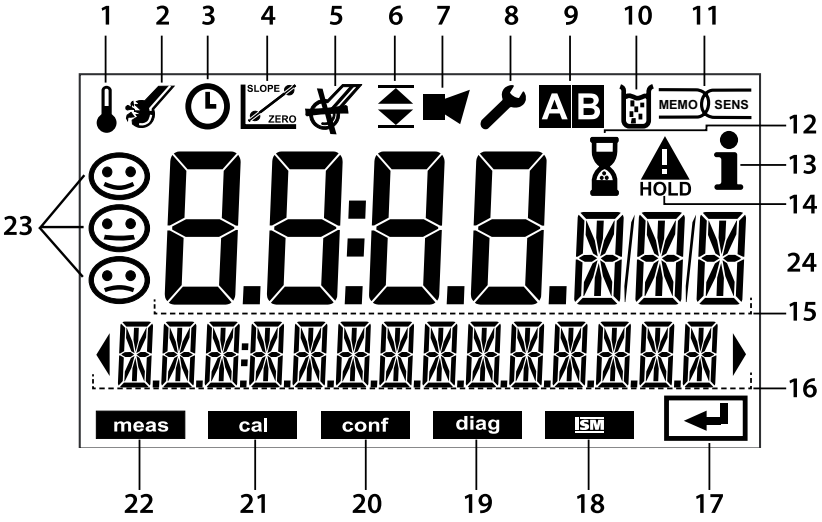
- Retrieve information
- Show error messages

enter

- Configuration: Confirm entries, next configuration step
- Calibration: Continue program flow

menu

- Measuring mode: Call menu

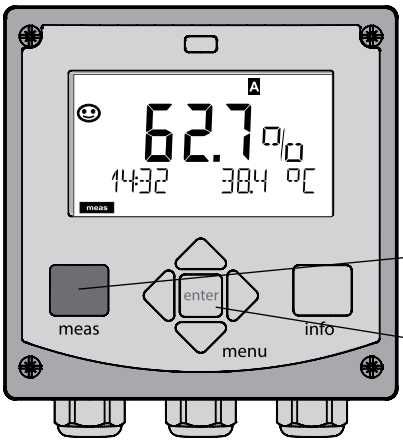


1 Temperature
2 Sensocheck
3 Interval/response time
4 Sensor data
5 Wear
6 Limit message:
Limit 1 ▼ or Limit 2 ▲
7 Alarm
8 Service
9 Not used
10 Calibration
11 Memosens sensor
12 Waiting time running
13 Info available
14 HOLD mode active
15 Primary process value
16 Secondary display
17 Proceed using enter
18 Not used
19 Diagnostics
20 Configuration mode
21 Calibration mode
22 Measuring mode
23 Sensoface
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

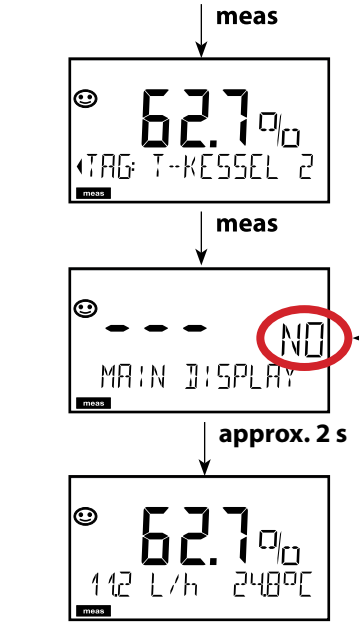
Display in Measuring Mode



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 primary value or tag number (TAG).
After 60 sec they switch back to the main display.

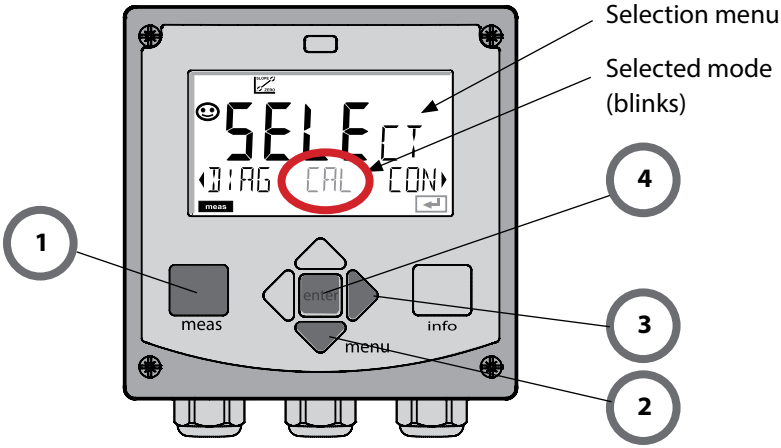
Press **enter** to select a display as MAIN DISPLAY (displayed permanently in measuring mode).

The secondary display shows "MAIN DISPLAY – NO".

Use the **UP** / **DOWN** arrows to select "MAIN DISPLAY – YES" and confirm by pressing **enter**.
This display is now shown in measuring mode.

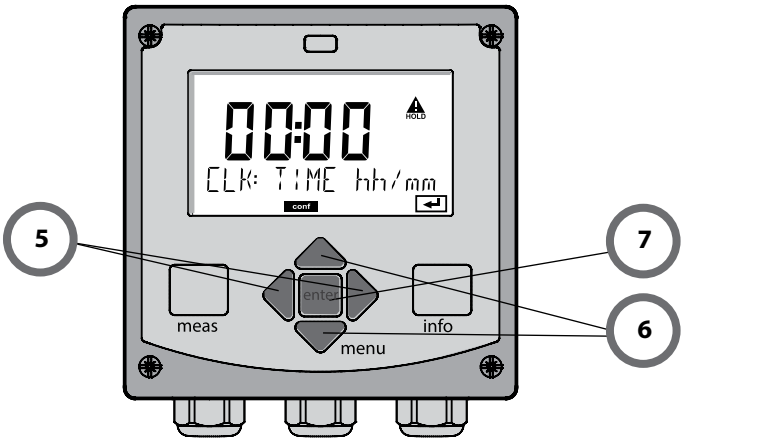
To select the operating mode:

1) Hold **meas** key depressed (> 2 s) (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
6) Change numeral: up / down arrow
7) Confirm entry by pressing **enter**



Diagnostics
Display of calibration data, display of sensor data, sensor monitor, 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.

HOLD
Manual activation of HOLD mode, e.g., for replacing a sensor.
The signal outputs adopt a defined state. HOLD can also be activated via the external input (see next page).

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
You must configure the analyzer 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.

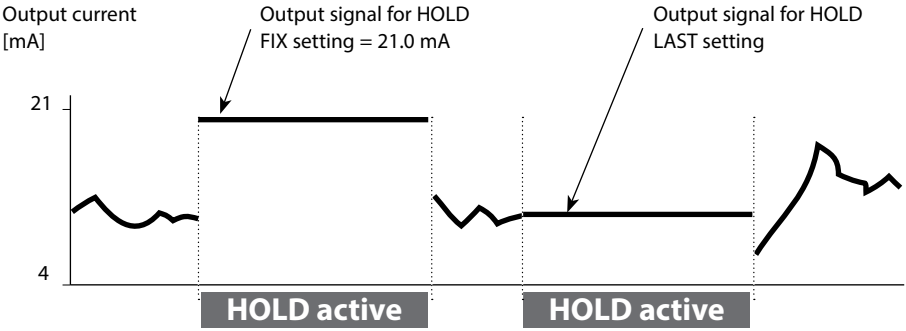
Service
Maintenance functions (current source, relay test), assigning passcodes, selecting the device type (pH/oxy/conductivity), resetting to factory settings.

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.
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:



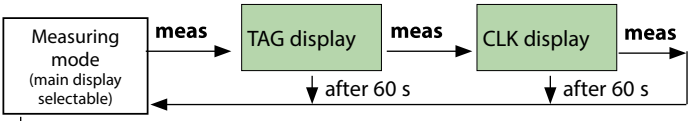
Terminating the HOLD mode

The HOLD mode is exited 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).

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



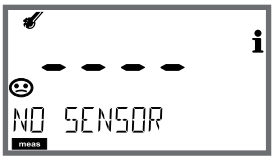
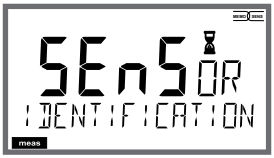
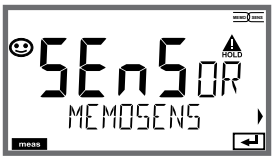
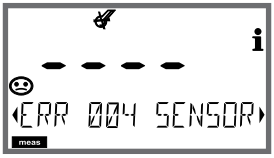
Pressing the **menu** key (down arrow) opens the selection menu.
Select the menu group using the left/right arrow keys.
Pressing **enter** opens a menu item. Press **meas** to return.

