Knick ›

User Manual

Stratos Pro A201CONDI
Conductivity Measurement
with Toroidal Sensors

Stratos® *Pro*

Knick ›

☺ **150.0** mS
14:23   25.0 °C
meas

A

meas

menu

info

www.knick.de
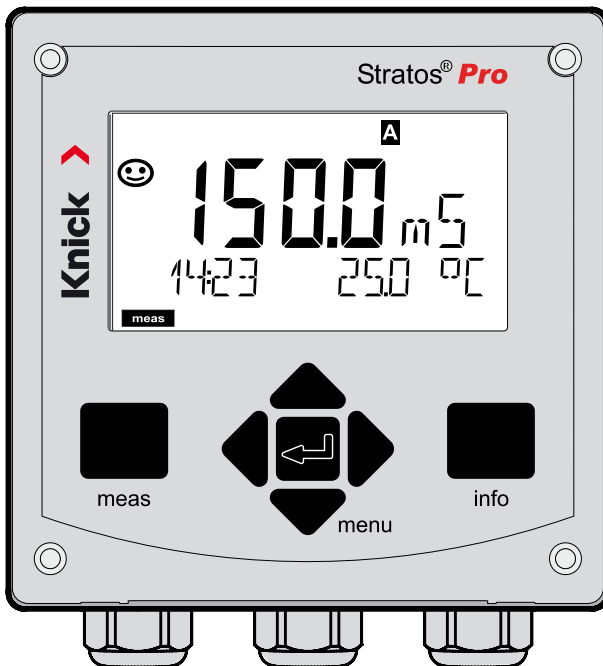
Supplemental Directives

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

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

Ex devices:

Control Drawings

EU Declaration of Conformity

Table of Contents

Table of Contents

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.

Intended Use
Stratos Pro A201CONDI is a 2-wire device for measurement of electrical conductivity and temperature in liquids using toroidal (electrodeless) sensors. Fields of application are: biotechnology, chemical industry, environment, food processing, water/wastewater treatment.
Stratos Pro A201X and the separately approved Ex sensor may be operated in Zone 0 / Division 1.
Stratos Pro A201B and the separately approved Ex sensor may be operated in Zone 2.

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

Function Check Mode (HOLD Function)
After activating configuration, calibration, or service, Stratos Pro 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.

Control Drawings
If installing in hazardous locations, observe the information provided on the included Control Drawings.

Devices Not Intended for Use in Hazardous Locations
Devices identified with an N in their product name must not be used in hazardous locations.

Configuration
Replacing components may affect intrinsic safety. The modules are not intended to be replaced on devices in the Stratos Pro A201 product line.

Housing and Mounting Options
- The sturdy molded enclosure is designed for IP66/IP67 / TYPE 4X Outdoor protection, is made of PBT glass fiber reinforced PC, and has the following dimensions: H 148 mm, W 148 mm, T 117 mm. Knockouts in the housing enable
- wall mounting (with sealing plugs to seal the housing) see page 14
- pipe mounting (Ø 40 … 60 mm, ☐ 30 … 45 mm) see page 15
- panel mounting (cutout 138 mm x 138 mm acc. to DIN 43700) see page 16

Protective Hood (Accessory)
The protective hood, which is available as accessory, provides additional protection against direct weather exposure and mechanical damage; see page 15.

Connection of Sensors, Cable Glands
For connecting the cables, the enclosure provides
- 3 knockouts for M20x1.5 cable glands
- 2 knockouts for ½" 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.

Sensors
The device has been designed for toroidal conductivity sensors, in particular for Models SE 655/656, SE 660, SE 670 and SE 680.

Introduction

Display
Plain-text messages on a large, backlit LC display enable intuitive operation. You can specify which values are to be displayed in standard measuring mode ("Main Display," see page 31).

Color-Coded User Interface
The colored display backlighting indicates different operating states (e.g., alarm: red, HOLD mode: orange; see page 32). The display backlighting can be switched off; see page 82.

Diagnostic Functions
"Sensocheck" automatically monitors sensor and cables; and the "Sensoface" function clearly indicates the sensor condition; see page 127.

Data Logger
The internal logbook (TAN SW-A002) can handle up to 100 entries – up to 200 with AuditTrail (TAN SW-A003); see page 98.

Two Parameter Sets A, B
The device provides two parameter sets that can be switched manually or via a control input for different process connections or different process conditions.
For an overview of parameter sets (original for copy), see page 46.

