Knick ›

User Manual

Stratos MS A405
Conductivity Measurement

Stratos® **MS**

MEMO SENS

Knick ›

😊 **7.65** PH

14:32   123.4 °C

meas

meas   ⟵   info

menu

www.knick.de
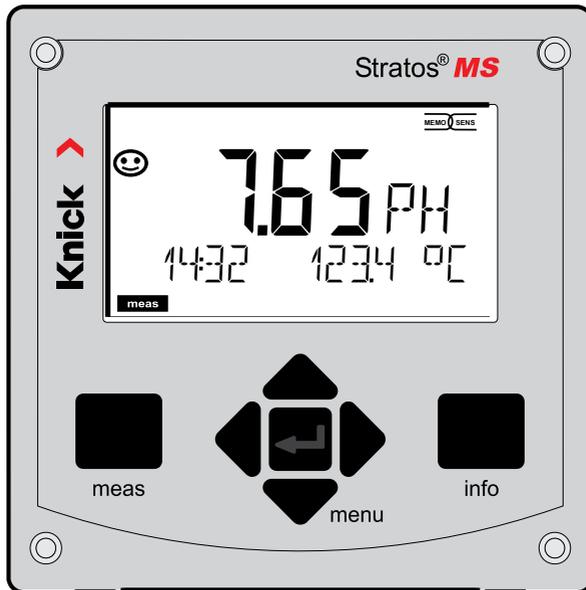
Supplemental Directives

Read this document and retain it for future reference. Before assembling, installing, operating, or maintaining the product, ensure that you fully understand the instructions and risks. Observe all safety instructions. Failure to follow the instructions in this document may result in serious injury and/or property damage.

This document is subject to change without notice.

These supplemental directives explain how safety information is laid out in this document and what content it covers.

Safety Chapter

This document's Safety chapter is designed to give the reader a basic understanding of safety. It illustrates general hazards and gives strategies on how to avoid them.

Safety Guide

The external Safety Guide is designed to give the reader a basic understanding of safety. It illustrates general hazards and suggests strategies on how to avoid them.

Warnings

This document uses the following warnings to indicate hazardous situations:

Symbol	Category	Meaning	Remark
⚠	WARNING	Designates a situation that can lead to death or serious (irreversible) injury.	The warnings contain information on how to avoid the hazard.
⚠	CAUTION	Designates a situation that can lead to slight or moderate (reversible) injury.	
None	NOTICE	Designates a situation that can lead to property or environmental damage.	

Additional Safety Information

Stratos Safety Guide

Table of Contents

Table of Contents

Safety Guide
In official EU languages and others

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

Test Report 2.2 According to EN 10204

Electronic Documentation
www.knick-international.com:
Manuals + software

Safety

Always Read and Observe the Safety Instructions!
The device is constructed in accordance with the latest technology and generally accepted safety rules and regulations.
Under certain circumstances, however, usage may pose risks to users or cause damage to the device.

Commissioning must be carried out by specialist personnel authorized by the operating company. If safe operation is not possible, the device must not be switched on or, if it is already on, must be switched off properly and secured against unintended operation.
Reasons to assume safe operation is not possible:
*   the device shows visible damage
*   failure to perform the intended function
*   prolonged storage at temperature of below -30 °C/-22 °F or above 70 °C/158 °F
*   severe transport stresses

Before recommissioning the device, a professional routine test must be performed. This test should be carried out by the manufacturer at its factory.

Mains Connection
The device does not have a power switch. An appropriately arranged and accessible disconnecting device for the transmitter must be present in the system installation. The disconnecting device must disconnect all non-grounded, current-carrying wires. The disconnecting device must be labeled in a way that enables the associated transmitter to be identified. The power line may carry dangerous touch voltages. Touch protection must be ensured by proper installation.

Personnel Requirements
Customer shall ensure that any personnel using or otherwise interacting with the product is adequately trained and has been properly instructed.
The operating company shall comply and cause its personnel to comply with all applicable laws, regulations, codes, ordinances and relevant industry qualification standards related to product. Failure to comply with the foregoing shall constitute a violation of operating company's obligations concerning the product, including but not limited to an unintended use as described in this document.

Intended Use

Stratos MS is a 4-wire analyzer for use with Memosens sensors. 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)

The defined rated operating conditions must be observed when using this product. They can be found in the Specifications chapter of this User Manual; see page 92.

Function Check Mode (HOLD Function)
After activating configuration, calibration, or service, Stratos MS enters function check mode (HOLD).
The current outputs respond in accordance with the configuration.
Operations must not be carried out while Stratos Pro is in function check (HOLD) mode, as the system may behave unexpectedly and put users at risk.

Introduction

Enclosure and mounting possibilities
- The sturdy molded enclosure is rated IP66/IP67 / TYPE 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
For quasi-stationary installations with Memosens sensors, we recommend using the M12 socket accessory (ZU0822) instead of a cable gland – which allows simple replacement of the sensor cable without opening the device.

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
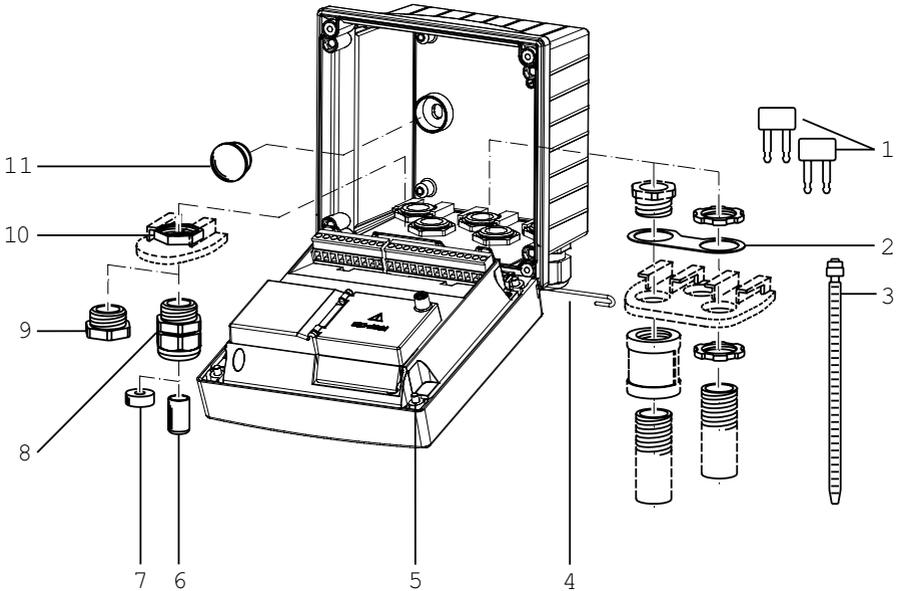
Fig.: Assembling the enclosure

1) Insertable jumper (3x)
2) Plate (1x), for conduit mounting:
   Plate between housing and nut
3) Cable tie (3x)
4) Hinge pin (1x), insertable from
   either side
5) Enclosure screw, captive (4x)
6) Blanking plug (2x)
7) Reduction sealing insert (1x)
8) Cable gland (3x)
9) Blanking cap (2x)
10) Hex nut (5x)
11) Plastic sealing plug (2x),
    for sealing in case of wall mounting

Assembly

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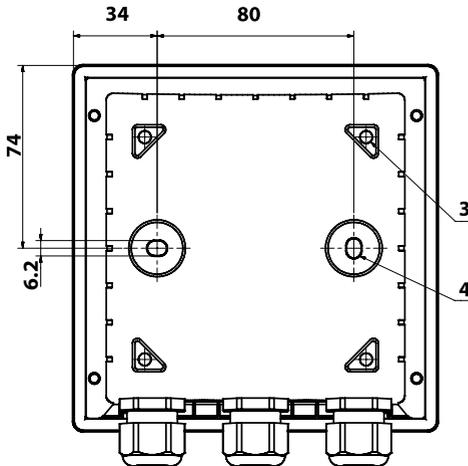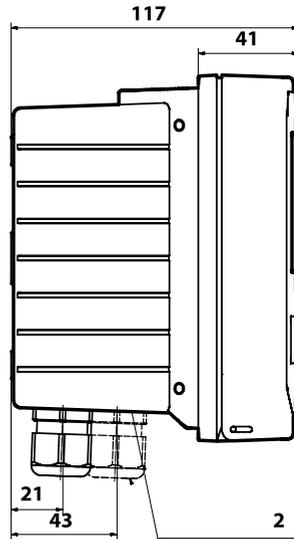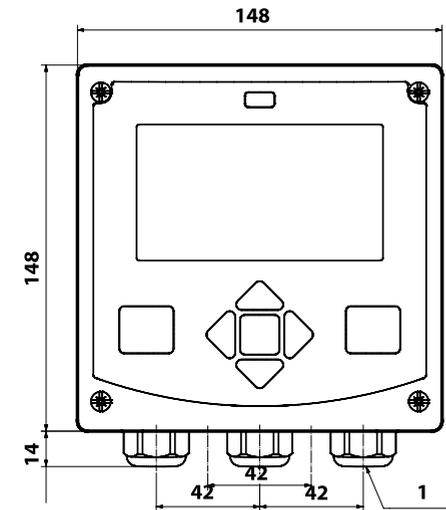
1) Cable gland (3x)
2) Knockouts for cable gland or ½" conduit, dia. 21.5 mm (2 knockouts). Conduit couplings not included!
3) Knockout for pipe mounting (4x)
4) Knockout for wall mounting (2x)

Mounting Accessories
Pipe-mount kit, accessory ZU0274
Protective hood for wall and pipe mounting, accessory ZU0737
Panel-mount kit, accessory ZU0738

All dimensions in mm

Pipe Mounting, Protective Hood

ø40...ø60

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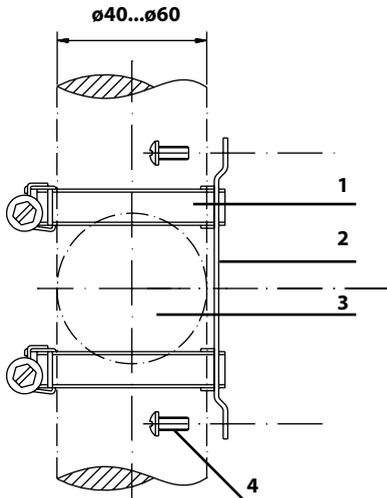
1) Hose clamp with worm gear drive to DIN 3017 (2x)
2) Pipe-mount plate (1x)
3) For vertical or horizontal posts or pipes
4) Self-tapping screw (4x)

Fig.: Pipe-mount kit, accessory ZU0274

199   **147**

185

91

Fig.: Protective hood for wall and pipe mounting, accessory ZU0737

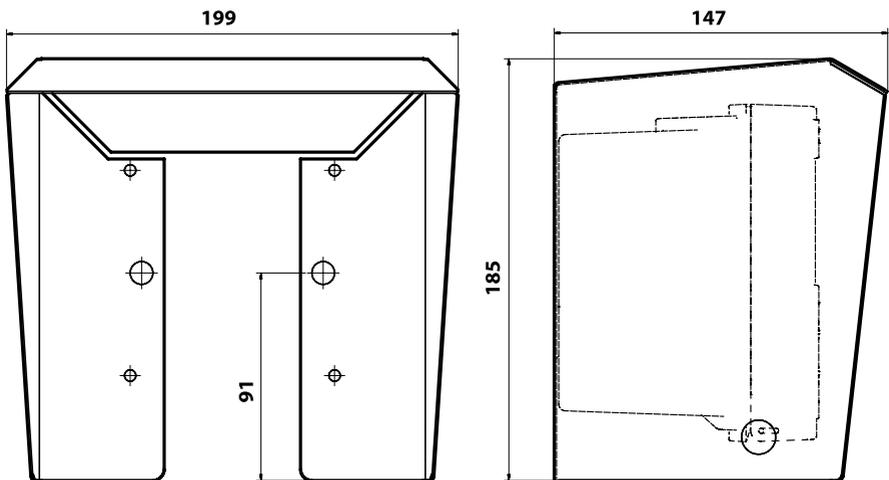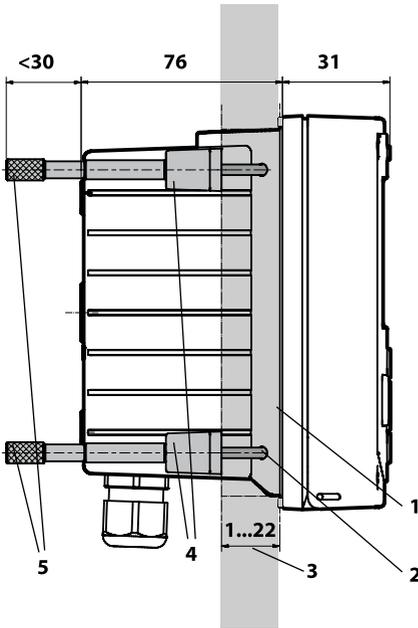All dimensions in mm

11

Panel Mounting
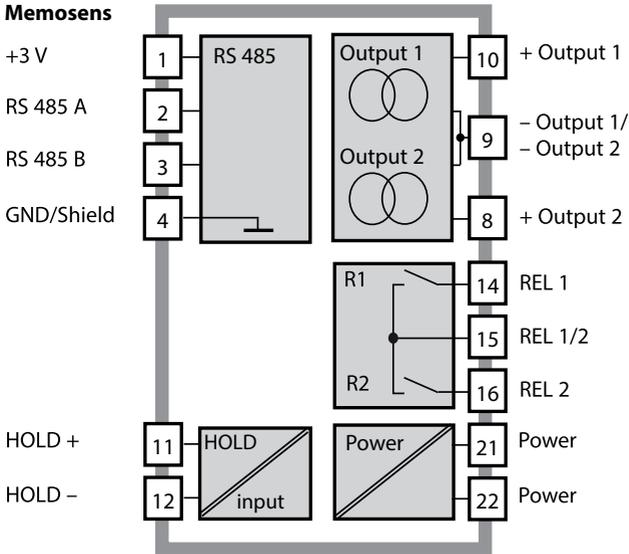

1) Circumferential sealing (1 x)
2) Screw (4 x)
3) Position of control panel
4) Span piece (4 x)
5) Threaded sleeve (4 x)

Cutout
138 x 138 mm (DIN 43700)

Fig.: Panel-mount kit, accessory ZU0738

All dimensions in mm

Overview of the Stratos MS

Memosens

+3 V

RS 485 A

RS 485 B

GND/Shield

1	RS 485		Output 1		10	+ Output 1
2						
3			Output 2		9	– Output 1/ – Output 2
4					8	+ Output 2

R1   14 REL 1

15 REL 1/2

R2   16 REL 2

HOLD +   11 HOLD

HOLD –   12 input

Power   21 Power

22 Power

Terminal Assignments, Rating Plates

The terminals are suitable for single or stranded wires up to 2.5 mm^2 (AWG 14).