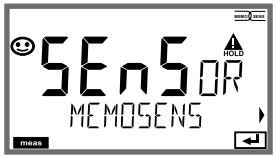
DIAG	CALDATA	Display of calibration data
	SENSOR	Display of sensor data
	SELFTEST	Self test: RAM, ROM, EEPROM, module
	LOGBOOK	100 events with date and time
	MONITOR	Display of direct sensor values
	VERSION	Display of software version, model designation, serial no.
HOLD		Manual activation of HOLD mode, e.g., for sensor replacement. The signal outputs behave as configured (e.g., last measured value, 21 mA)
CAL	pH	pH adjustment / ORP adjustment / product calibration
	Oxy	Adjustment (WTR/AIR) / zero adjustment / product cal.
	COND(I)	Adjustment with solution / cell factor input / product cal.
	CAL_RTD	Adjustment of temperature probe
CONF	CONF	Configuration See “Overview of Configuration” on next page.
SERVICE (Access via code, factory setting: 5555)	MONITOR	Display of measured values for validation (simulators)
	OUT1	Current source, output 1
	OUT2	Current source, output 2
	RELAIS	Relay test
	CODES	Specifying access codes for operating modes
	DEVICE TYPE	Selecting the device type
	DEFAULT	Reset to factory setting

The configuration steps are assigned to different menu groups.
Using 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 settings	SNS:		enter
		Menu item 1		enter
		⋮		
		Menu item ...		enter
	Current output 1	OT1:		enter
	Current output 2	OT2:		
	Compensation	COR:		
	Alarm mode	ALA:		
	Relay outputs (LIMIT / ALARM / WASH)	REL:		
	Setting the clock	CLK:		
	Tag number	TAG:		

Connecting a Memosens Sensor

Step	Action/Display	Remark
Connect sensor		When no 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**.	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 (timeout).
Possible error message		
Sensor defective. Replace sensor		When this error message appears, the sensor cannot be used. Sensoface is sad.

Step	Action/Display	Remark
Select HOLD mode A sensor should only be replaced during HOLD mode to prevent unintended reactions of the outputs or contacts.	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 logbook.
Wait until the sensor data are displayed.		
Check sensor data	 View sensor information using ◀ ▶ keys, press **enter** to confirm.	You can view the sensor manufacturer and type, serial number and last calibration date.
Check measured values		
Exit HOLD	Hit **meas** key: Return to the selection menu. Hold **meas** key depressed: Device switches to measuring mode.	

Configuration (default in bold print)			
Sensor			**Oxy**
SNS	MEAS MODE		**dO %** / dO mg/l / dO ppm / GAS %
	TEMP UNIT		**°C** / °F
	CAL MODE		**CAL AIR** / CAL WTR
	CALTIMER		ON / **OFF**
	ON	CAL-CYCLE	0 ... 9999 h (**168 h**)
	CHECK TAG		ON / **OFF**
	CHECK GROUP		ON / **OFF**

Current output 1			Oxy
OT1	RANGE		**4 ... 20 mA** / 0 ... 20 mA
	CHANNEL		**OXY** / TMP
	OXY dO %	BEGIN (0)/4 mA	**000.0** ... 600.0 **%**
		END 20 mA	000.0 ... **600.0 %**
	OXY dO / mg/l	BEGIN (0)/4 mA	00.00 mg/l ... 99.99 mg/l
		END 20 mA	00.00 mg/l ... 99.99 mg/l
	OXY dO / ppm	BEGIN (0)/4 mA	00.00 ppm ... 99.99 ppm
		END 20 mA	00.00 ppm ... 99.99 ppm
	OXY GAS / %	BEGIN (0)/4 mA	00.00 ppm ... 99.99 %
		END 20 mA	00.00 ppm ... 99.99 %
	TMP °C	BEGIN (0)/4 mA	–20 ... 150 °C / **000.0 °C**
		END 20 mA	–20 ... 150 °C / **100.0 °C**
	TMP °F	BEGIN (0)/4 mA	–4 ... 302 °F / **032.0 °F**
		END 20 mA	–4 ... 302 °F / **212.0 °F**
	FILTERTIME		0...120 SEC / **120 SEC**
	FAIL 22 mA		ON / **OFF**
	FACE 22 mA		ON / **OFF**
	HOLD MODE		**LAST** / FIX
	FIX	HOLD-FIX	4 ... 22 mA / **021.0 mA**

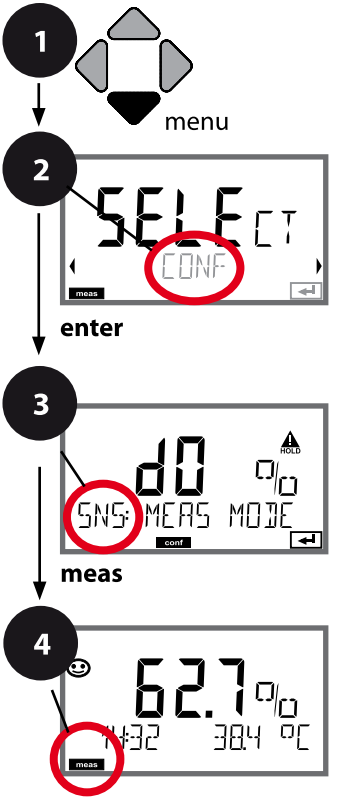
Current output 2	Default setting CHANNEL: TMP (other settings like OT1)

Configuration (default in bold print)			
Correction			**Oxy**
COR	SALINITY		00.00 ... 45.00 ppt (**00.00 ppt**)
	PRESSURE UNIT		**BAR** / KPA / PSI
	BAR	PRESSURE	0.000 ... 9.999 BAR (**1.013 BAR**)
	KPA	PRESSURE	000.0 ... 999.9 KPA (**100 KPA**)
	PSI	PRESSURE	000.0 ... 145.0 PSI (**14.5 PSI**)
Alarm		**Oxy**	
ALA	DELAYTIME	0 ... 600 s (**0010 SEC**)	
	SENSOCHECK	ON / **OFF**	
Relay 1			
RL1	**LIMIT** ALARM WASH	The following submenu depends on the selected setting.	
LM1	CHANNEL	**OXY** / TMP	
	FUNCTION	**Lo LEVL** / Hi LEVL	
	CONTACT	**N/O** / N/C	
	LEVEL	**000.0 %** 000.0 ... 600.0 % 00.00 mg/l ... 99.99 mg/l 00.00 ppm ... 99.99 ppm 00.00 ppm ... 99.99 % (–20 ... 150 °C)	
	HYSTERESIS	**000.0 %** / 0 ... 50 % full scale	
	DELAYTIME	**0010 SEC** / 0000 ... 9999 s	
AL1	TRIGGER	FAIL / FACE	
	CONTACT	**N/O** / N/C	
WS1	CYCLE TIME	**000.0 h** / 0.0 ... 999.9 h	
	DURATION	**0060 SEC** / 0 ... 1999 s	
	RELAX TIME	**0030 SEC** / 0000 ... 1999 s	
	CONTACT	**N/O** / N/C	
Relay 2 Default LIMIT / FUNCTION: Hi LEVL (other settings like Relay 1)			

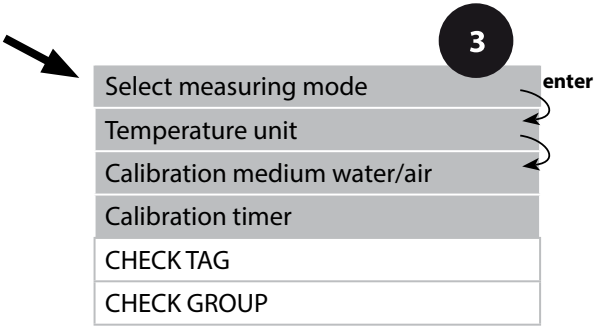
Time/date			
CLK	FORMAT	**24 h** / 12 h	
	24 h	hh:mm	
	12 h	hh:mm (AM / PM) 00 ... 12:59 AM / 1 ... 11:59 PM	
	DAY / MONTH	dd.mm	
	YEAR	2000 ... 2099	
Measuring points (TAG / GROUP)			
TAG	The entries are made in the text line.		A...Z, 0...9, – + < > ? / @
GROUP	The entries are made in the text line.		0000...9999 (**0000**)

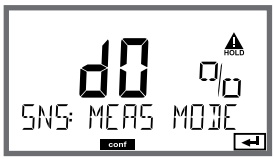
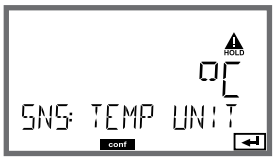
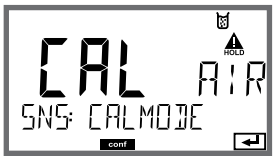
Device Type: Oxy

The device type is automatically selected upon first start-up. In the SERVICE menu you can change the device type. Afterwards, you must select the corresponding calibration mode in the CONF menu.