Password Protection
Password protection (passcodes) for granting access rights during operation can be configured; see page 102.

TC process medium: Selecting the compensation method
The following temperature compensation methods are provided: linear (by entering a temperature coefficient), natural waters (nLF), ultrapure water with traces of NaCl, HCl, NH_3, NaOH, see page 70.

Control Inputs (TAN SW-A005)
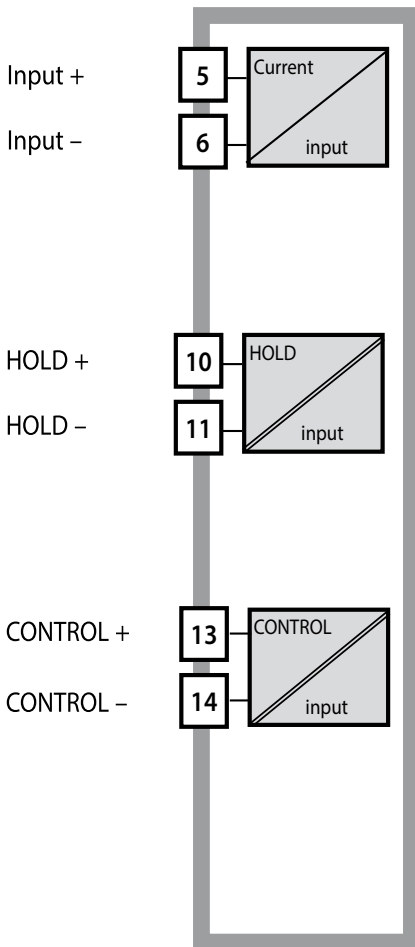
Input +	**5** Current	**I input**
Input –	**6** input	The analog (0) 4 ... 20 mA current input can be used for external temperature compensation; see page 70.

HOLD +	**10** HOLD	**HOLD**
HOLD –	**11** input	(Floating digital control input) The HOLD input can be used for external activation of HOLD mode; see page 35.

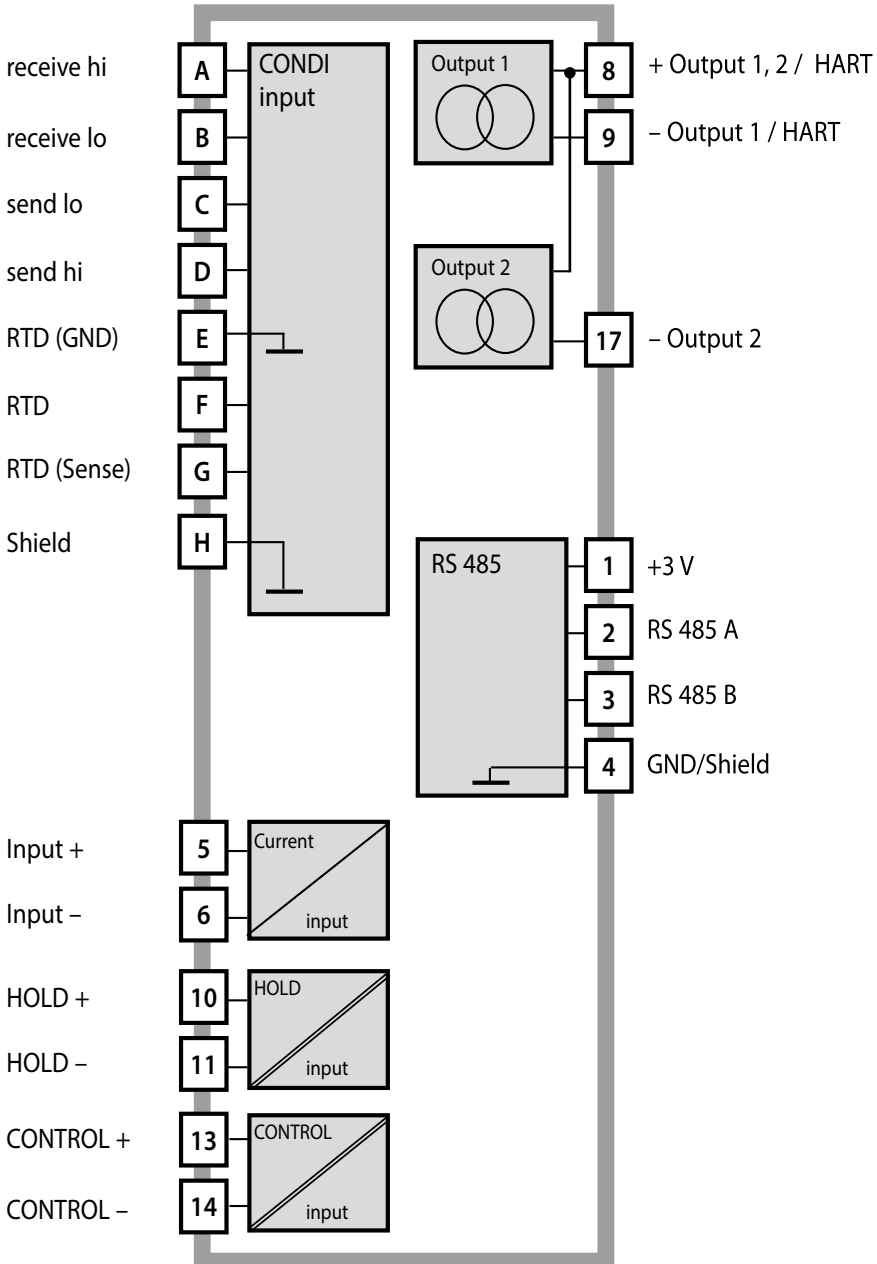|		
CONTROL +	**13** CONTROL	**CONTROL**
CONTROL –	**14** input	(Floating digital control input) The CONTROL input can be used either for parameter set selection (A/B) or for flow monitoring; see page 74.