22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
24 to 230 V AC/DC		do not connect	do not connect	do not connect	do not connect	REL 2	REL 1		do not connect	HOLD	HOLD	0(4) to 20 mA +	0(4) to 20 mA –	0(4) to 20 mA +	do not connect	do not connect	do not connect	GND/ SHIELD	WH/CL B	YE A	GN BN 3 V

⌐ Power ⌐   ⌐ Contacts ⌐   In Digital   Out 1 Out 2   ⌐ RS 485 ⌐

WARNING:
DO NOT SEPARATE WHEN ENERGIZED!   **DO NOT REMOVE OR REPLACE FUSE WHEN ENERGIZED!**

Fig.: Terminal assignments of Stratos MS

Knick ❭

A4*5N

No. 84194 / 0000000 / 1233

-20 ≤ T$_a$ ≤ +55°C
EnclosureType4X

D-14163Berlin   Made in Germany

Power
80 (-15%) to 230 (+10%) V AC,
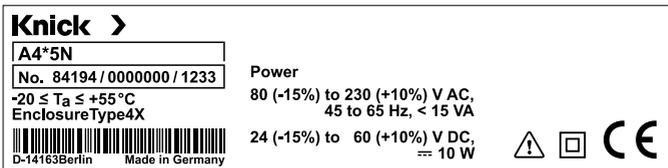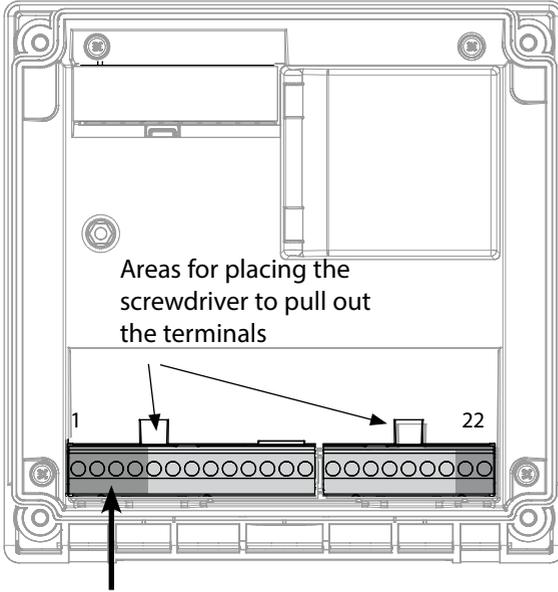**45 to 65 Hz, < 15 VA**

24 (-15%) to 60 (+10%) V DC,
⎓ 10 W

⚠ ▣ CE

Fig.: Stratos MS rating plate at outside bottom of front
(illustrative example)

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)

Areas for placing the
screwdriver to pull out
the terminals

1   22

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.

Settings and specifications

Connected sensor: sensor type, manufacturer, order code and serial number

Function selection: The selected function is highlighted.

Connected sensor: sensor type, manufacturer, order code and serial number, measuring point and tag number

Last adjustment

You can magnify a measured-value display at a click of the mouse.

Wiring Example SE670 / SE680

Device — terminals: 1 (+ 3 V), 2 (RS485 (A)), 3 (RS485 (B)), 4 (GND / shield)

Cable — Brown, Green, Yellow, White, Transparent
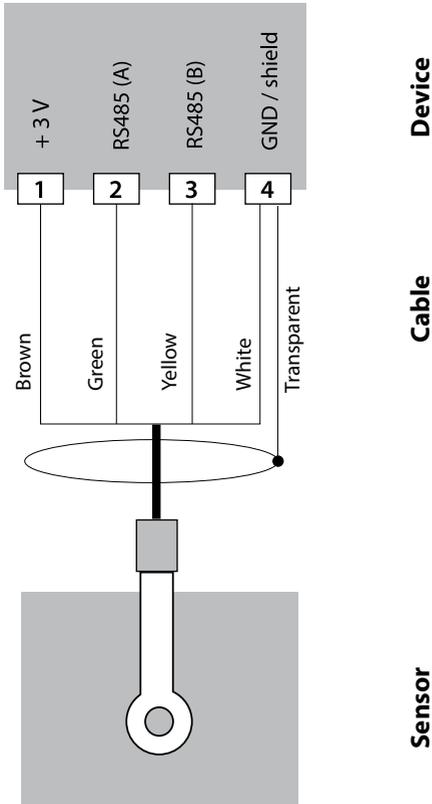
Sensor

Connect the SE670 / SE680 sensor to the RS-485 interface of the device. When SE670 / SE680K is selected as sensor in the Configuration menu, the default values are taken as calibration data. They can then be modified by calibration.
All calibration data of the SE680M sensor with Memosens protocol are stored in the sensor.
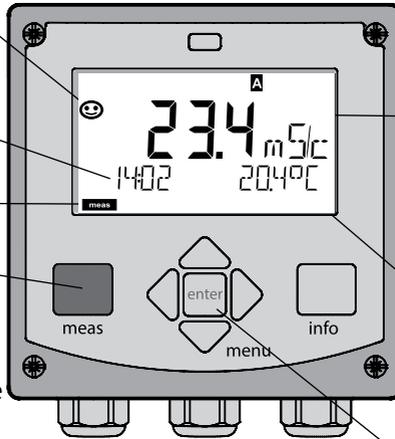
Measuring Mode

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).

Sensoface indicator
(sensor status)

Time

Mode indicator
(measuring)

Hold **meas** key depressed
for calling the measuring mode
(hitting the key once more switches the display)

Display indicates OUT1:
e.g., measured value

Display indicates OUT2:
e.g., temperature

enter key

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.

You must configure the analyzer for the respective measurement task, see page 29.
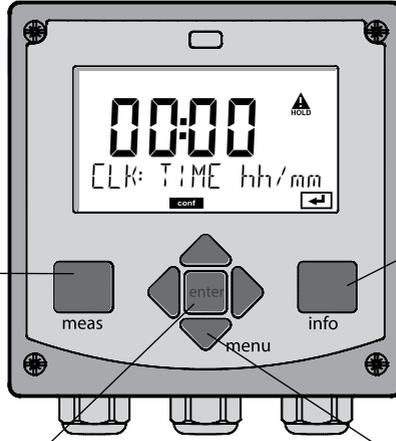
The Keys and Their Functions

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
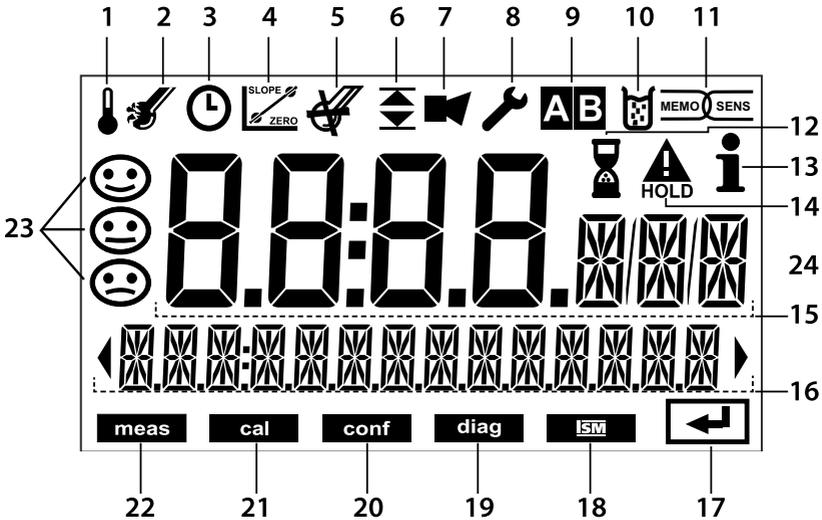- Retrieve information
- Show error messages

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

menu
- Measuring mode: Call menu

The Display

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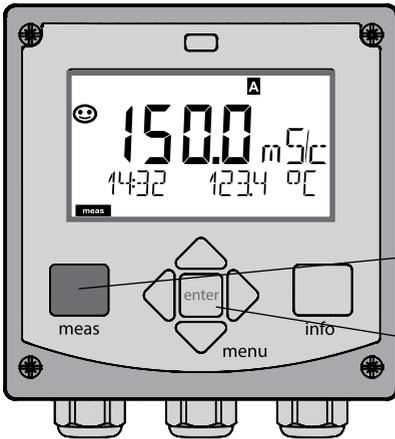
The MAIN DISPLAY is the display which is shown in measuring mode. To call the measuring mode from any other mode, hold the **meas** key depressed for at least 2 sec.

meas key

enter key

meas

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.

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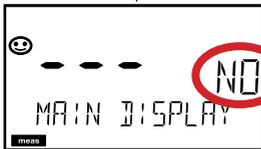
Press **enter** to select a display as MAIN DISPLAY (displayed permanently in measuring mode).

The secondary display shows "MAIN DISPLAY – NO".

approx. 2 s

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

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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

Selection menu

Selected mode (blinks)
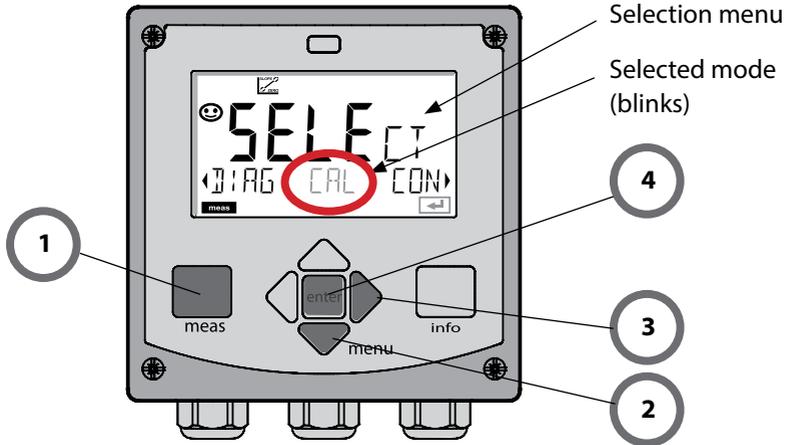
To enter a value:
5) Select numeral: left / right arrow
6) Change numeral: up / down arrow
7) Confirm entry by pressing **enter**
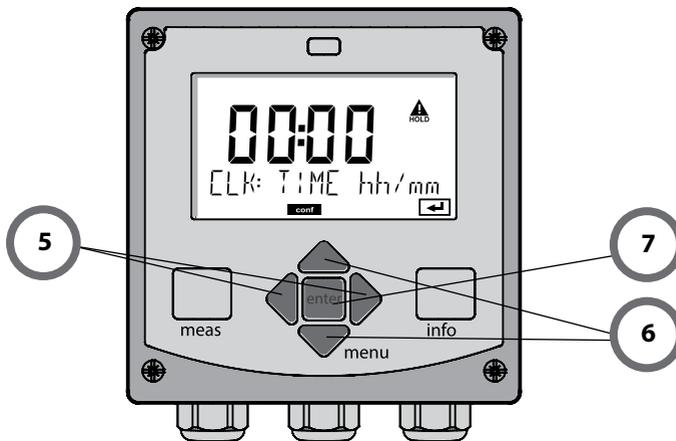
Operating Modes

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:

⚠
HOLD

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:
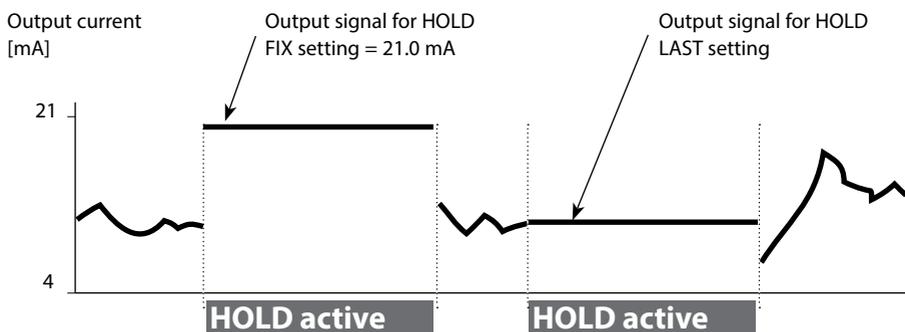
Terminating the HOLD mode
The HOLD mode is exited by switching to measuring mode (hold **meas** key depressed). The display reads "Good Bye". After that, the HOLD mode is exited. When the calibration mode is exited, a confirmation prompt ensures that the installation is ready for operation (e.g.: sensor 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

Operating Modes / Functions

Measuring mode (main display selectable)	meas →	TAG display	meas →	CLK display	meas →

↓ after 60 s   ↓ after 60 s
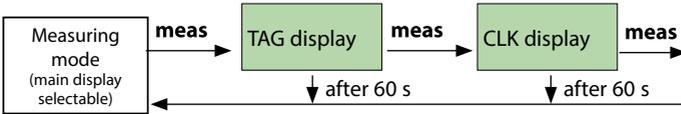
Pressing the **menu** key (down arrow) opens the selection menu.
Select the menu group using the left/right arrow keys.
Pressing **enter** opens a menu item. Press **meas** to return.