1 Press **menu**.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select **SENSOR** menu using ◂ ▸ keys,
press **enter**.
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**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.



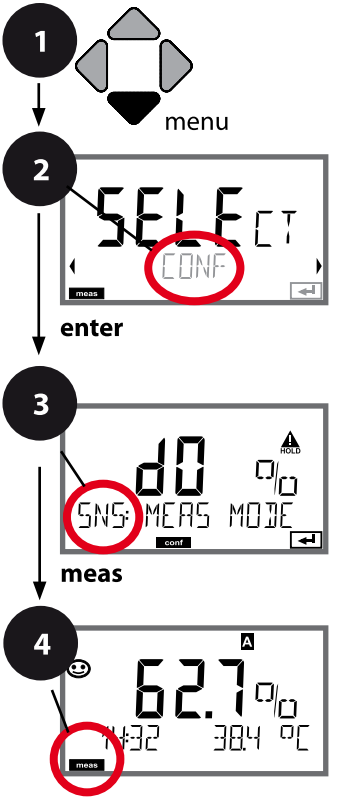
Menu item	Action	Choices
Select measuring mode 	Select measuring mode using ▲ ▼ keys. DO: Measurement in liquids GAS: Measurement in gases Press **enter** to confirm.	**dO %** dO mg/l dO ppm GAS %
Temperature unit 	Select °C or °F using ▲ ▼ keys. Press **enter** to confirm.	**°C** °F
Air/water as cal medium 	Select calibration medium using ▲ ▼ keys. AIR: Air as calibration medium WTR: Air-saturated water as calibration medium Press **enter** to confirm.	**CAL_AIR** CAL_WTR
Calibration Timer 	Adjust CALTIMER using ▲ ▼: OFF: No timer ON: Fixed cal cycle (adjust in the next step) Press **enter** to confirm.	**OFF/ON** **(ON:** 0 ... 9999 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:

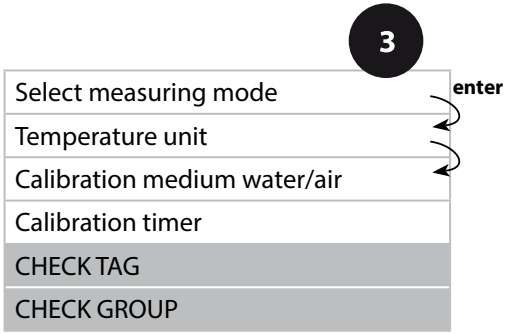
+	Over 80 % of the calibration interval has already passed.
+	The calibration interval has been exceeded.

The time remaining until the next due calibration can be seen in the diagnostics menu (see Diagnostics chapter).

Sensor Verification (TAG, GROUP)



1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select **SENSOR** menu using ◂ ▸ keys,
press **enter**.
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**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.



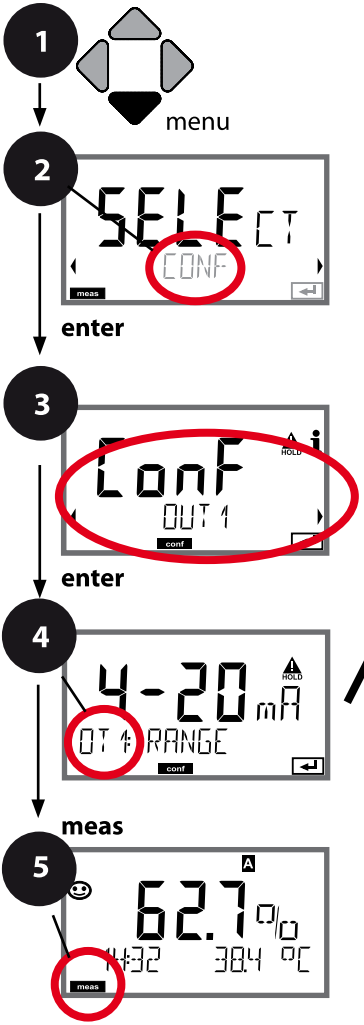
Menu item	Action	Choices
TAG 	Select ON or OFF using ▲ ▼ keys. Press **enter** to confirm. When switched on, the entry for "TAG" in the Memosens sensor is compared to the entry in the analyzer. If the entries differ, a message will be generated.	ON/**OFF**
GROUP 	Select ON or OFF using ▲ ▼ keys. Press **enter** to confirm. Function as described above	ON/**OFF**

Sensor Verification (TAG, GROUP)

When Memosens sensors are calibrated in the lab, it is often useful and sometimes even mandatory that these sensors will be operated again at the same measuring points or at a defined group of measuring points. To ensure this, you can save the respective measuring point (TAG) or group of measuring points (GROUP) in the sensor. TAG and GROUP can be specified by the calibration tool or automatically entered by the transmitter. When connecting an MS sensor to the transmitter, it can be checked if the sensor contains the correct TAG or belongs to the correct GROUP. If not, a message will be generated and Sensoface gets "sad". The "sad" Sensoface icon can also be signaled by a 22 mA error current. Sensor verification can be switched on in the Configuration in two steps as TAG and GROUP if required.
When no measuring point or group of measuring points is saved in the sensor, e.g., when using a new sensor, Stratos enters its own TAG and GROUP. When sensor verification is switched off, Stratos always enters its own measuring point and group. A possibly existing TAG/GROUP will be overwritten.

Output Current: Range, Current Start/End

(Example: current output 1)

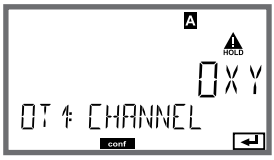


1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select **OUT1** menu using ◂ ▸ keys,
press **enter**.
4 All items of this menu group are indicated by the "OT1:" code.
Press **enter** to select menu,
edit using arrow keys (see next page).
Confirm (and proceed) by pressing **enter**.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

4

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

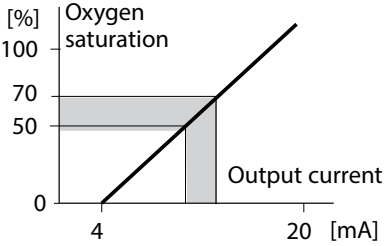
enter

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 	**Example: current output 1, device type OXY** Select using ▲ ▼ keys: OXY: oxygen value TMP: Temperature Press **enter** to confirm.	**OXY**/TMP
Current start / end 	Modify digit using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm.	000.0 ... 0600% (OXY) –20 ... 150 °C / –4 ... 302 °F (TMP)

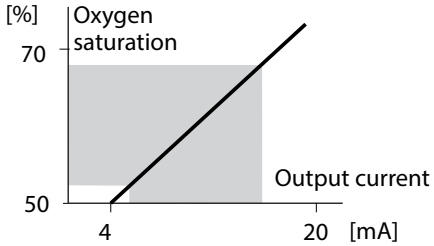
For **process variables comprising several decades**, decimal point and dimension can be shifted using the ◀ ▶ cursor keys.
Then, the desired number is entered using ▲ ▼ and ◀ ▶. For measurement in gases (GAS), this method is used to switch between ppm and % for volume concentration (10000 ppm = 1 %).

Assignment of measured values: current start and current end

Example 1: Range 0...100%

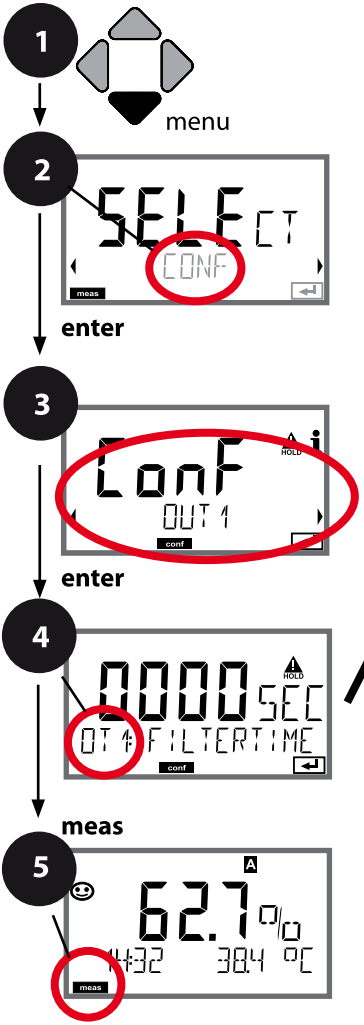


Example 2: Range 50...70%
Advantage: Higher resolution in range of interest



Output Current: Time Averaging Filter

(Example: current output 1)