Signal Outputs

The device provides two current outputs (for transmission of measured value and temperature, for example). The output curve is adjustable (linear, bilinear or logarithmic), see page 60.

Options

Additional functions can be enabled by entering a TAN (p. 102).

11

Overview

Overview of Stratos Pro A201CONDI

receive hi	**A**	CONDI input
receive lo	**B**	
send lo	**C**	
send hi	**D**	
RTD (GND)	**E**	
RTD	**F**	
RTD (Sense)	**G**	
Shield	**H**	

Output 1 — **8** + Output 1, 2 / HART

9 − Output 1 / HART

Output 2 — **17** − Output 2

RS 485 — **1** +3 V

2 RS 485 A

3 RS 485 B

4 GND/Shield

Input +	**5**	Current input
Input −	**6**	
HOLD +	**10**	HOLD input
HOLD −	**11**	
CONTROL +	**13**	CONTROL input
CONTROL −	**14**	

Package Contents

Note: Check all components for damage upon receipt.
Do not use damaged parts.
The package should contain:

• Front unit, rear unit, bag containing small parts
• Specific test report
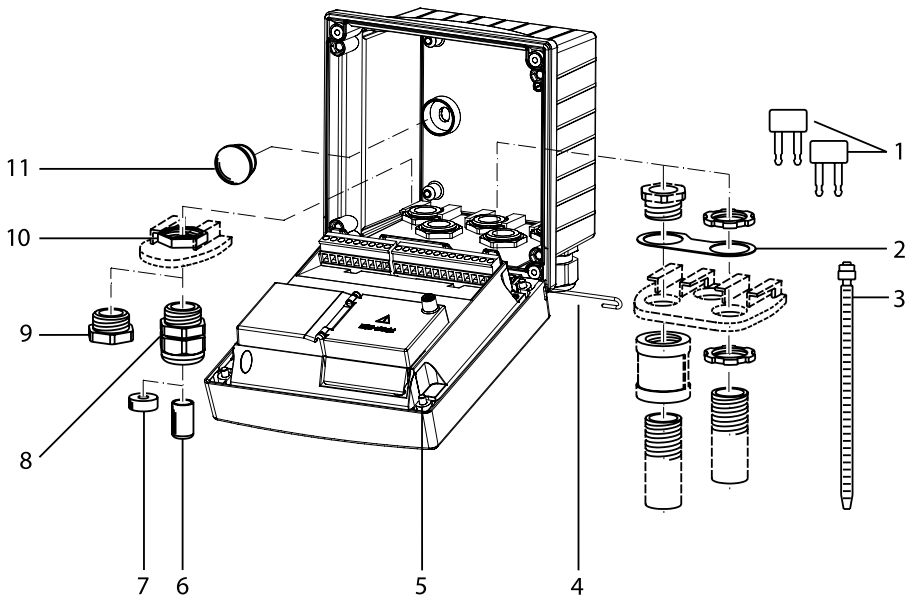• Documentation (see page 3)