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 / prod. cal.
	COND(I)	Adjustment with solution / factor input / prod. cal.
	CAL_RTD	Adjustment of temperature probe

CONF	CONF	Configuration See "Overview of Configuration" on next page.

SERVICE	MONITOR	Display of measured values for validation (simulators)
(Access via code, factory setting: 5555)	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

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The configuration steps are assigned to different menu groups.

Using the left/right arrow keys, you can jump between the individual menu groups.

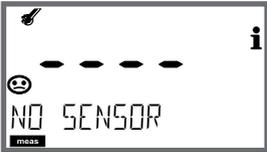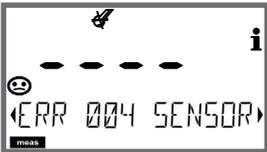Each menu group contains menu items for setting the parameters.

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:	ConF SENSOR	enter
	Menu item 1			enter
	⋮			enter
	Menu item ...			enter
	Current output 1	OT1:	ConF OUT 1	enter
	Current output 2	OT2:	ConF OUT2	
	Compensation	COR:	ConF CORRECTION	
	Alarm mode	ALA:	ConF ALARM	
	Relay outputs (LIMIT / ALARM / WASH)	REL:	ConF REL 1/REL2	
	Setting the clock	CLK:	ConF CLOCK	
	Tag number	TAG:	ConF 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.

Replacing a Sensor

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.	 SEnSoR IDENTIFICATION	
Check sensor data	 SEnSoR MEMOSENS 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 the selection menu. Hold **meas** key depressed: Device switches to measuring mode.	

Configuration

⚠️ **CAUTION!** Incorrect parameter settings or adjustments can result in incorrect outputs. Stratos MS must therefore be commissioned by a system specialist, all its parameters must be set, and it must be fully adjusted. For detailed information on parameter setting and adjustment, see the user manual

Configuration: Overview

Configuration (default in bold print)			
Sensor			**Cond**
SNS	MEAS MODE		**Cond** Conc % SAL ‰
	Cond	MEAS RANGE	x.xxx µS/cm * xx.xx µS/cm * xxx.x µS/cm * xxxx µS/cm * x.xxx mS/cm xxxx mS/cm ** xx.xx mS/cm **xxx.x mS/cm** x.xxx S/m xx.xx S/m xx.xx MΩ *
	Conc	SOLUTION	**-01- (NaCl)** -02- (HCl) -03- (NaOH) -04- (H_2SO_4) -05- (HNO_3) -06- (H_2SO_4) -07- (HCl) -08- (HNO_3) -09- (H_2SO_4) -10- (NaOH) -11- ($H_2SO_4 \cdot SO_3$) (oleum) -U1-
	TEMP UNIT		**°C** / °F
	CHECK TAG		**OFF** / ON
	CHECK GROUP		**OFF** / ON

* not for toroidal (inductive) conductivity sensors ** only for inductive conductivity measurement

Configuration (default in bold print)			
Current output 1		**Cond**	
OT1	RANGE		**4 ... 20 mA** / 0 ... 20 mA
	CHANNEL		**COND** / TMP
	OUTPUT (Current output curve)		**LIN** / BILIN / LOG (LOG for S/cm and S/m only)
	LIN	BEGIN 0/4 mA	Floating-point input, **000.0 mS/c**
		END 20 mA	Floating-point input, **100.0 mS/c**
	LOG	BEGIN 0/4 mA	**Selectable decades:** S/cm: 1.0 µS/cm / 10.0 µS/c / 100.0 µS/c / **1.0 mS/c** / 10.0 mS/c / 100.0 mS/c / 1000 mS/c S/m: 0.001 S/m / 0.01 S/m / 0.1 S/m / 1.0 S/m / 10.0 S/m / 100 S/m
		END 20 mA	Decades (see above) **100.0 mS/c**
	BI LIN	BEGIN 0/4 mA	Range depending on selected channel
		END 20 mA	Range depending on selected channel
		CORNER X	Conditions for bilinear characteristic: Vertex X: BEGIN ≤ CORNER X ≤ END (rising) BEGIN ≥ CORNER X ≥ END (falling)
		CORNER Y	Default: 12 mA Vertex Y: (0 mA) 4 mA ≤ CORNER Y ≤ 20 mA
	TMP °C	BEGIN 0/4 mA	–50 ... 250 °C (**000.0 °C**)
		END 20 mA	–50 ... 250 °C (**100.0 °C**)
	TMP °F	BEGIN 0/4 mA	–58 ... 482 °F (**032.0 °F**)
		END 20 mA	–58 ... 482 °F (**212.0 °F**)
	ERROR		Output current for error message **OFF** / FAIL / FACE (Sensoface)
	FILTERTIME		Output filter, time interval **0 s** ... 120 s (0 s = filter OFF)
	HOLD		Output current for HOLD **LAST** / FIX
Current output 2		**Default setting CHANNEL: TMP (other settings like OT1)**	

Correction			Cond
COR	TC SELECT		**OFF** / LIN / NLF / compensation for ultrapure water: NaCl, HCl, NH3, NaOH
	LIN	TC LIQUID	00.00 ... 19.99 %/K (**00.00 %/K**)
		REF TEMP	000.0 ... 199.9 °C (**025.0 °C**)

Configuration (default in bold print)		
Alarm		
ALA	DELAYTIME	Delay 0 ... 600 s (**0010 SEC**)
	SENSOCHECK	ON / **OFF**
	TEMPCHECK	ON / **OFF**
Relay 1		
RL1	**LIMIT** ALARM WASH	The following submenu depends on the selected setting.
LM1	CHANNEL	**COND** / TMP
	FUNCTION	**Lo LEVL** / Hi LEVL
	CONTACT	**N/O** / N/C
	LEVEL	**000.0 mS/cm**
	HYSTERESIS	**005.0 mS/cm** 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** / 0.0 ... 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)		

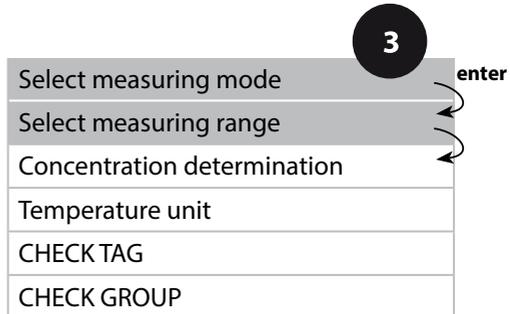| Time/date		
CLK	FORMAT	**24 h** / 12 h
	24 h	hh:mm
	12 h	hh:mm (AM / PM) 00 ... 12:59 AM / 1 ... 11:59 PM
	DAY / MONTH	dd.mm
	YEAR	2000 ... 2099
Measuring points (TAG / GROUP)		
TAG	The entries are made in the text line.	A...Z, 0...9, – + < > ? / @
GROUP	The entries are made in the text line.	0000...9999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

Configuring the Sensor
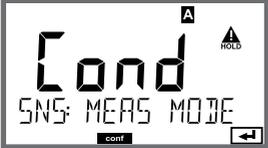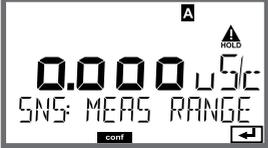
Device Type: Cond / CondI

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** 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**.
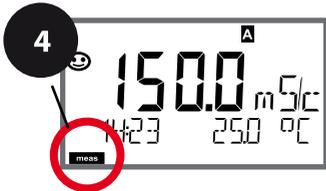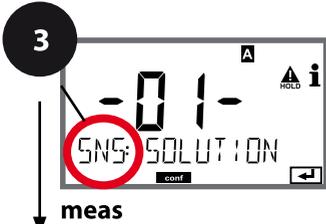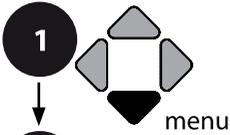4 Exit: Press **meas** key until the [meas] mode indicator is
   displayed.

Select measuring mode
Select measuring range
Concentration determination
Temperature unit
CHECK TAG
CHECK GROUP

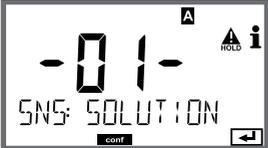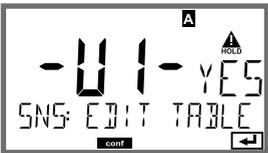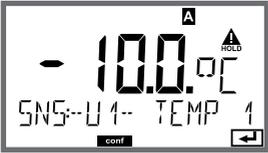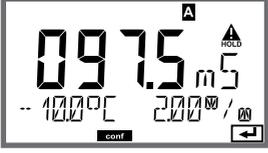| Menu item	Action	Choices
Select measuring mode **Cond** SNS: MEAS MODE conf	Select desired mode using ▲ ▼ keys. Press **enter** to confirm.	**Cond** Conc % Sal ‰
Select measuring range 0.000 µSc SNS: MEAS RANGE conf	**For cond measurement only** Select desired measuring range using ▲ ▼ keys. Press **enter** to confirm.	x.xxx µS/cm, xx.xx µS/cm xxx.x µS/cm, xxxx µS/cm x.xxx mS/cm, xx.xx mS/cm **xxx.x mS/cm**, x.xxx S/m xx.xx S/m, xx.xx MΩ

Configuring the Sensor

Concentration Determination, Temperature Unit

1

menu

2

SELECT
CONF

meas

enter

3

-01-
⚠ i
HOLD
SNS: SOLUTION
conf

meas

4

150.0 mS/c
4:23   25.0 °C
meas

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**.
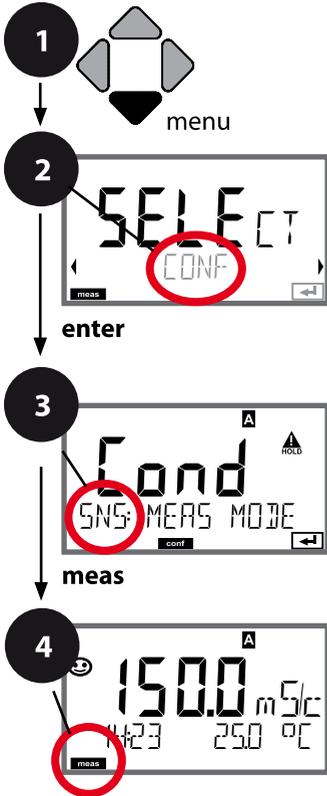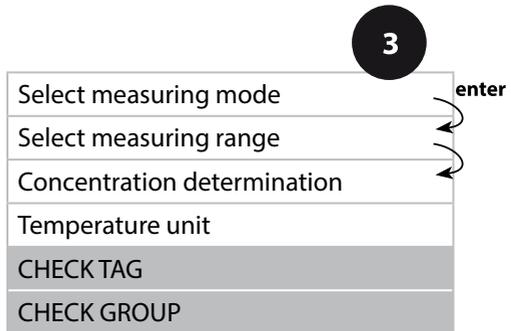4   Exit: Press **meas** key until the [meas] mode indicator is
     displayed.

3

Select measuring mode	**enter**
Select measuring range	
Concentration determination	
Temperature unit	
CHECK TAG	
CHECK GROUP	

Menu item	Action	Choices
Concentration determination	**For conc measurement only** Select desired concentration solution using ▲ ▼ keys. Press **enter** to confirm.	**-01- (NaCl),** -02- (HCl), -03- (NaOH), -04- (H_2SO_4), -05- (HNO_3), -06- (H_2SO_4), -07- (HCl), -08- (HNO_3), -09- (H_2SO_4), -10- (NaOH), -11- ($H_2SO_4 \cdot SO_3$) (Oleum), -U1-

-U1-: Specifying a Concentration Solution for Conductivity Measurement
To specify a custom solution, 5 concentration values are entered in a matrix together with 5 temperature values 1 ... 5. First enter the 5 temperature values, then the corresponding conductivity values for each of the concentrations 1 ... 5.
These solutions are then available as "U1" in addition to the default standard solutions.