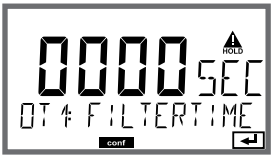


1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select **OUT1** menu using ◂ ▸ keys,
press **enter**.
4 All items of this menu group are indicated by the "OT1:" code.
Press **enter** to select menu,
edit using arrow keys (see next page).
Confirm (and proceed) by pressing **enter**.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

4

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

enter

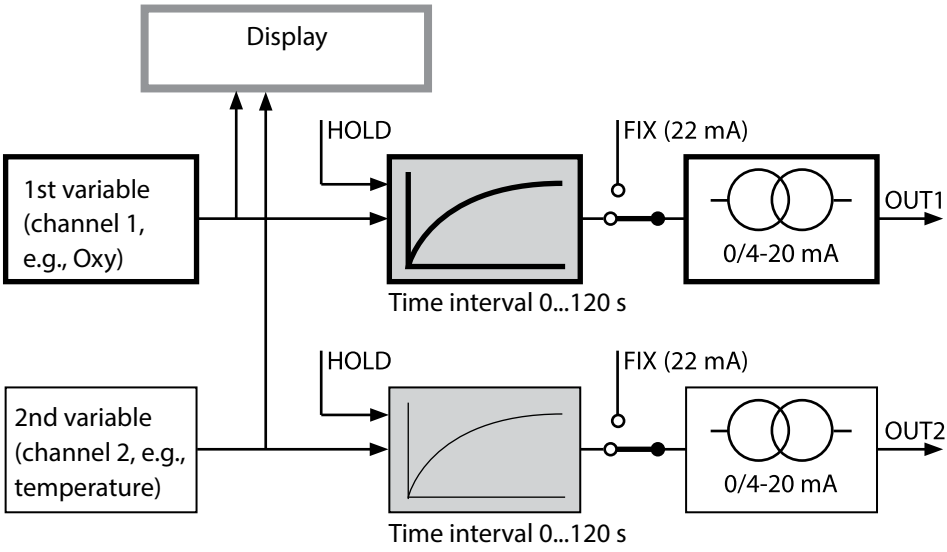
Menu item	Action	Choices
Time averaging filter 	Enter value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0...120 SEC **(0000 SEC)**

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.

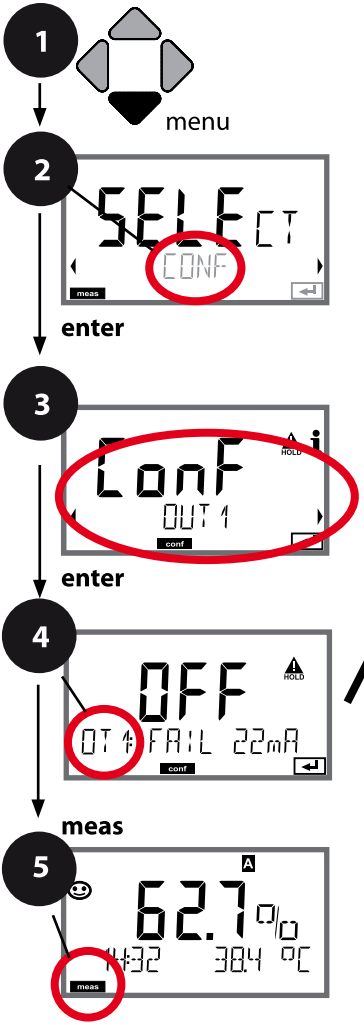
Note:

The filter only acts on the current output, not on the display or the limit values! During HOLD the filter is not applied. This prevents a jump at the output.



Output Current: Error and HOLD

(Example: current output 1)



1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select **OUT1** menu using ◂ ▸ keys,
press **enter**.
4 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**.
5 Exit: Press **meas** key until the [meas] mode indicator is displayed.

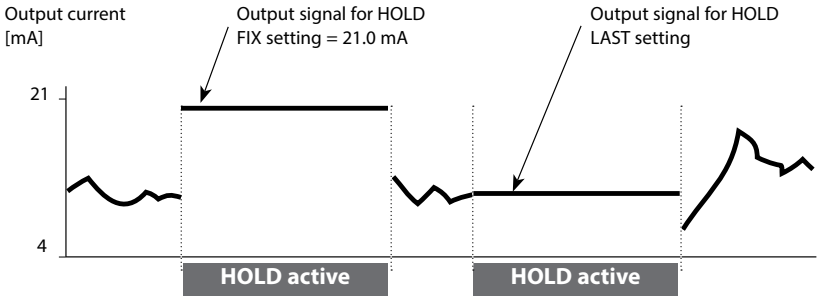
4

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

enter

Menu item	Action	Choices
Output current during error message 	The output current can be set to 22 mA in the case of error messages or error messages. Select ON or OFF using ▲ ▼ keys. Confirm by pressing **enter**	**OFF** / ON
Output current during Sensoface messages **OT1: FACE 22 mA**	The output current can be set to 22 mA in the case of Sensoface messages. Select ON or OFF using ▲ ▼ keys. Confirm by pressing **enter**	**OFF** / ON
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 ▲ ▼ 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 ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	00.00...22.00 mA (**21.00 mA**)

Output signal during HOLD:



Output Current: Alarm Delay, Sensocheck

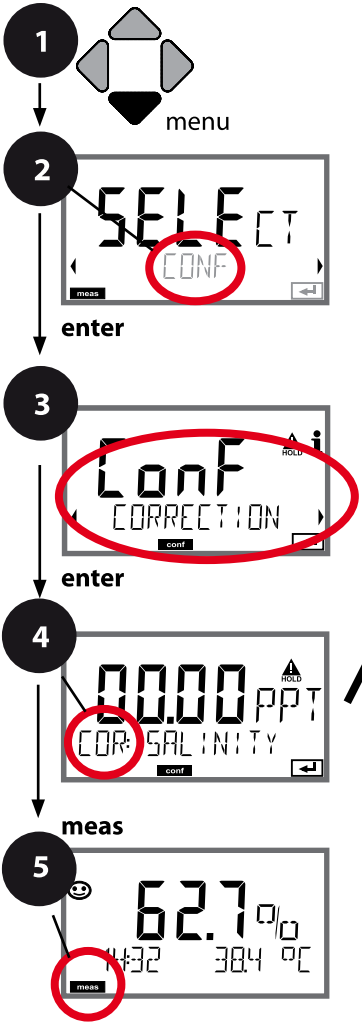
1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select **ALARM** menu using ◂ ▸ keys,
press **enter**.
4 All items of this menu group are indicated by the "ALA:" code.
Press **enter** to select menu,
edit using arrow keys (see next page).
Confirm (and proceed) by pressing **enter**.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

Menu item	Action	Choices
Alarm delay 	Enter value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0...600 SEC **(10 SEC)**
Sensocheck 	Select Sensocheck (continuous monitoring of sensor membrane and lines). Select ON or OFF using ▲ ▼ keys. Press **enter** to confirm. (At the same time, Sensoface is activated. With OFF, Sensoface is also switched off.)	ON/**OFF**

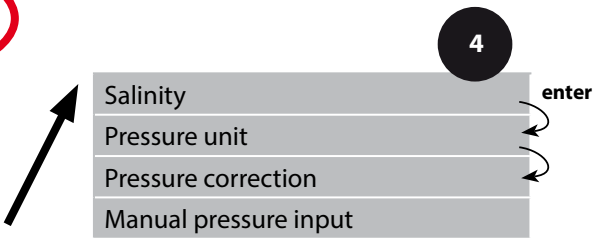
The alarm delay time delays the color change of the display backlighting to red, the 22 mA signal (if configured), and the alarm contact switching.

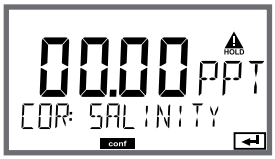
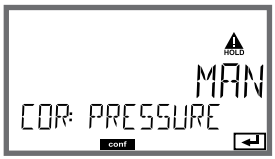
Error messages can be signaled by a 22 mA output current. In addition, a relay contact (RELAY1 / RELAY2) can be configured as alarm contact.

Salinity Correction, Pressure Correction

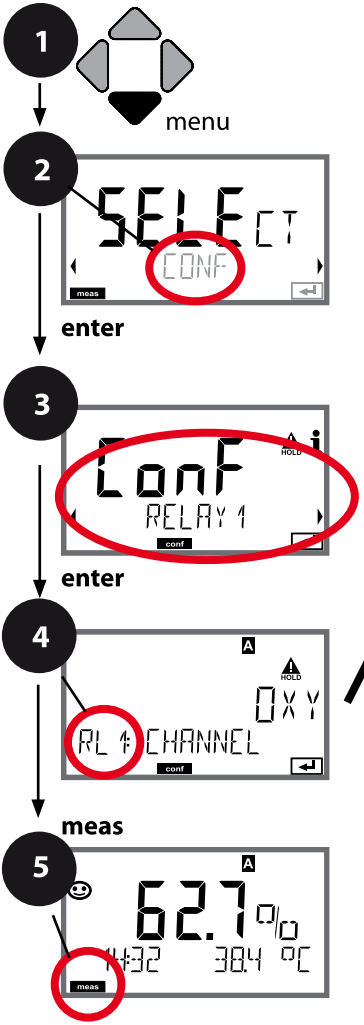


1 Press **menu** key.
2 Select **CONF** using ◂ ▸, press **enter**.
3 Select **CORRECTION** menu using ◂ ▸ keys, press **enter**.
4 All items of this menu group are indicated by the "**COR**:" code.
Confirm (and proceed) by pressing **enter**.
5 Exit: Press **meas** key until the [meas] mode indicator is displayed.



Menu item	Action	Choices
Enter salinity 	Enter the 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 using ▲ ▼ keys: MAN (manual 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**

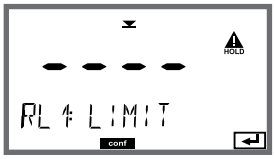
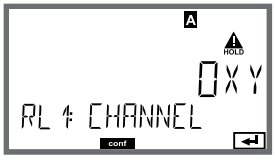
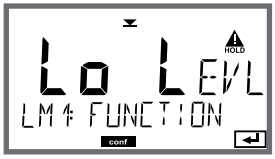
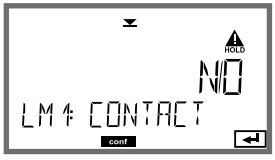
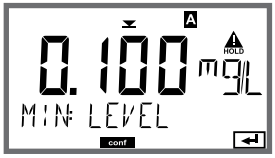
Relay Contacts: Function Assignment, Limit Values



1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select **RELAY1** menu using ◂ ▸ keys,
press **enter**.
Specify relay contact function: **LIMIT**.
4 All items of this menu group are indicated by the "**LM1**:" code.
Press **enter** to select menu,
edit using arrow keys (see next page).
Confirm (and proceed) by pressing **enter**.
5 Exit: Press **meas** key until the [meas] mode indicator is displayed.

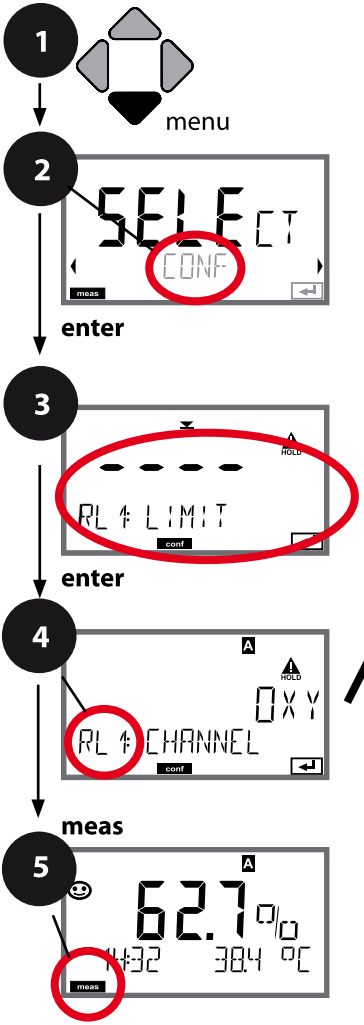
4

Use of relays	enter
Select process variable	
Limit 1 switching characteristics (function)	
Limit 1 contact type	
Limit 1 setpoint	
Limit 1 hysteresis	
Limit 1 delay	

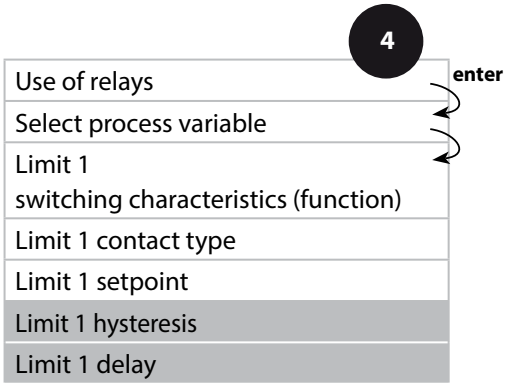
Menu item	Action	Choices
Use of relays 	Select in the text line using ▲ ▼ keys: • Limit function (LIMITS) • Error message (ALARM) • Rinse contact (WASH) Press **enter** to confirm.	**LIMIT /** ALARM / WASH **Note:** The following submenu depends on the selected setting.
Select process variable 	Select desired process variable using ▲ ▼ keys. Press **enter** to confirm.	**OXY**/TMP
Limit 1 function 	Select desired function using arrow keys. LoLevel: active if value falls below setpoint LoLevel: active if value exceeds setpoint Press **enter** to confirm.	**Lo LEVL** / Hi LEVL Limit 1 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.	Depending on Memosens sensor

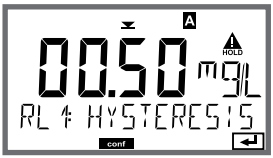
Relay Contacts: Limit Function, Hysteresis

(Example: relay 1)



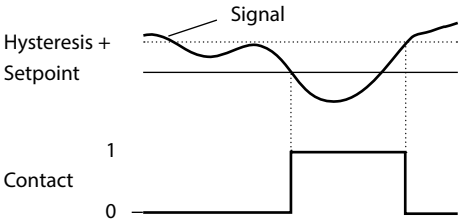
1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select **RELAY1** menu using ◂ ▸ keys,
press **enter**.
Specify relay contact function: **LIMIT**.
4 All items of this menu group are indicated by the "**LM1**:" code.
Press **enter** to select menu,
edit using arrow keys (see next page).
Confirm (and proceed) by pressing **enter**.
5 Exit: Press **meas** key until the [meas] mode indicator is displayed.



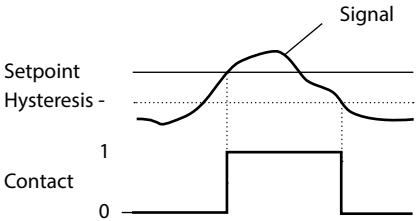
Menu item	Action	Choices
Limit 1 hysteresis 	Select hysteresis using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0...50 % full scale
Limit 1 delay 	The contact is activated with delay (deactivated without delay) Adjust delay using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0 ... 9999 SEC (**0010 SEC**)

Application of Hysteresis:

Limit Lo

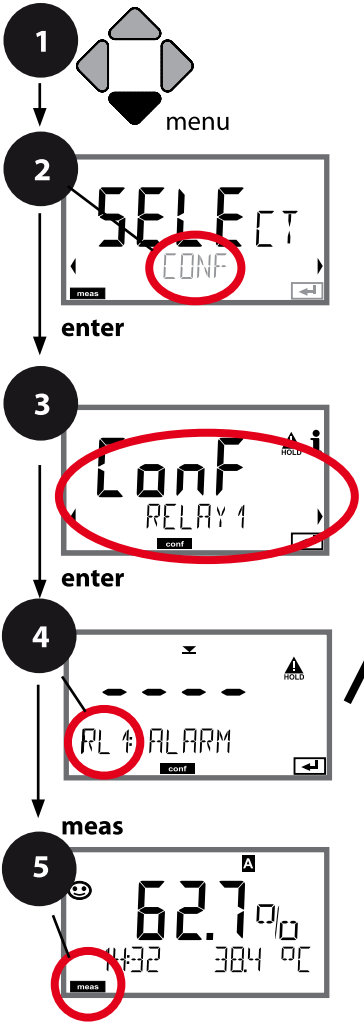


Limit Hi



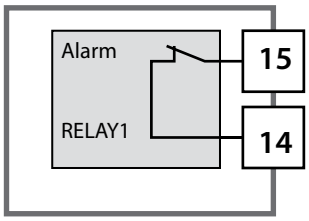
Relay Contacts: Alarm

(Example: relay 1)



1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select **RELAY1** menu using ◂ ▸ keys,
press **enter**.
Specify relay contact function: **ALARM**.
4 All items of this menu group are indicated by the "**AL1**:" code.
Press **enter** to select menu,
edit using arrow keys (see next page).
Confirm (and proceed) by pressing **enter**.
5 Exit: Press **meas** key until the [meas] mode indicator is displayed.