	Press **enter** to confirm	
	Use the arrow keys ▲ ▼ ◄ ► to enter temperature values 1 ... 5. Confirm with **enter**	Input range: –50...250 °C / –58...482 °F
	Use the arrow keys ▲ ▼ ◄ ► to enter concentration value 1. Confirm with **enter**	
	For concentration value 1: Use the arrow keys ▲ ▼ ◄ ► to enter conductivity values for temperatures 1 ... 5. Confirm with **enter**	
Temperature unit	Select °C or °F using ▲ ▼ keys. Press **enter** to confirm.	**°C** / °F
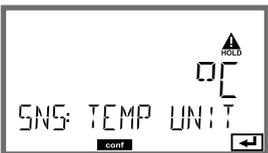
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Sensor Verification (TAG, GROUP)

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.

| Select measuring mode |
| Select measuring range |
| Concentration determination |
| Temperature unit |
| CHECK TAG |
| CHECK GROUP |

Menu item	Action	Choices
TAG **On** HOLD SNSCHECK TAG conf ⏎	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 **On** HOLD SNSCHECK GROUP conf ⏎	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.

Configuring the Current Output
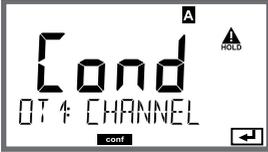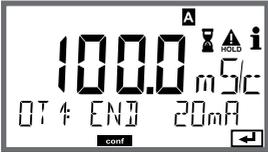
Output Current: Range, Current Start/End
(Example: current output 1, device type Cond)

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.

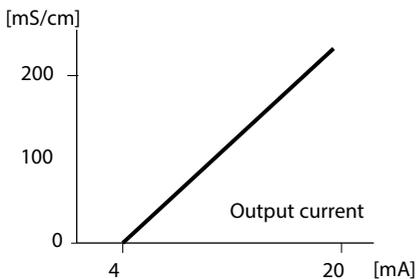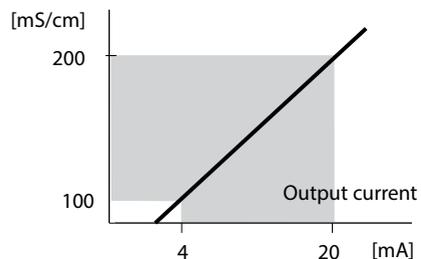| Current range |
| --- |
| Process variable |
| Current start |
| Current end |
| Time averaging filter |
| Output current during error message |
| Output current for Sensoface message |
| Output current during HOLD |
| Output current for HOLD FIX |

Menu item	Action	Choices
Current range **4-20**mA OT 1 RANGE conf	Select 4-20 mA or 0-20 mA range using ▲ ▼ keys. Press **enter** to confirm.	**4-20 mA** / 0-20 mA
Process variable Cond OT 1 CHANNEL conf	Select using ▲ ▼ keys. Cond: Conductivity TMP: Temperature Press **enter** to confirm. Then select characteristic (LIN/biLIN/LOG).	**Cond**/TMP TMP OT 1 CHANNEL conf
Current start 000.0 mS/c OT 1 BEGIN 4mA conf	Modify digit using ▲ ▼ keys, select next digit using ◄ ► keys. Press **enter** to confirm.	Entered value applies to selected process variable/range. If the adjusted range is exceeded, the device automatically switches to the next higher range (Autorange)
Current end 100.0 mS/c OT 1 END 20mA conf	Enter value using ▲ ▼ ◄ ► keys. Press **enter** to confirm.	Entered value applies to selected process variable/range. If the adjusted range is exceeded, the device automatically switches to the next higher range (Autorange)

Assignment of measured values: Current start and current end

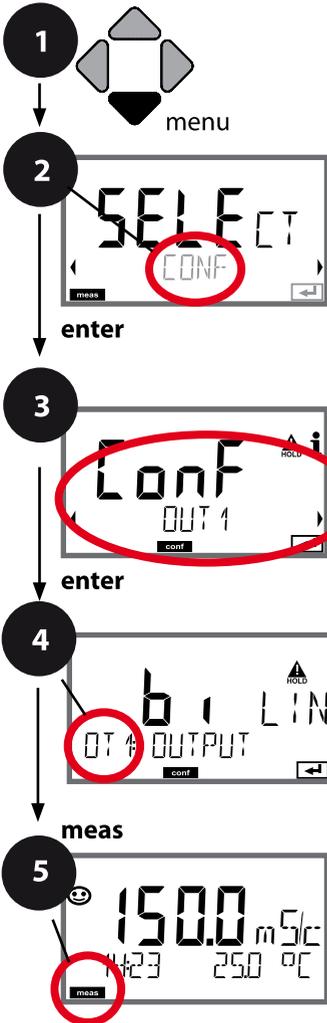Example 1: Measuring range 0 … 200 mS/cm

Example 2: Measuring range 100 … 200 mS/cm
Advantage: Higher resolution in range of interest

Output Current: Curve

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.

Current range
Process variable
LIN/biLIN/LOG output
Current start
Current end
Bilinear: Vertex X
Bilinear: Vertex Y
Time averaging filter
Output current during error message
Output current for Sensoface message
Output current during HOLD
Output current for HOLD FIX

| Menu item	Action	Choices
Output current curve **b ı LIN** OT 1 OUTPUT	Select using ▲ ▼ keys, confirm by pressing **enter**	**LIN** Linear characteristic biLIN Bilinear curve LOG Logarithmic curve
Current start and current end **000.0** mS/c OT 1 BEGIN 4mA	Enter value using ▲ ▼ ◄ ► keys. Press **enter** to confirm.	Entered value applies to selected process variable/range. If the adjusted range is exceeded, the device automatically switches to the next higher range (Autorange)
Bilinear curve: Vertex X/Y **0005** uS OT 1 CORNER X	Enter value using ▲ ▼ ◄ ► keys. Press **enter** to confirm.	Entered value applies to selected vertex of bilinear curve "Corner X" (process variable) and "Corner Y" (output current) – see figure below.

Vertex of bilinear curve

Output current
[mA]
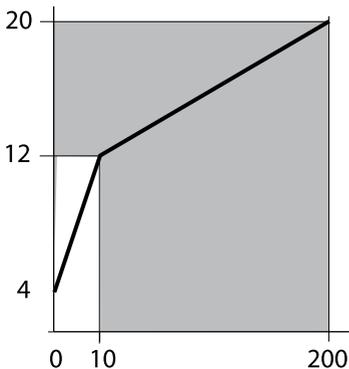
Example:
Current range 4 ... 20 mA
Current start: 0 µS/cm
Current end: 200 µS/cm
Vertex:
"CORNER X": 10 µS/cm (process variable)
"CORNER Y": 12 mA (output current)
Result: The output current change in the range 0 ... 10 µS/cm is much greater than in the range 10 ... 200 µS/cm.

Process variable
[µS/cm]

41

Output Current: Logarithmic Curve

Nonlinear output current characteristic: allows measurements over several decades, e.g., measuring very low values with a high resolution and high values with a low resolution.
Parameters required: Start and end value

Possible start and end values
The start value must be at least one decade lower than the end value. Start value and end value must be specified in the same units (either in µS/cm or in S/m, see listing):

1.0 µS/cm	
10.0 µS/cm	0.001 S/cm
100.0 µS/cm	0.01 S/cm
1.0 mS/cm	0.1 S/cm
10.0 mS/cm	1.0 S/cm
100.0 mS/cm	10.0 S/cm
1000 mS/cm	100 S/cm

The start value
is the next decade value below the lowest measured value.

The end value
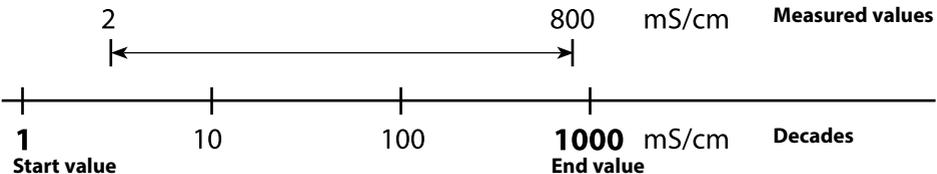is the next decade value above the highest measured value.

The number of decades results from:
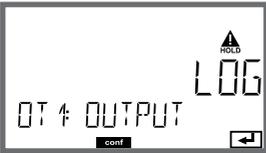Number of decades = log (end value) – log (start value)

The output current value is defined as follows:

$$\text{Output current} = 16\,\text{mA} * \frac{\log(\text{measured value}) - \log(\text{start value})}{\text{Number of decades}} + 4\,\text{mA}$$

Menu item	Action	Choices
Logarithmic curve Output current	Select using ▲ ▼ keys, confirm by pressing **enter**	**LOG** Logarithmic curve
		biLIN Bilinear curve
		LIN Linear characteristic
Start value	Enter value using ▲ ▼ ◄ ► keys. Press **enter** to confirm.	Start value of logarithmic output curve
End value	Enter value using ▲ ▼ ◄ ► keys. Press **enter** to confirm.	End value of logarithmic output curve
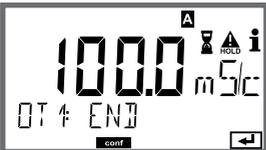
Possible start and end values for the logarithmic curve

S/cm:
1.0 µS/cm, 10.0 µS/cm, 100.0 µS/cm,
1.0 mS/cm, 10.0 mS/cm, 100.0 mS/cm, 1000 mS/cm

S/m:
0.001 S/m, 0.01 S/m, 0.1 S/m, 1.0 S/m, 10.0 S/m, 100 S/m

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Output Current: Time Averaging Filter

Example: Current Output 1

1

menu

2

SELE ct
CONF

meas

enter

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.

3

ConF
OUT 1

conf

enter

4

0000 SEC
OT 1: FILTERTIME

conf

meas

5

150.0 mS/c
443   25.0 °C

meas

4

enter

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

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

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.
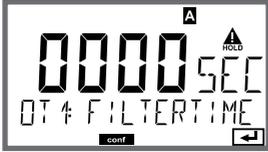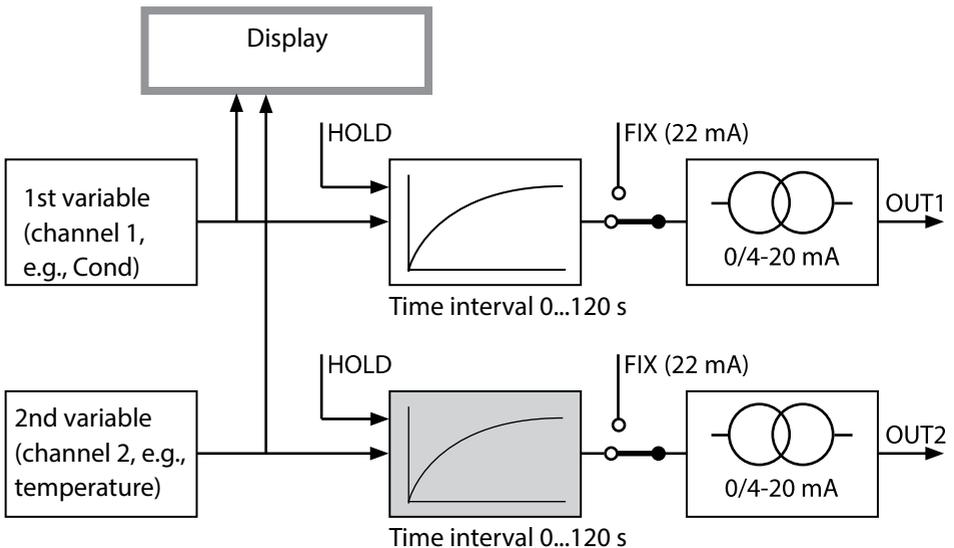
Output Current: Error and HOLD

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.

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

46

Menu item	Action	Choices

Output current during error message
 	
`OFF`
`OT1 FAIL 22mA`
⚠ HOLD / conf ↵
	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
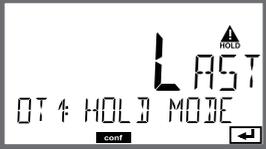 	
`LAST`
`OT1 HOLD MODE`
⚠ HOLD / conf ↵
	LAST: During HOLD the last measured value is maintained at the output.
	FIX: During HOLD a value (to be entered) is maintained at the output.
	Select using ▲ ▼
	Press **enter** to confirm.
		LAST/FIX

Output current for HOLD IX
 	
`12.00 mA`
`OT1 HOLD FIX`
⚠ HOLD / conf ↵
	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 [mA]   Output signal for HOLD FIX setting = 21.0 mA   Output signal for HOLD LAST setting

HOLD active   HOLD active

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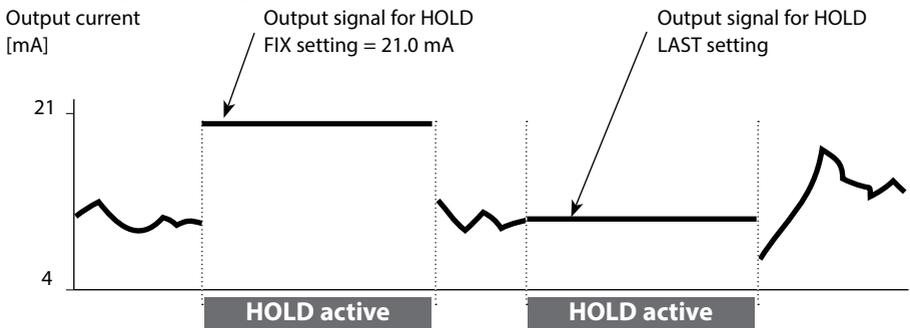
Configuring the Alarm

Alarm Delay, Sensocheck, Tempcheck

1

menu

2

SELEct
CONF

enter

3

ConF
ALARM

enter

4

0010 SEC
ALA: DELAYTIME
conf

meas

5

150.0 mS/c
1423   25.0 °C
meas
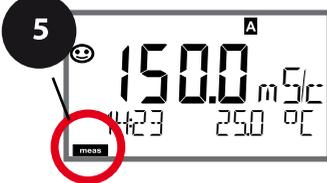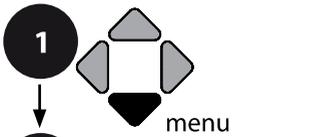
1 Press **menu** key.
2 Select **CONF** using ◀ ▶,
   press **enter**.
3 Select **ALARM** menu using ◀ ▶ keys,
   press **enter**.
4 All items of this menu group are indicated by the
   "ALA:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) by pressing **enter**.
5 Exit: Press **meas** key until the [meas] mode indicator is
   displayed.

4

enter

| Alarm: Delay |
| Alarm: Sensocheck |
| Alarm: Tempcheck |

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Menu item	Action	Choices

Alarm delay
 	
`0010 SEC`
`ALA DELAY TIME`
HOLD / conf
	Enter value using ▲ ▼ ◄ ► keys.
	Press **enter** to confirm.
		0...600 SEC
		(10 SEC)

Sensocheck
 	
`OFF`
`ALA SENSOCHECK`
HOLD / conf
	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**

Tempcheck	To monitor the temperature probe with TC OFF selected: Select Tempcheck ON using ▲ ▼ keys. Press **enter** to confirm. Now, the temperature probe will be monitored.	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.

Temperature Compensation

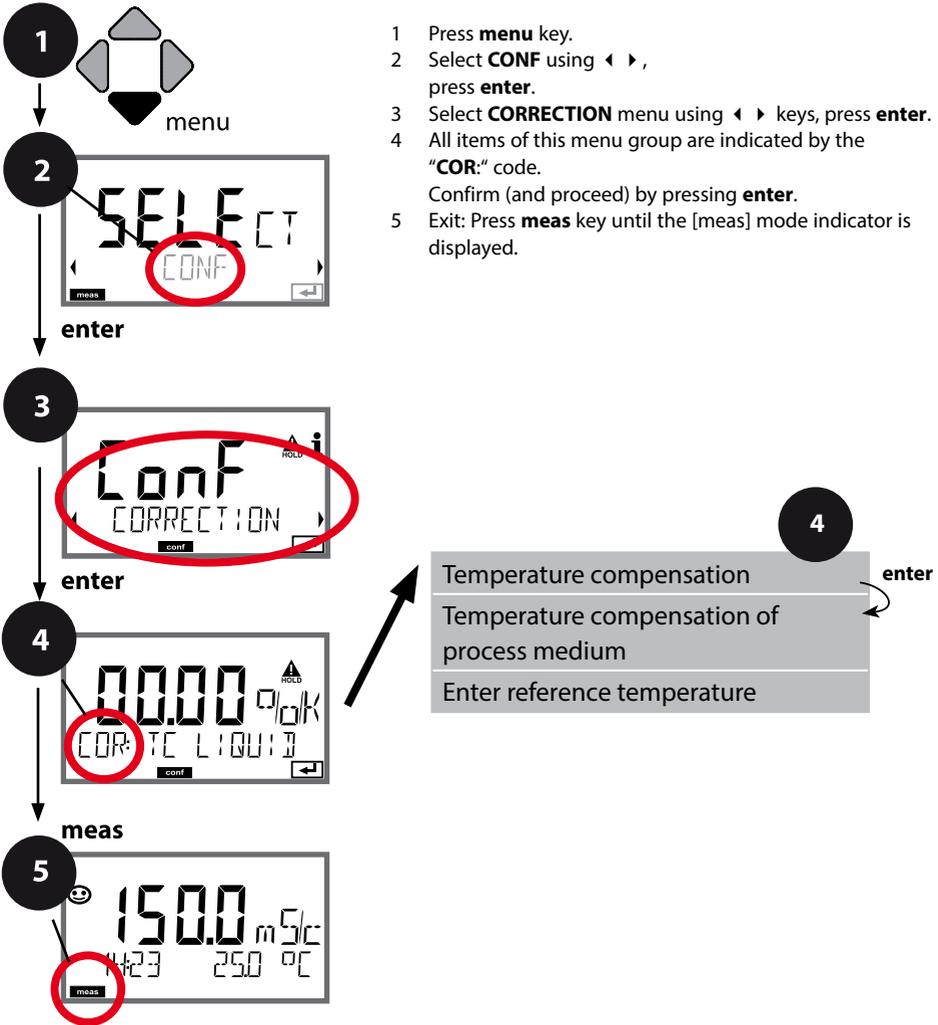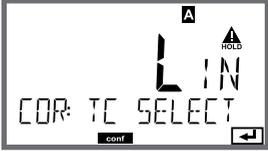## Selecting the compensation method

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.

1

menu

2

SELECt
CONF
meas

enter

3

ConF
CORRECTION
conf

enter

4

00.00 %/K
COR: TC LIQUID
conf

Temperature compensation	**enter**
Temperature compensation of process medium	
Enter reference temperature	

4

meas

5

150.0 mS/c
4:23   25.0 °C
meas

50

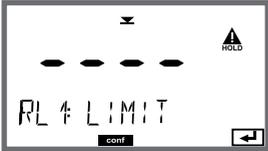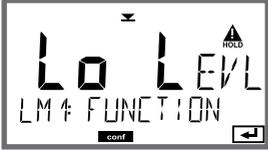| Menu item	Action	Choices
Temperature compensation	Select desired compensation using ▲ ▼ keys: **OFF:** Temperature compensation switched off	**OFF** COR: TC SELECT
	LIN: Linear temperature compensation with entry of temperature coefficient and reference temperature	**L IN** COR: TC SELECT
	nLF: Temperature compensation for natural waters to EN 27888	**nLF** COR: TC SELECT
	NaCl, HCL, NH3, NaOH: Ultrapure water with traces of impurity (0 ... +120 °C /+32 ... +248 °F)	**nACL** COR: TC SELECT
Temperature compensation of process medium	**With linear compensation only:** Step 1: Enter temperature compensation of the process medium.	**00.00** %/K COR: TC LIQUID
Enter reference temperature	Step 2: Enter reference temperature Enter value using ▲ ▼ ◄ ► keys Press **enter** to confirm. Permissible range 0 ... 199.9 °C	**025.0** °C COR: REF TEMP

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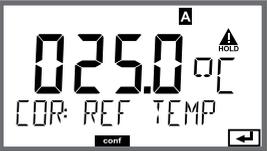
Configuring the Relay Contacts

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.

| Use of relays |
|---|
| 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.	**Cond**/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.	within measuring range

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Relay Contacts: Limit Function, Hysteresis

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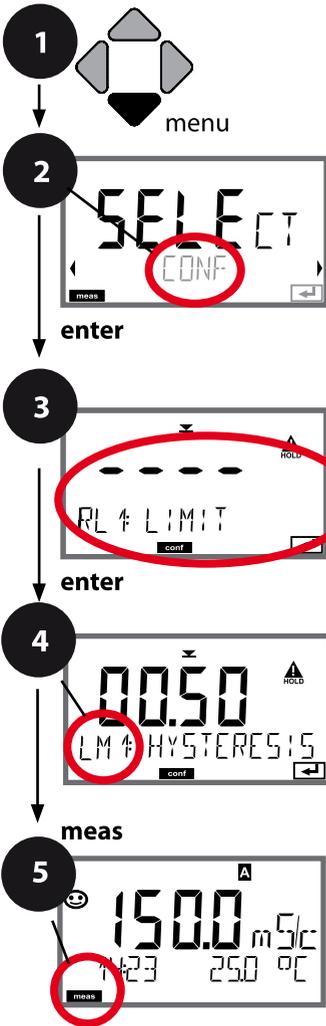
1 Press **menu** key.
2 Select **CONF** using ◀ ▶,
press **enter**.
3 Select **RELAY1** menu using ◀ ▶ keys,
press **enter**.
Specify relay contact function: **LIMIT**.
4 All items of this menu group are indicated by the
"**LM1:**" code.
Press **enter** to select menu,
edit using arrow keys (see next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

1

menu

2

SELE CT
CONF
meas

enter

3

RL 1: LIMIT
conf

enter

4

00.50
LM 1: HYSTERESIS
conf

meas

5

150.0 mS/c
+123   25.0 °C
meas

	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	

54

Menu item	Action	Choices
Limit 1 hysteresis **0 10.0** mS/c LM1 HYSTERESIS conf	Select hysteresis using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0...50 % full scale
Limit 1 delay **00 10** SEC LM 1 DELAY TIME conf	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
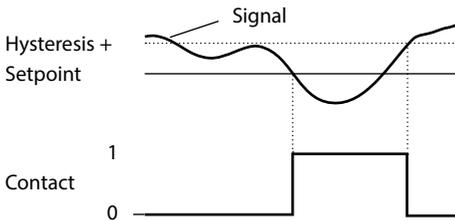
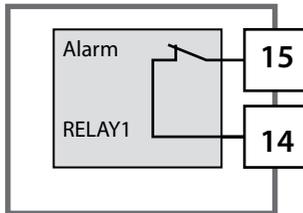**Limit Hi**
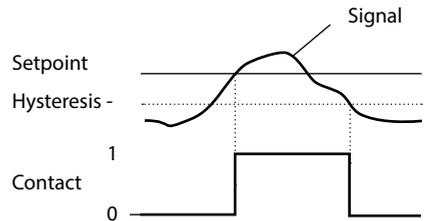
Relay Contacts: Alarm

(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.

Use of relays
Alarm
Contact response

Menu item	Action	Choices
Alarm **FAIL** AL 1: TRIGGER HOLD · conf · ↵	Select error messages (FAIL) or Sensoface messages (FACE) as trigger signal using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	**FAIL** / FACE
Contact response **NO** AL 1: CONTACT HOLD · conf · ↵	N/O: normally open contact N/C: normally closed contact Select using ▲ ▼ keys. Press **enter** to confirm.	**N/O** / N/C

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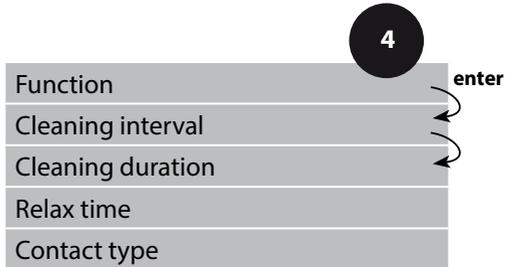
A relay contact (RELAY1 / RELAY2) can be configured as alarm contact.

Alarm — 15

RELAY1 — 14

Relay Contacts: Controlling a Rinsing Probe
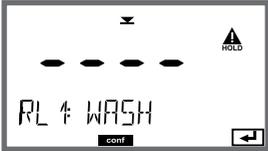
(Example: relay 1)

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.

| Function |
| Cleaning interval |
| Cleaning duration |
| Relax time |
| Contact type |

Menu item	Action	Choices
Use of relays RL 1: WASH	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 000.0 h WS 1: CYCLE TIME	Adjust value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0.0...999.9 h (**000.0 h**)
Cleaning duration 060.0 SEC WS 1: 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 NO WS 1: CONTACT	N/O: normally open contact N/C: normally closed contact Select using ▲ ▼ keys. Press **enter** to confirm.	**N/O** / N/C

Cleaning | Relax time adjustable

Cycle interval | HOLD
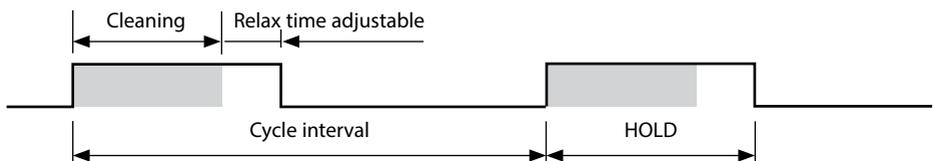
Protective Wiring of Relay Contacts

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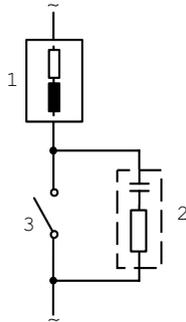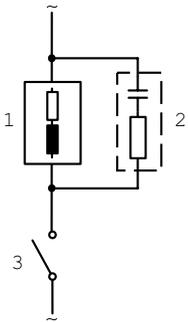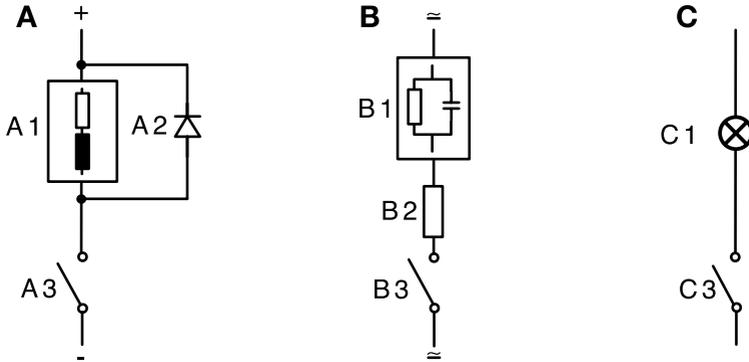
Typical AC applications with inductive load
1 Load
2 RC combination,
  e.g., RIFA PMR 209
  Typical RC combinations for
  230 V AC:
  capacitor 0.1 µF / 630 V,
  resistor 100 Ω / 1 W
3 Contact

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
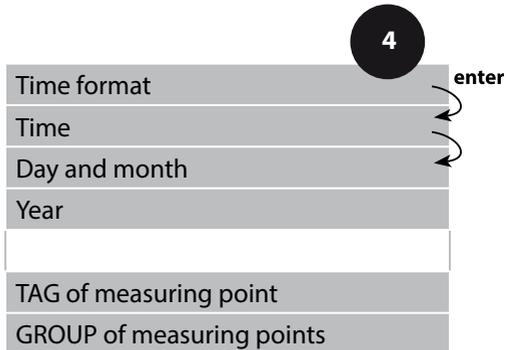C3   Contact

NOTICE! Make sure that the maximum ratings of the relay contacts are not exceeded even during switching, see page 95.