Menu item	Action	Choices
Alarm 	Select error messages (FAIL) or Sensoface messages (FACE) as trigger signal using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	**FAIL** / FACE
Contact response 	N/O: normally open contact N/C: normally closed contact Select using ▲ ▼ keys. Press **enter** to confirm.	**N/O** / N/C



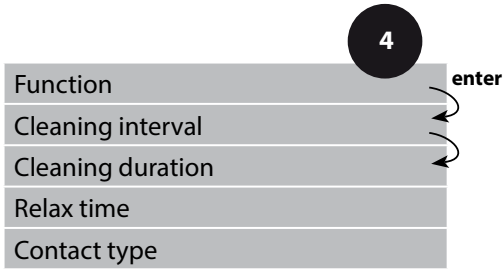
Alarm contact

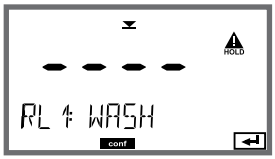
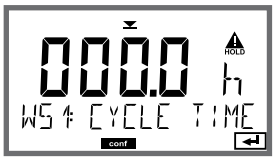
A relay contact (RELAY1 / RELAY2) can be configured as alarm contact.

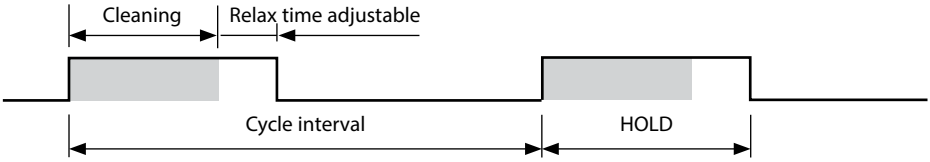
Relay Contacts: Controlling a Rinsing Probe

(Example: relay 1)

1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select **RELAY1** menu using ◂ ▸ keys,
press **enter**.
Specify relay contact function: **WASH**.
4 All items of this menu group are indicated by the "**WS1**:" code.
Press **enter** to select menu,
edit using arrow keys (see next page).
Confirm (and proceed) by pressing **enter**.
5 Exit: Press **meas** key until the [meas] mode indicator is displayed.

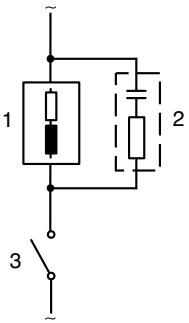


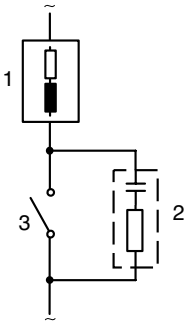
Menu item	Action	Choices
Use of relays 	Select in the text line using ▲ ▼ keys: • Limit function (LIMITS) • Error message (ALARM) • Rinse contact (WASH) Press **enter** to confirm.	LIMIT / ALARM / **WASH** **Note:** The following submenu depends on the selected setting.
Cleaning interval 	Adjust value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0.0...999.9 h (**000.0 h**)
Cleaning duration 	Adjust value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm. Without figure: Relax time	0...9999 SEC (**0060 SEC**) Relax time: 0000 ... 1999 SEC **(0030 SEC)**
Contact type 	N/O: normally open contact N/C: normally closed contact Select using ▲ ▼ keys. Press **enter** to confirm.	**N/O** / N/C



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.

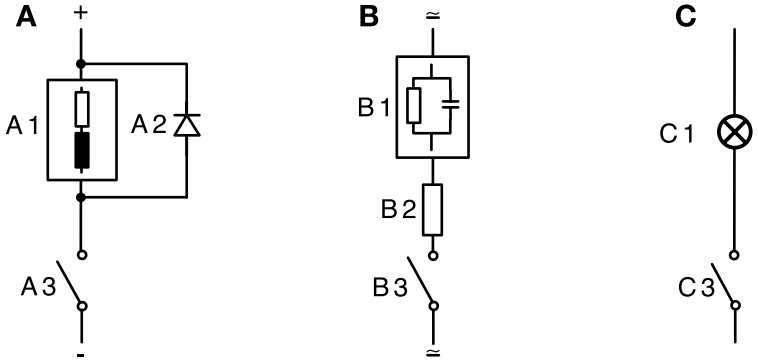




Typical AC applications with inductive load

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

Typical Protective Wiring Measures



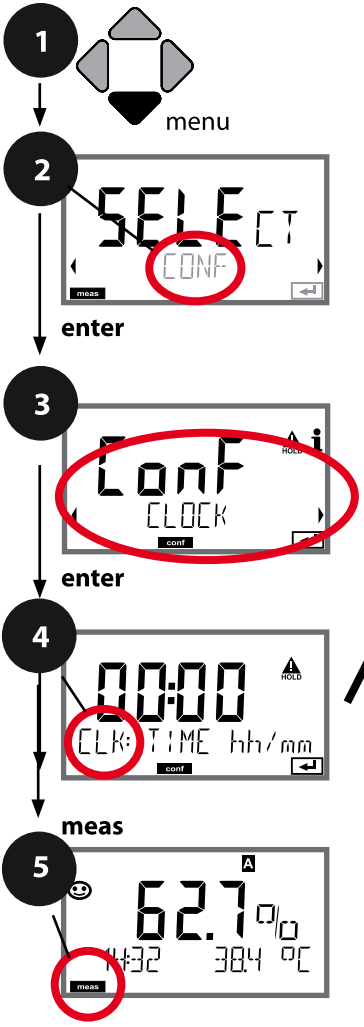
A: DC application with inductive load
B: AC/DC applications with capacitive load
C: Connection of incandescent lamps

A1 Inductive load
A2 Free-wheeling diode, e.g.,1N4007 (Observe polarity)
A3 Contact
B1 Capacitive load
B1 Resistor, e.g., 8 Ω / 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!

Time and Date, Measuring Point (TAG/GROUP)



1 Press **menu** key.
2 Select **CONF** using ◂ ▸, press **enter**.
3 Select **CLOCK** or **TAG** using ◂ ▸ keys, press **enter**.
4 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) by pressing **enter**.
5 Exit: Press **meas** key until the [meas] mode indicator is displayed.

4

Time format
Time
Day and month
Year
TAG of measuring point
GROUP of measuring points

enter

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.

Note:

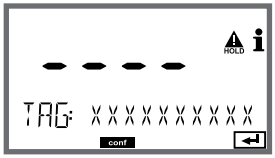
There is no automatic switchover from winter to summer time!

Be sure to manually adjust the time!

Sensor Verification (TAG, GROUP)

When Memosens sensors are calibrated in the lab, it is often useful and sometimes even mandatory that these sensors will be operated again at the same measuring points or at a defined group of measuring points. To ensure this, you can save the respective measuring point (TAG) or group of measuring points (GROUP) in the sensor. TAG and GROUP can be specified by the calibration tool or automatically entered by the transmitter. When connecting an MS sensor to the transmitter, it can be checked if the sensor contains the correct TAG or belongs to the correct GROUP. If not, a message will be generated and Sensoface gets "sad". The "sad" Sensoface icon can also be signaled by a 22 mA error current. Sensor verification can be switched on in the Configuration in two steps as TAG and GROUP if required.

When no measuring point or group of measuring points is saved in the sensor, e.g., when using a new sensor, Stratos enters its own TAG and GROUP. When sensor verification is switched off, Stratos always enters its own measuring point and group. A possibly existing TAG/GROUP will be overwritten.

Menu item	Action	Choices
TAG of measuring point 	In the lower display line you can enter a designation for the measuring point (TAG) and for a group of measuring points (GROUP) if applicable. Up to 32 digits are possible. By pressing **meas** (repeatedly) in the measuring mode you can view the 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 without scrolling.
GROUP of measuring points	Select number using ▲ ▼ keys, select next digit using ◀ ▶ keys. Confirm by pressing **enter**	0000 ... 9999 **(0000)**

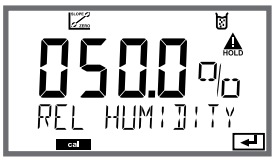
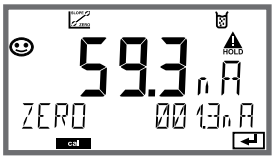
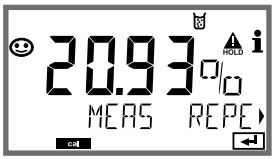
Calibration adapts the device to the individual sensor characteristics.
For best performance, you should always calibrate in air.
Compared to water, air is a calibration medium which is easy to handle, stable, and thus safe. In the most cases, however, the sensor must be removed for a calibration in air.
When dealing with biotechnological processes which require sterile conditions, the sensor cannot be removed for calibration. Here, calibration must be performed directly in the process medium (e.g., after sterilization and aeration).
In the field of biotechnology, for example, often saturation is measured and calibration is performed in the process medium for reasons of sterility.
For other applications where concentration is measured (water control etc.), calibration in air has proved to be useful.

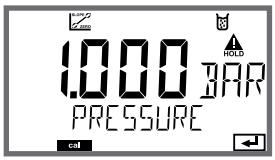
Note:
All calibration procedures must be performed by trained personnel. Incorrectly set parameters may go unnoticed, but change the measuring properties.