Configuring the Time/Date

Time and Date, Measuring Point (TAG/GROUP)

1

menu

2

SELECT
CONF

enter

3

ConF
CLOCK

enter

4

00:00
CLK: TIME hh/mm

meas

5

150.0 mS/c
N+23 25.0 °C

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

enter

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

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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.
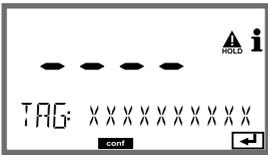
Note:
There is no automatic switchover from winter to summer time!
Be sure to manually adjust the time!

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 TAG: XXXXXXXXXX conf	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

Note:

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

Calibration can be performed by:

- determining the cell constant (cell factor for toroidal sensors) with a known calibration solution
- entering the cell constant (cell factor for toroidal sensors)
- sampling (product calibration)
- zero calibration in air or with calibration solution (toroidal sensors)
- temperature probe adjustment

Selecting a Calibration Mode for 2-/4-Electrode Sensors

Calibration adapts the device to the individual sensor characteristics.
Access to calibration can be protected with a passcode (SERVICE menu).
First, you open the calibration menu and select the calibration mode:

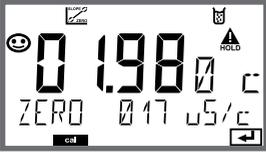|	
CAL_SOL	Calibration with calibration solution
CAL_CELL	Calibration by input of cell constant
CAL_INSTALL	Calibration by input of an installation factor
P_CAL	Product calibration (calibration with sampling)
CAL_RTD	Temperature probe adjustment

Selecting a Calibration Mode for Toroidal Sensors

CAL_SOL	Calibration with calibration solution
CAL_CELL	Calibration by input of cell factor
CAL_INSTALL	Calibration by input of an installation factor
P_CAL	Product calibration (calibration with sampling)
CAL_ZERO	Zero calibration
CAL_RTD	Temperature probe adjustment

Calibration

Calibration with Calibration Solution

Input of temperature-corrected value of calibration solution with simultaneous display of cell constant (cell factor for toroidal sensors).

Display	Action	Remark
°☺ SELECT ◀DIAG CAL CON▶ meas	Select Calibration. Press **enter** to proceed. Select CAL_SOL calibration method. Press **enter** to proceed.	
CAL SOLUTION cal	Ready for calibration. Hourglass blinks.	Display (3 sec) Now the device is in HOLD mode.
12.88 mS/c 0 10021c 25.3°C cal	Immerse sensor in calibration solution. Enter the temperature-corrected value of the calibration solution using the arrow keys (see table). Press **enter** to confirm.	Lower line: display of cell constant (cell factor) and temperature
°☺ CELL c 0 12345 1/cm cal	**Contacting conductivity measurement (Cond)** The determined cell constant is displayed. The "hourglass" icon is blinking. Proceed by pressing **enter**	
°☺ 0 1.980 c ZERO 0 17 uS/c cal	**Inductive conductivity measurement (CondI)** The determined cell factor and zero point are displayed. The "hourglass" icon is blinking. Proceed by pressing **enter**	

Display	Action	Remark
☺ **12.65** mS/c MEAS REPE▸ cal	Display of selected process variable (here: mS/cm). Now the device is in HOLD mode: Reinstall the sensor and check whether the measurement is OK. MEAS exits calibration, REPEAT permits repetition.	
☺ **12.65** mS/c --- GOOD BYE --- meas	With MEAS selected: Press **enter** to exit calibration.	Display of conductivity and temperature, Sensoface is active. After end of calibration, the outputs remain in HOLD mode for a short time. After display of GOOD BYE, the device automatically returns to measuring mode.

Note:
- Be sure to use known calibration solutions and the respective temperature-corrected conductivity values (see "Calibration Solutions" tables).
- Make sure that the temperature does not change during the calibration procedure.

Calibration by Input of Cell Constant / Cell Factor

You can directly enter the value for the cell constant / cell factor of a sensor. The value must be known, eg, determined beforehand in the laboratory. The selected process variable and the temperature are displayed. This method is suitable for all process variables.

Display	Action	Remark
°☺SELECT ‹DIAG CAL CON› meas	Select Calibration. Press **enter** to proceed. Select CAL_CELL calibration method. Press **enter** to proceed.	
CAL CELLFACTOR cal	Ready for calibration. Hourglass blinks.	Display (3 sec) Now the device is in HOLD mode.
01.12₃ 1288mS/c 23.4°C cal	Enter cell constant / cell factor. Press **enter** to proceed.	The selected process variable and the temperature are displayed.
☺01.980 c ZERO 013 µS cal	The device shows the calculated values for the cell constant / cell factor and zero point (at 25 °C). Sensoface is active.	
☺12.65 mS/c MEAS REPE› cal	**Use the arrow keys to select:** • MEAS (exit) • REPEAT Press **enter** to proceed.	Exit: HOLD is deactivated after a short time.
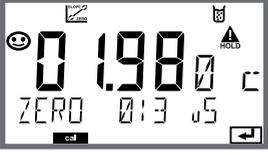
Please refer to the specifications in the sensor manual for the nominal cell constant / cell factor. When measuring in a restricted space, the individual cell constant / cell factor must be determined.

Calibration by Input of an Installation Factor

When using a sensor in a tight space, you can enter an installation factor.

Display	Action	Remark
SELEct DIAG CAL CON	Select Calibration. Press **enter** to proceed. Select CAL_INSTALL calibration method. Press **enter** to proceed.	
CAL CAL_INSTALL	Ready for calibration. Hourglass blinks.	Display (3 sec) Now the device is in HOLD mode.
1.000 12.68mS 23.4°C	Enter installation factor. Press **enter** to proceed.	The selected process variable and the temperature are displayed.
12.65 mS MEAS REPE	**Use the arrow keys to select:** • MEAS (end) • REPEAT Press **enter** to proceed.	End: HOLD is deactivated after a short time.

Product Calibration

Calibration by sampling – for product calibration, the uncompensated conductivity (µS/cm, mS/cm, S/m) is used.

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

Procedure:

1) The sample is measured in the lab or directly on the site using a portable meter. To ensure an exact calibration, the sample temperature must correspond to the measured process temperature.
   During sampling the analyzer saves the currently measured value and then returns to measuring mode. Then, the "calibration" mode indicator blinks.

2) In the second step you enter the measured sample value in the device. From the difference between the stored measured value and entered sample value, the device calculates the new cell constant (the new cell factor for toroidal sensors).

If the sample is invalid, you can take over the value stored during sampling. In that case, the old calibration values are stored. Afterwards, you can start a new product calibration.

Display	Action	Remark
SELECT	Select Calibration. Press **enter** to proceed. Select P_CAL calibration method. Press **enter** to proceed.	
CAL PRODUCT STEP 1	Ready for calibration. Hourglass blinks.	Display (3 sec) Now the device is in HOLD mode.
12.88 mS/c STORE VALUE	Take sample and save value. Press **enter** to proceed.	Now the sample can be measured in the lab.

Display	Action	Remark
☺ **12.82** mS/c 12:27　　26.3°C meas　cal	The device returns to measuring mode.	From the blinking CAL mode indicator, you see that product calibration has not been terminated.
CAL PRODUCT STEP 2 cal	**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.
12.15 mS/c 2　LAB VALUE cal	The stored value is displayed (blinking) and can be overwritten with the lab value. Press **enter** to proceed.	
☺**CELL** c 0.12345 1/cm cal	Display of new cell constant / cell factor (based on 25°C). Sensoface is active. To exit calibration: Select MEAS, then **enter**	To repeat calibration: Select REPEAT, then **enter**
☺ **12.65** mS/c --- GOOD BYE --- meas	End of calibration	After end of calibration, the outputs remain in HOLD mode for a short time.

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Calibration

Temp Probe Adjustment

Display	Action	Remark
SELECT ◁DIAG CAL CON▷	Select Calibration. Press **enter** to proceed. Select CAL_RTD calibration method. Press **enter** to proceed.	Wrong settings change the measurement properties!
CAL TEMP ADJUST	Measure the temperature of the process medium using an external thermometer.	Display (3 sec) Now the device is in HOLD mode.
25.0°C ADJUST 23.5°C▷	Enter the measured temperature value. Maximum difference: 10 K. Press **enter** to proceed.	Display of actual temperature (uncompensated) in the lower display.
25.0°C MEAS	The corrected temperature value is displayed. Sensoface is active. To exit 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.
12.65 mS/c --- GOOD BYE ---	After calibration is ended, the device will switch to measuring mode.	

Calibrating Toroidal Sensors
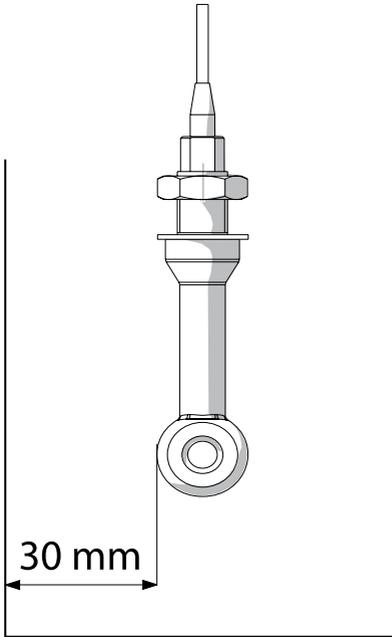
Note:
When the sensor is installed in a pipe/tank at a distance less than 30 mm from the wall, you should perform the calibration either by means of sampling (product calibration) with the sensor installed or in a suitable calibration beaker with dimensions and material corresponding to the process conditions.

30 mm

Zero Calibration

(Toroidal sensors)

Display	Action	Remark
°SELECt ◁DIAG CAL CON▶	Select Calibration. Press **enter** to proceed. Select CAL_ZERO calibration method. Press **enter** to proceed.	
CAL ZERO POINT	Ready for calibration. Hourglass blinks.	Display (3 sec) Now the device is in HOLD mode.
0000 mS/c 16:52 12mS/c	**Calibration in air** Edit digits until the lower display indicates Zero **Calibration in air (AIR-SET)** **for SE680-M and Memosens** **sensors:** Press **enter** to start AIR-SET. When zero point and cell factor are displayed, press **enter** to confirm.	
°01.980 c ZERO 013 µS	The device shows the cell factor (at 25 °C) and the zero point. Sensoface is active.	
°12.65 mS/c MEAS REPE▶	**Use the arrow keys to select:** • MEAS (exit) • REPEAT Press **enter** to proceed.	Exit: HOLD is deactivated after a short time.
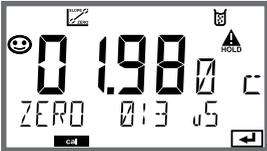
Measurement

Display	Remark
☺ **150.0** mS/c 14:32 123.4 °C [meas] or AM/PM and °F: ☺ **150.0** mS/c A 8:32 123 °F [meas]	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 (Cond, Conc or temperature), the lower display line shows the time and the second configured process variable (Cond, Conc 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 different 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.

☺ **150.0** mS/c TAG: GQ123PH--C2 [meas]	Further displays (each by pressing **meas**). 1) Display of tag number ("TAG") 2) Display of time and date (without figure)

Diagnostics

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**.
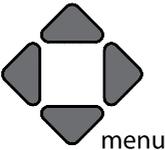
Display	Menu item
	Displaying the calibration data Select CALDATA using ◀ ▶ , confirm by pressing **enter**. Use the ◀ ▶ keys to select the desired parameter from the bottom line of the display (LAST_CAL / CELL / ZERO / INSTALL). The selected parameter is shown in the upper display line. Press **meas** 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**.