Common Combination: Process Variable / Calibration Mode

Measurement	Calibration	Application
Saturation	Water	Biotechnology; sensor cannot be removed for calibration (sterility)
Concentration	Air	Waters, open basins

On the following pages, the calibration procedure for a slope calibration in air is described. Of course, other combinations of process variable and calibration mode are possible.

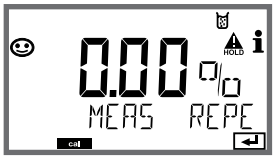
Display	Action	Remark
	Select calibration. Place sensor in air, press **enter** to start. Device goes to HOLD mode.	"CAL WATER" or "CAL AIR" is selected in the configuration.
	Enter relative humidity using **arrow keys** Press **enter** to proceed.	Default for relative humidity in air: rH = 50%
	Enter cal pressure using **arrow keys**. Press **enter** to proceed.	Default: **1.013 bar** Unit: bar/kpa/PSI
	Drift check: Display of: sensor current (nA), response time (s), temperature (°C/°F) Press **enter** to proceed.	The drift check can take some minutes.
	Display of calibration data (slope and zero). Press **enter** to proceed.	
	Display of selected process variable (here: %vol). Now the device is in HOLD mode: Reinstall the sensor and check whether the measurement is OK. MEAS exits calibration, REPEAT permits repetition.	After end of calibration, the outputs remain in HOLD mode for a short time.

Display	Action	Remark
	Select calibration (SLOPE). Immerse sensor in cal medium, press **enter** to start.	"CAL WATER" or "CAL AIR" is selected in the configuration.
	Enter cal pressure Press **enter** to proceed.	Default: **1.013 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 mbar
	Display of selected process value. To exit calibration: Select MEAS ◂ ▸, then **enter**	To repeat calibration: Select REPEAT ◂ ▸, then **enter**
	Place sensor in process. End of calibration	After end of calibration, the outputs remain in HOLD mode for a short time.

Zero Calibration

Flawless, amperometric oxygen sensors have a low zero current. 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 (sulfite solution or nitrogen) in order to obtain stable, non-drifting values.
During zero calibration, a drift check is not performed. Zero current of a flawless sensor is notably less than 0.5 % of air current.

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.
	Primary display: zero current. Press **enter** to save this value or correct using **arrow keys** and then save by pressing **enter**. Secondary display: currently measured sensor current	Wait for the value to stabilize, can take 10 ... 30 minutes.
	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 primary display. To exit calibration: Select MEAS, then **enter**	To repeat calibration: Select REPEAT, then **enter**
	End of calibration	After end of calibration, the outputs remain in HOLD mode for a short time.

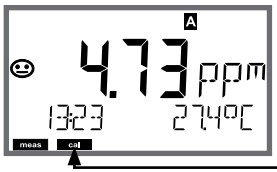
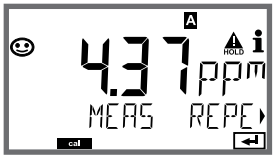
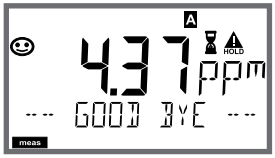
Calibration by Sampling (One-Point Calibration).

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

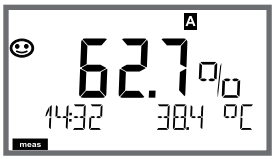
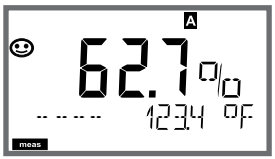
Procedure:

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 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 product calibration: P_CAL Press **enter** to proceed.	If you have protected the calibration with a passcode (in the Service menu), the device will return to measuring mode when an invalid code is entered.
	Ready for calibration. Hourglass blinks. Press **enter** to proceed.	Display (3 sec)
	Take sample and save value. Press **enter** to proceed.	Now the sample can be measured in the lab.

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 (P_CAL).	Display (3 sec) Now the device is in HOLD mode.
	The stored value is displayed (blinking) and can be over-written with the measured sample value. Press **enter** to proceed.	
	Display of new slope and zero. Sensoface is active. Press **enter** to proceed.	Related to 25 °C and 1013 mbar To repeat calibration: Select REPEAT, then **enter**
	Display of new oxy value. Sensoface is active. To exit calibration: Select MEAS, then **enter**	To repeat calibration: Select REPEAT, then **enter**
	End of calibration	After end of calibration, the outputs remain in HOLD mode for a short time.

Display	Action	Remark
	Select CAL_RTD calibration method. 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 (uncompensated) in the lower display.
	The corrected temperature value is displayed. Sensoface is active. To exit calibration: Select MEAS, then **enter**	To repeat calibration: Select REPEAT, then **enter**
	After calibration is ended, the device will switch to measuring mode.	After end of calibration, the outputs remain in HOLD mode for a short time.

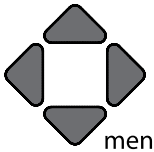
Display	Remark
 or AM/PM and °F:  	From the configuration or calibration menus, you can switch the device to measuring mode by pressing the **meas** key. In the measuring mode the upper display line shows the configured process variable (%, mg/l, ppm or temperature), the lower display line shows the time and the second configured process variable (%, mg/l, ppm or temperature). The [meas] mode indicator lights. **Note:** • After prolonged power outage (> 5 days), the time display is replaced by dashes and cannot be used for processing. In that case, enter the correct time.
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 standard display, see "Display in Measuring Mode" on page 20.	
	Further displays (each by pressing **meas**). 1) Display of tag number ("TAG") 2) Display of time and date (without figure)

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

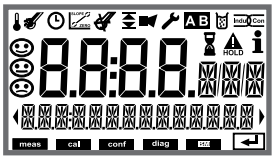
CALDATA	Viewing the calibration data
SENSOR	Viewing the sensor data
SELFTEST	Starting a device self-test
LOGBOOK	Viewing the logbook entries
MONITOR	Displaying currently measured values
VERSION	Displaying device type, software version, serial number

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

Note:
HOLD is not active during Diagnostics mode!

Action	Key	Remark
Activate diagnostics	 menu	Press **menu** key to call the selection menu. 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**.

Display	Menu item
    	**Displaying the calibration data** Select CALDATA using ◂ ▸, confirm by pressing **enter**. Use the ◂ ▸ keys to select from the bottom line of the display (LAST_CAL ZERO SLOPE NEXT_CAL). The selected parameter is shown in the upper display line. Press **meas** to return to measurement.
	**Displaying the sensor data** Manufacturer, type, serial number and last calibration date. In each case Sensoface is active. Display data using ◂ ▸ keys, return by pressing **enter** or **meas**.

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). Proceed by pressing **enter**
	2 **RAM test:** Hourglass blinks, then display of --PASS-- or --FAIL-- Proceed by pressing **enter**
	3 **EEPROM test:** Hourglass blinks, then display of --PASS-- or --FAIL-- Proceed by pressing **enter**
	4 **FLASH test:** Hourglass blinks, then display of --PASS-- or --FAIL-- Proceed by pressing **enter**

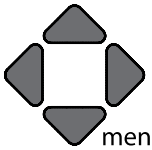
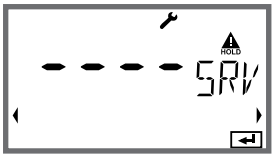
Display	Menu item
  	**Displaying the logbook entries** Select LOGBOOK using ◂ ▸, press **enter** to confirm. With the ▲ ▼ keys, you can scroll backwards and forwards through the logbook (entries -00-...-99-), -00- being the last entry. If the display is set to date/time, you can search for a particular 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.

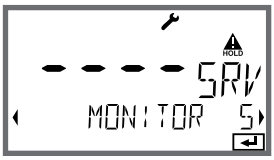
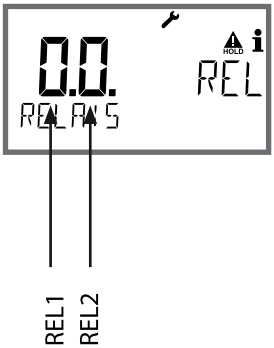
Display	Menu item
 Display examples:  	**Displaying the currently measured values (sensor monitor)** Select MONITOR using ◂ ▸, press **enter** to confirm. Use the ◂ ▸ keys to select the desired parameter from the bottom line of the display. The selected parameter is shown in the upper display line. Press **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
	**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.

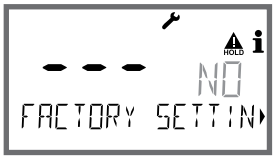
In the Service mode you can access the following menus:

MONITOR	Displaying currently measured values
OUT1	Testing current output 1
OUT2	Testing current output 2
RELAY	Testing the relay function
CODES	Assigning and editing passcodes
DEVICE TYPE	Selecting the device type (pH, Oxy, Cond)
DEFAULT	Resetting the device to factory settings

Note:
HOLD is active during Service mode!