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Diagnostics
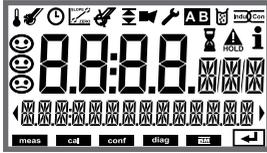
Display	Menu item
	Device self-test (To abort, you can press **meas**.) 1 **Display test**: Display of all segments with changing background colors (white/green/red). Proceed by pressing **enter**
	2 **RAM test:** Hourglass blinks, then display of --PASS-- or --FAIL-- Proceed by pressing **enter**
	3 **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**

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Display	Menu item
d IAG ‹TA LOGBOOK diag ↵	**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.
-00- LOG 14:09 30.09.2005› diag ↵	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.
-00- LOG ‹ERR 01 RANGE C› diag ↵	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
d IAG MONITOR diag ⏎	**Displaying the currently measured values (sensor monitor)** Select MONITOR using ◀ ▶ , press **enter** to confirm. Use the ◀ ▶ keys to select from the bottom line of the display. The selected parameter is shown in the upper display line. Press **meas** to return to measurement.
Display examples: **25.03** 🔧 ⚠HOLD Ω R_CONJ	
256 ⚠HOLD h ◀OPERATION TIME▶	Display of sensor operating time
1.0.2 SW ◀SERIAL-No 0073▶ diag ⏎	**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
OUT1   Testing current output 1
OUT2   Testing current output 2
RELAIS   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	menu	Press **menu** key to call the selection menu. Select SERVICE using ◀ ▶ keys, press **enter** to confirm.
Passcode	5555 PASSCODE SERV ↵	Enter passcode "5555" for service mode using the ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.
Display	- - - - SRV	In service mode the following icons are displayed: • HOLD triangle • Service (wrench)
Exit	**meas**	Exit by pressing **meas**.
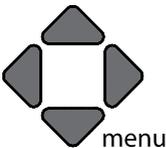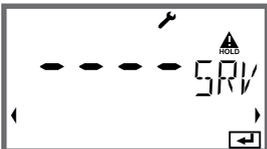
Service

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.
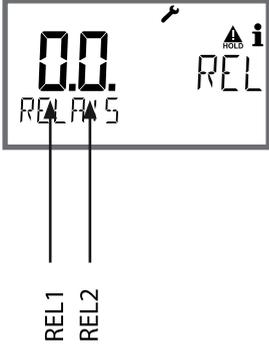
Menu item	Remark
	Setting the passcodes: In the "SERVICE - CODES" menu you can assign passcodes to DIAG, HOLD, CAL, CONF and SERVICE modes (Service preset to 5555). **When you have lost the** Service passcode, you have to request an "Ambulance TAN" from the manufacturer specifying the serial number and 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!

Operating Error!

Power Disruption while Loading the Process Variable

In very rare cases it seems that the analyzer cannot be operated because it remains in "Firmware Update" mode – indicated by the --FIRMW UPDATE-- message.
This occurs when the power is disrupted while the process variable is loaded.
Follow the instructions below to fix the error.

```
--FIRMW UPDATE--
```

Action	Key/Display	Remark
Device start	**53** %□ LOADING PH	If the power supply is disrupted while the process variable is loaded (e.g., during initial start-up or when changing the process variable), the following can occur:
Reconnecting the power supply	--FIRMW UPDATE--	After the power supply has been reconnected, the analyzer starts and then remains in --FIRMW UPDATE-- mode. If this occurs, disconnect the power supply.
Restoring the factory settings	▲ ◄ ► ▼ menu	Press the ▲ ▼ keys simultaneously and hold them depressed while the analyzer is reconnected to the power supply.
Device start	**45.** %□ LOADING BASE	Release the keys when the display shows LOADING BASE. The analyzer will restart with the BASE software when 100 % is reached.
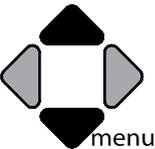
Action	Key/Display	Remark
Searching for the process variable	- - - - ⧗ SEARCHING	Then the analyzer searches for a measuring module or Memosens sensor.
Loading the process variable, automatic	🔧 ⧗ **53** % LOADING PH	When a module or a sensor has been found, the loading progress is shown in percentages.
Loading the process variable, manual	🔧 PH DEVICE TYPE ⏎	If neither module nor sensor are found, the display shows DEVICE TYPE. The selected process variable blinks. You can modify it using the ▲ ▼ keys. Press **enter** to load the process variable displayed.
Loading ...	🔧 **100** % LOADING PH	Make sure that the power supply is not interrupted before the **process variable is fully loaded (100%)**.

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** 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** Replace the sensor.
ERR 04	SENSOR FAILURE	**Failure in sensor** Replace the sensor.
ERR 05	CAL DATA	**Error in cal data**
ERR 10	CONDUCTANCE TOO HIGH	**Display range exceeded** Conductivity: Conductance > 3500 mS
ERR 11	RANGE	**Display range violation**
ERR 13	TEMPERATURE RANGE	**Temperature range exceeded** Connect the sensor, check the sensor cable and replace if necessary, check the sensor connection, adjust the parameter settings.

Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
ERR 60	OUTPUT LOAD	**Load error** Check the current loop, deactivate unused current outputs.
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:

Cell factor monitoring	SENSOR CELL FACTOR CALIBRATE OR CHANGE SENSOR
Table monitoring (TC/Conc/Sal/USP)	OUT OF INTERNAL TABLE
Zero point monitoring	SENSOR ZERO CALIBRATE OR CHANGE SENSOR
Cell factor / zero point monitoring	SENSOR ZERO/CELL FACTOR 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 and Sensoface

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.

Disposal

Local codes and regulations must be observed when disposing of the product.

Returns

If required, send the product in a clean condition and securely packed to your local contact. See www.knick.de.

Operating States

Operating status	OUT 1	OUT 2	REL 1/2	Time out
Measure	active	active	active	-
DIAG	active	active	active	60 s
CAL	as configured	as configured		No
CONF	as configured	as configured		20 min
SERVICE	as configured	as configured		20 min
SERVICE OUT 1	manual	as configured		20 min
SERVICE OUT 2	as configured	manual		20 min
SERVICE RELAYS	as configured	as configured	manual	20 min
Cleaning function	as configured	as configured		No
HOLD	as configured	as configured		No

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

▉ active

▨ manual

Product Range

Devices	Order No.
Stratos MS A405N	A405N

Mounting accessories	
Pipe-mount kit	ZU0274
Panel-mount kit	ZU0738
Protective hood	ZU0737
M12 socket for sensor connection with Memosens cable / M12 connector	ZU0860

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

Specifications

COND 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 Ω, short-circuit-proof	

Display ranges	Conductivity	0.000 ... 9.999 µS/cm
		00.00 ... 99.99 µS/cm
		000.0 ... 999.9 µS/cm
		0000 ... 9999 µS/cm
		0.000 ... 9.999 mS/cm
		00.00 ... 99.99 mS/cm
		000.0 ... 999.9 mS/cm
		0.000 ... 9.999 S/cm
		00.00 ... 99.99 S/cm
	Resistivity	00.00 … 99.99 MΩ · cm
	Concentration	0.00 ... 100 %
	Temperature	−20.0 … 150.0 °C / -4.0 … 302.0 °F
	Salinity	0.0 ... 45.0 ‰ (0 ... 35 °C / 32 ... 86 °F)
	Response time (T90) approx. 1 s	
Measurement error [1]	Depending on Memosens	

Temperature compensation * (Reference temp. 25 °C / 77 °F)	(OFF)	Without
	(LIN)	Linear characteristic 00.00 ... 19.99 %/K
	(NLF)	Natural waters to EN 27888
	(NACL)	Ultrapure water with NaCl traces (0 ... 120 °C / 32 ... 248 °F)
	(HCL)	Ultrapure water with HCl traces (0 ... 120 °C / 32 ... 248 °F)
	(NH3)	Ultrapure water with NH_3 traces (0 ... 120 °C / 32 ... 248 °F)
	(NAOH)	Ultrapure water with NaOH traces (0 ... 120 °C / 32 ... 248 °F)

[*] user-defined
[1] at normal operating conditions

Concentration determination	-01- NaCl	0 – 26 wt% (0 °C /32 °F) ... 0 – 28 wt% (100 °C/212 °F)
	-02- HCl	0 – 18 wt% (-20 °C /-4 °F) ... 0 – 18 wt% (50 °C/122 °F)
	-03- NaOH	0 – 13 wt% (0 °C /32 °F) ... 0 – 24 wt% (100 °C/212 °F)
	-04- H_2SO_4	0 – 26 wt% (-17 °C/1.4 °F)…0 – 37 wt% (110 °C/230 °F)
	-05- HNO_3	0 – 30 wt% (-20 °C /-4 °F) ... 0 – 30 wt% (50 °C/122 °F)
	-06- H_2SO_4	94 – 99 wt% (17 °C/1.4 °F)…89 – 99 wt% (115 °C/239 °F)
	-07- HCl	22 – 39 wt% (-20 °C/-4 °F)…22 – 39 wt% (50 °C/122 °F)
	-08- HNO_3	35 – 96 wt% (-20 °C/-4 °F)…35 – 96 wt% (50 °C/122 °F)
	-09- H_2SO_4	28 – 88 wt% (17 °C/1.4 °F)…39 – 88 wt% (115 °C/239 °F)
	-10- NaOH	15 – 50 wt% (0 °C/32 °F)…35 – 50 wt% (100 °C/212 °F)
	-11- $H_2SO_4 \cdot SO_3$ (oleum)	13 – 45 wt% (0 °C /32 °F) ... 13 – 45 wt% (120 °C/248 °F)
	-U1-	Specifiable concentration table

Sensor standardization	Input of cell constant/cell factor with simultaneous display of selected process variable and temperature
	Input of conductivity of calibration solution with simultaneous display of cell constant/cell factor and temperature
	Input of an installation factor
	Product calibration for conductivity
	Temperature probe adjustment
	Zero calibration (CondI)

Sensocheck	Polarization detection
Delay	Approx. 30 s

Sensoface	Provides information on the sensor condition

Sensor monitor	Direct display of measured values from sensor for validation (resistance/temperature)

Specifications

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, bilinear or logarithmic
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, bilinear or logarithmic
Output filter *	PT_1 filter, time constant 0 ... 120 s
Measurement error [1]	< 0.25% current value + 0.025 mA

*) user-defined
[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

Specifications

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
Device type	Selecting the measuring function
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
EMC	EN 61326-1
Emitted interference	Class A (industrial applications) [1]
Immunity to interference	Industrial applications
RoHS conformity	according to EC directive 2011/65/EU
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	
Climatic class	3K5 according to EN 60721-3-3
Location class	C1 according to EN 60654-1
Ambient temperature	−20 … 65 °C / −4 … 149 °F
Relative humidity	10 … 95 %
Transport and storage	
Transport/Storage temperature	−30 … 70 °C / −22 … 158 °F
Enclosure	Molded enclosure made of PBT/PC, glass fiber reinforced
Mounting	Wall, pipe/post or panel mounting
Color	Gray, RAL 7001
Ingress protection	IP66/IP67/TYPE 4X outdoor (with pressure compensation) when the device is closed
Flammability	UL 94 V-0 for external parts
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	5 knockouts for M20 x 1.5 cable glands 2 of 5 knockouts for NPT ½" or rigid metallic conduit
Terminals	
Screw terminals	for single or stranded wires 0.2 … 2.5 mm²
Tightening torque	0.5 … 0.6 Nm

[1]   This equipment is not designed for domestic use, and is unable to guarantee adequate protection of the radio reception in such environments.

Calibration Solutions

Potassium Chloride Solutions
(Conductivity in mS/cm)

Temperature	Concentration[1]		
[°C]	0.01 mol/l	0.1 mol/l	1 mol/l
0	0.776	7.15	65.41
5	0.896	8.22	74.14
10	1.020	9.33	83.19
15	1.147	10.48	92.52
16	1.173	10.72	94.41
17	1.199	10.95	96.31
18	1.225	11.19	98.22
19	1.251	11.43	100.14
20	1.278	11.67	102.07
21	1.305	11.91	104.00
22	1.332	12.15	105.94
23	1.359	12.39	107.89
24	1.386	12.64	109.84
25	1.413	12.88	111.80
26	1.441	13.13	113.77
27	1.468	13.37	115.74
28	1.496	13.62	
29	1.524	13.87	
30	1.552	14.12	
31	1.581	14.37	
32	1.609	14.62	
33	1.638	14.88	
34	1.667	15.13	
35	1.696	15.39	
36		15.64	

1   Data source: K. H. Hellwege (Editor), H. Landolt, R. Börnstein: Zahlenwerte und Funktionen ..., volume 2, part. volume 6

Calibration Solutions

Sodium Chloride Solutions
(Conductivity in mS/cm)

Temperature	Concentration		
[˚C]	0.01 mol/l [1]	0.1 mol/l [1]	Saturated [2]
0	0.631	5.786	134.5
1	0.651	5.965	138.6
2	0.671	6.145	142.7
3	0.692	6.327	146.9
4	0.712	6.510	151.2
5	0.733	6.695	155.5
6	0.754	6.881	159.9
7	0.775	7.068	164.3
8	0.796	7.257	168.8
9	0.818	7.447	173.4
10	0.839	7.638	177.9
11	0.861	7.831	182.6
12	0.883	8.025	187.2
13	0.905	8.221	191.9
14	0.927	8.418	196.7
15	0.950	8.617	201.5
16	0.972	8.816	206.3
17	0.995	9.018	211.2
18	1.018	9.221	216.1
19	1.041	9.425	221.0
20	1.064	9.631	226.0
21	1.087	9.838	231.0
22	1.111	10.047	236.1
23	1.135	10.258	241.1
24	1.159	10.469	246.2
25	1.183	10.683	251.3
26	1.207	10.898	256.5
27	1.232	11.114	261.6
28	1.256	11.332	266.9
29	1.281	11.552	272.1
30	1.306	11.773	277.4
31	1.331	11.995	282.7
32	1.357	12.220	288.0
33	1.382	12.445	293.3
34	1.408	12.673	298.7
35	1.434	12.902	304.1
36	1.460	13.132	309.5