Action	Key/Display	Remark
Activate Service		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.
Display		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 the process variable in the bottom text line using ◂ ▸. The selected parameter is shown in the upper display line. 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 for 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. Confirm by pressing **enter**. 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 relays is "frozen". The 2 digits of the main display represent the respective states (from left to right: REL1, REL2). The selected digit blinks. Select one of the 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
	**Setting the 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 and hardware version 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. **NOTICE!** After a reset to factory setting the device must be reconfigured completely, including the sensor parameters!

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** Configuration or calibration data defective; completely reconfigure and recalibrate the device.
ERR 95	SYSTEM ERROR	**System error** Restart required. If error still persists, send in the device for repair.
ERR 01	NO SENSOR	**Sensor error** Device type not assigned Defective sensor Sensor not connected Break in sensor cable
ERR 02	WRONG SENSOR	**Wrong sensor**
ERR 04	SENSOR FAILURE	**Failure in sensor**
ERR 05	CAL DATA	**Error in cal data**
ERR 11	RANGE	**Display range violation**
ERR 12	MV RANGE	**mV range**
ERR 13	TEMPERATURE RANGE	**Temperature range violation**

Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
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

Sensoface messages:

Calibration timer expired:	OUT OF CAL TIME CALIBRATE OR CHANGE SENSOR
Sensor zero/slope:	SENSOR ZERO/SLOPE CALIBRATE OR CHANGE SENSOR
Sensor response:	SENSOR DRIFT CALIBRATE OR CHANGE SENSOR
Sensor TAG does not correspond to device entry.	WRONG SENSOR TAG
Sensor GROUP does not correspond to device entry.	WRONG SENSOR GROUP xxxx

Sensocheck, Sensoface Sensor Monitoring

Sensocheck continuously monitors the sensor and its wiring.
The three Sensoface indicators provide information on required maintenance of the sensor. Additional icons refer to the error cause.
Pressing the **info** key shows an information text.

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

Sensoface message
The Sensocheck message is also output as error message Err 15.
The alarm contact is active, the display backlighting turns red,
output current OUT is set to 22 mA (when configured correspondingly).
All other Sensoface message can be output via a contact
(relay contacts, alarm --> "FACE").

Disabling Sensocheck and Sensoface

Sensocheck can be switched off in the configuration menu (then Sensoface is also disabled).
Exception:
After a calibration, a smiley is always displayed for confirmation.

Operating status	OUT 1	OUT 2	REL1/2	Time out
Measure				-
DIAG				60 s
CAL				No
CONF				20 min
SERVICE				20 min
SERVICE OUT 1				20 min
SERVICE OUT 2				20 min
SERVICE RELAY				20 min
Cleaning function				No
HOLD				No

Explanation:

as configured (Last/Fix or Last/Off)

active

manual

Devices	**Order No.**
Stratos MS A405N	A405N
Stratos MS A405B (operation in hazardous locations, Zone 2)	A405B

Mounting accessories	
Pipe-mount kit	ZU 0274
Panel-mount kit	ZU 0738
Protective hood	ZU 0737
M12 socket for sensor connection with Memosens cable / M12 connector	ZU 0860

Up-to-date information:
www.knick.de
Phone: +49 30 80191-0
Fax: +49 30 80191-200
Email: info@knick.de

Oxy input	Memosens (terminals 1 … 4)	
Data In/Out	Asynchronous interface, RS-485, 9600/19200 Bd	
Power supply	Terminal 1: +3.08 V/10 mA, Ri < 1 ohm, short-circuit-proof	
Operating modes	GAS	Measurement in gases
	DO	Measurement in liquids
	Temperature measurement	-20 ... 150 °C (depending on sensor)
Display ranges Standard sensor (depending on sensor)	Saturation (–10 ... 80 °C)	0.0 ... 600.0 %
	Concentration (–10 ... 80°C)	0.00 ... 99.99 mg/l
	(Dissolved oxygen)	0.00 ... 99.99 ppm
	Volume concentration in gas	0.00 ... 99.99 %vol
Input correction	Pressure correction *	0.000 ... 9.999 bar / 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 *	CAL_AIR Automatic calibration in air	
	CAL_WTR Automatic calibration in air-saturated water	
	CAL_ZERO Zero calibration	
	P_CAL Product calibration	
	CAL_RTD Temperature probe adjustment	
Pressure correction *	Manual 0.000 ... 9.999 bar / 999.9 kPa / 145.0 PSI	
Calibration timer *	Interval 0000 ... 9999 h	
Sensoface	Provides information on the sensor condition Evaluation of zero/slope, response, calibration interval	

*) user-defined

HOLD input	Galvanically separated (optocoupler)	
Function	Switches device to HOLD mode	
Switching voltage	0 ... 2 V AC/DC	HOLD inactive
	10 ... 30 V AC/DC	HOLD active
Output 1	0/4 ... 20 mA, max. 10 V, floating (terminals 8 / 9, galvanically connected to output 2)	
Overrange *	22 mA in the case of error messages	
Characteristic	Linear	
Output filter *	PT_1 filter, time constant 0 ... 120 s	
Measurement error [1)]	< 0.25% current value + 0.025 mA	
Output 2	0/4 ... 20 mA, max. 10 V, floating (terminals 9 / 10, galvanically connected to output 1)	
Overrange *	22 mA in the case of error messages	
Characteristic	Linear	
Output filter *	PT_1 filter, time constant 0 ... 120 s	
Measurement error [1)]	< 0.25% current value + 0.025 mA	

*) user-defined

1) according to IEC 746 Part 1, at normal operating conditions

Relays 1 / 2	Two relay contacts, floating (terminals 14 / 15 / 16)	
Contact ratings	AC < 250 V / < 3 A / < 750 VA DC < 30 V / < 3 A / < 90 W	
Usage	Limit value Alarm Wash	
Limit value	Function	Min or Max
	Setpoint	As desired within range
	Contact response	N/C or N/O
	Hysteresis	User-defined
	Response delay	0000 ... 9999 s
Alarm	Trigger	Failure or Sensoface
	Contact response	N/C or N/O
Wash	Cycle time	0.1 ... 999.9 h
	ON time	0 ... 1999 s
	Contact response	N/C or N/O
Real-time clock	Different time and date formats selectable	
Power reserve	> 5 days	
Display	LC display, 7-segment with icons, colored backlighting	
Primary 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, info, 4 cursor keys, enter	
Diagnostics		
Calibration data	Calibration date, zero, slope	
Device self-test	Automatic memory test (RAM, FLASH, EEPROM)	
Display test	Display of all segments	
Logbook	100 events with date and time	

Service functions	
Current source	Current specifiable for output 1 and 2 (00.00 ... 22.00 mA)
Sensor monitor	Display of direct sensor signals (mV/temperature/operating time)
Relay test	Manual control of relay contacts
Data retention	Parameters, calibration data, logbook > 10 years (EEPROM)
Electrical safety	Protection against electric shock by protective separation of all extra-low-voltage circuits against mains according to EN 61010-1
Explosion protection (A405B)	see Control Drawing or www.knick.de
EMC	EN 61326
Emitted interference	Class B (residential environment)
Immunity to interference	Industrial environment
RoHS conformity	according to EC directive 2002/95/EC
Power supply	80 V (-15%) ... 230 (+10%) V AC ; approx. 15 VA ; 45 … 65 Hz 24 V (-15%) … 60 (+10%) V DC ; 10 W Overvoltage category II, protection class II
Nominal operating conditions	
Ambient temperature	-20 … +55 °C / -4 … +131 °F
Transport/Storage temperature	-30 … +70 °C / -22 … +158 °F
Relative humidity	10 ... 95 % not condensing
Enclosure	Molded enclosure made of PBT/PC, glass fiber reinforced
Mounting	Wall, pipe/post or panel mounting
Color	Gray, RAL 7001
Ingress protection	IP 67 / NEMA 4X outdoor (with pressure compensation)
Flammability	UL 94 V-0
Dimensions	H 148 mm, W 148 mm, D 117 mm
Control panel cutout	138 mm x 138 mm to DIN 43 700
Weight	1.2 kg (1.6 kg incl. accessories and packaging)
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, recommended torque 0.5 ...0.6 Nm

D

E

M

O

P

Q

R

S

Knick
Elektronische Messgeräte GmbH & Co. KG
Beuckestraße 22
14163 Berlin
Germany

Phone: +49 30 80191-0
Fax: +49 30 80191-200
Web: www.knick.de
Email: info@knick.de

Stratos MS A405: Oxygen Measurement

092753

TA-212.100-oxy-KNE03 20170831 Software version: 1.x