1   Data source: Test solutions calculated according to DIN IEC 746-3
2   Data source: K. H. Hellwege (Editor), H. Landolt, R. Börnstein: Zahlenwerte und Funktionen ...,
    volume 2, part. volume 6

Measuring Ranges

Substance	Concentration ranges		
NaCl Configuration	0-26 wt% (0 °C / 32 °F) 0-26 wt% (100 °C / 212 °F) **-01-**		
HCl Configuration	0-18 wt% (−20 °C / −4 °F) 0-18 wt% (50 °C / 122 °F) **-02-**		22-39 wt% (−20 °C / −4 °F) 22-39 wt% (50 °C / 122 °F) **-07-**
NaOH Configuration	0-13 wt% (0 °C / 32 °F) 0-24 wt% (100 °C / 212 °F) **-03-**		15-50 wt% (0 °C / 32 °F) 35-50 wt% (100 °C / 212 °F) **-10-**
H_2SO_4 Configuration	0-26 wt% (-17 °C/-1.4 °F) 0-37 wt% (110 °C/230 °F) **-04-**	28-77 wt% (-17 °C/-1.4 °F) 39-88 wt% (115 °C/239 °F) **-09-**	94-99 wt% (-17 °C/-1.4 °F) 89-99 wt% (115 °C/239 °F) **-06-**
HNO_3 Configuration	0-30 wt% (−20 °C / −4 °F) 0-30 wt% (50 °C / 122 °F) **-05-**		35-96 wt% (−20 °C / −4 °F) 35-96 wt% (50 °C / 122 °F) **-08-**
$H_2SO_4 \cdot SO_3$ (Oleum) Configuration	13-45 wt% (0 °C / 32 °F) 13-45 wt% (120 °C / 248 °F) **-11-**		

For the solutions listed above, the device can determine the substance concentration from the measured conductivity and temperature values in % by wt. The measurement error is made up of the sum of measurements errors during conductivity and temperature measurement and the accuracy of the concentration curves stored in the device. We recommend to calibrate the device together with the sensor, e.g., directly to concentration using the CAL_CELL method. For exact temperature measurement, you should perform a temperature probe adjustment. For measuring processes with rapid temperature changes, use a separate temperature probe with fast response.

For specification of a concentration solution for conductivity measurement, see page 35.

Concentration Curves

-01- Sodium chloride solution NaCl
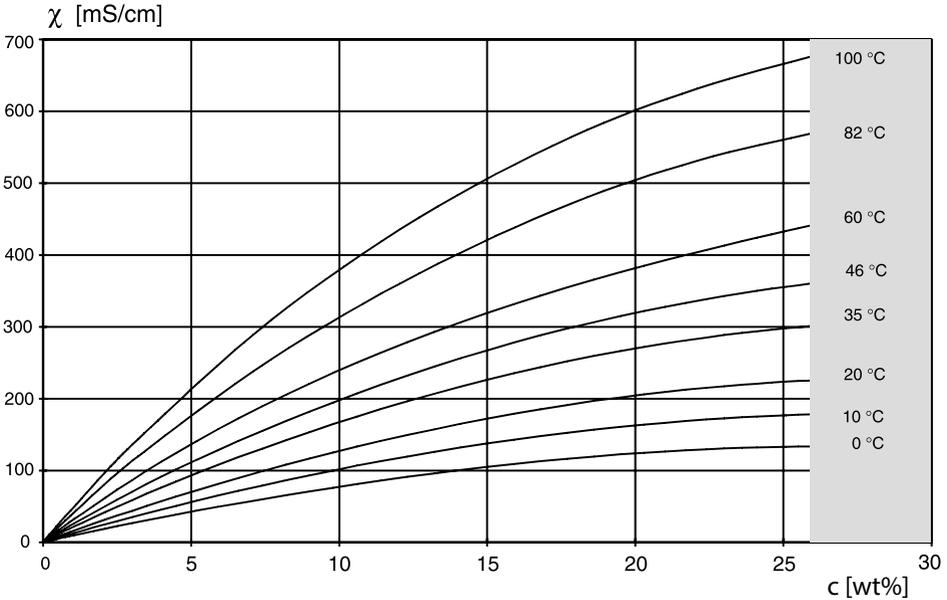
χ [mS/cm]

Concentration measurement not possible in this range.

Conductivity versus substance concentration and process temperature
for sodium chloride solution (NaCl)

-02- Hydrochloric acid HCl
-07-

Concentration measurement not possible in this range.
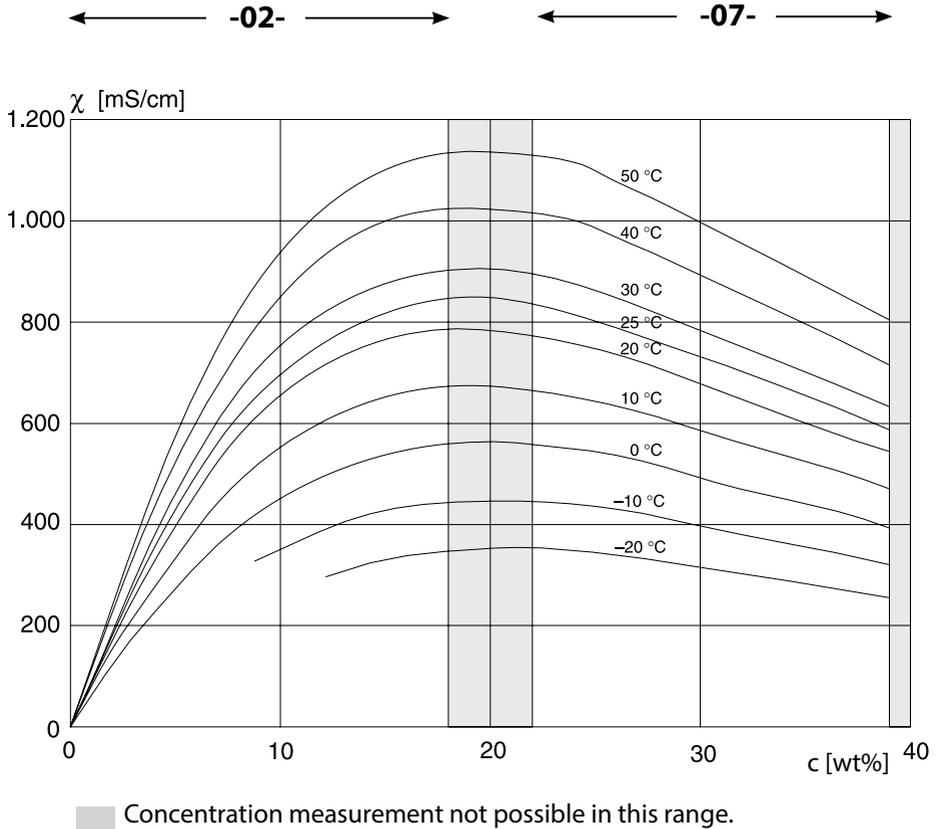
Conductivity versus substance concentration and process temperature
for hydrochloric acid (HCl)
Source: Haase/Sauermann/Dücker; Z. phys. Chem. New Edition, Vol. 47 (1965)

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-03- Sodium hydroxide solution NaOH
-10-

Concentration measurement not possible in this range.

Conductivity versus substance concentration and process temperature
for sodium hydroxide solution (NaOH)

-04- Sulfuric acid H$_2$SO$_4$
-06-
-09-

Concentration measurement not possible in this range.
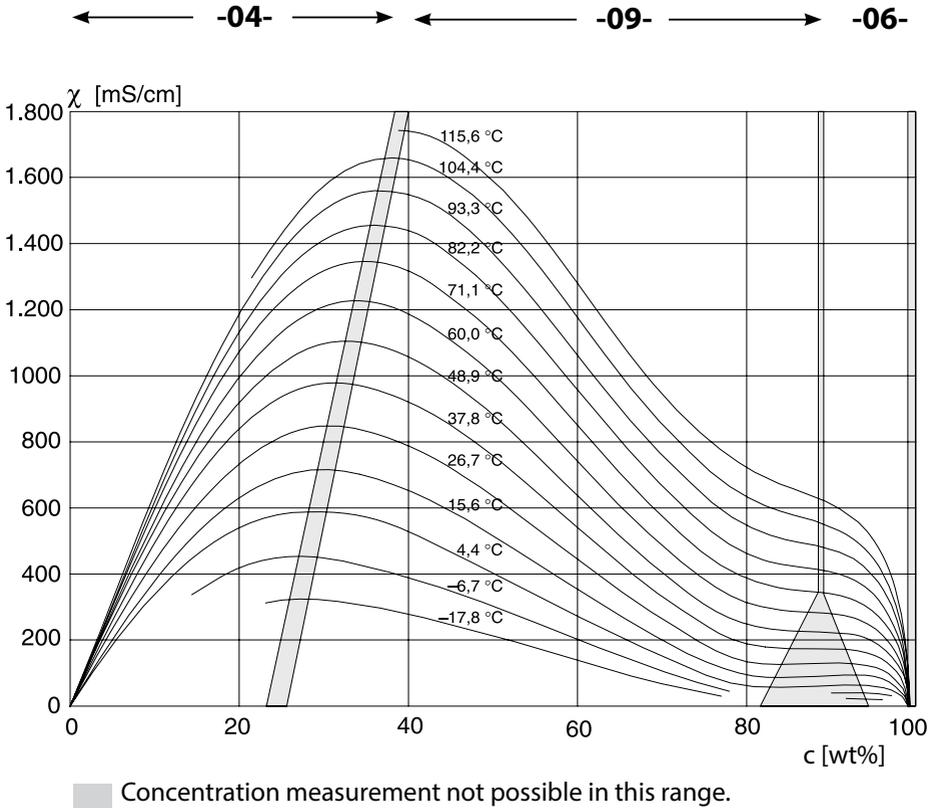
Conductivity versus substance concentration and process temperature
for sulfuric acid (H$_2$SO$_4$)
Source: Darling; Journal of Chemical and Engineering Data; Vol.9 No.3, July 1964

-05- Nitric acid HNO_3
-08-

χ [mS/cm]

50 °C
40 °C
30 °C
25 °C
20 °C
10 °C
0 °C
−10 °C
−20 °C

c [wt%]

Concentration measurement not possible in this range.
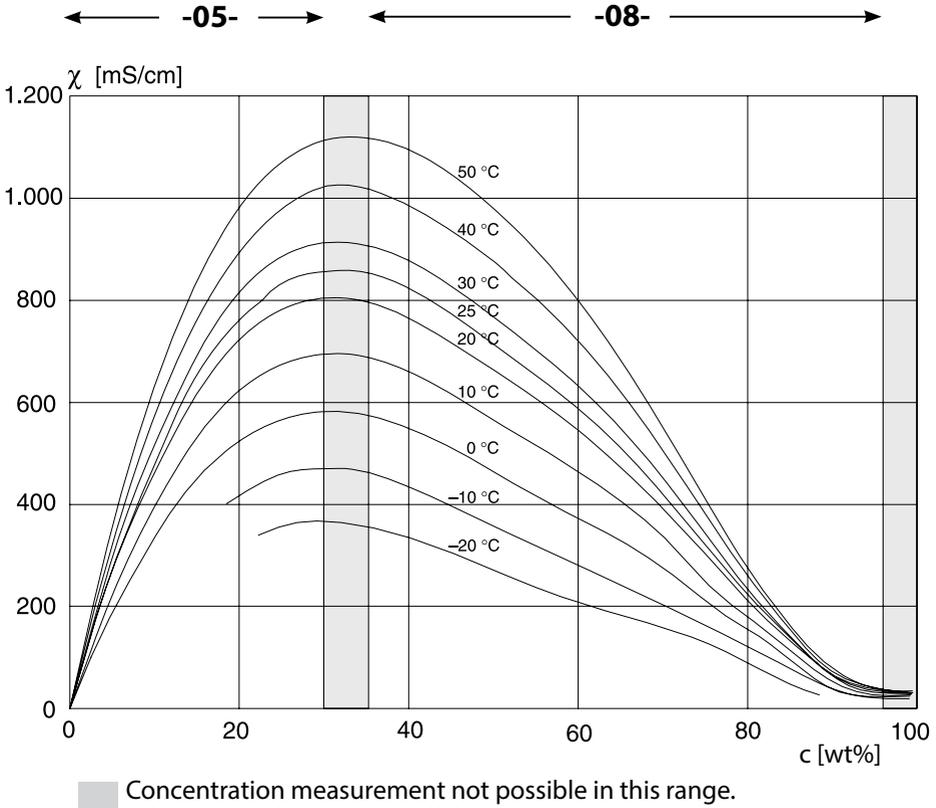
Conductivity versus substance concentration and process temperature
for nitric acid (HNO_3)
Source: Haase/Sauermann/Dücker; Z. phys. Chem. New Edition, Vol. 47 (1965)

-11- Oleum H$_2$SO$_4$•SO$_3$

Conductivity
[mS/cm]

c [wt%]

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W

Z

Knick
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