Fig.: Assembling the enclosure

1) Insertable jumper (3x)
2) Plate (1x), for conduit mount-
   ing: Plate between housing
   and nut
3) Cable tie (3x)
4) Hinge pin (1x), insertable from
   either side
5) Enclosure screw (4x)

6) Blanking plug (2x, non-Ex
   only)
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

Mounting Plan, Dimensions

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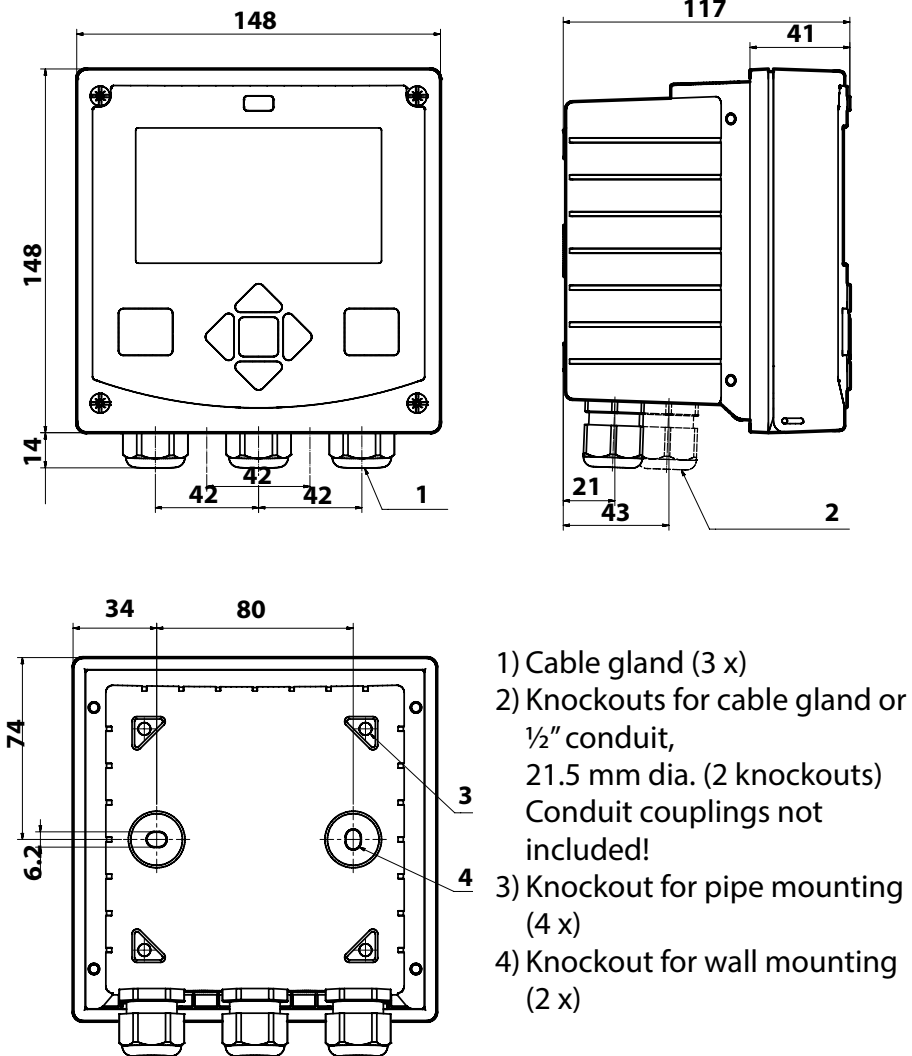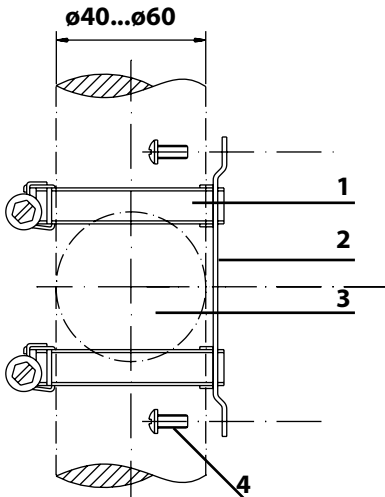4) Knockout for wall mounting (2 x)

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

Pipe Mounting, Protective Hood

ø40...ø60

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

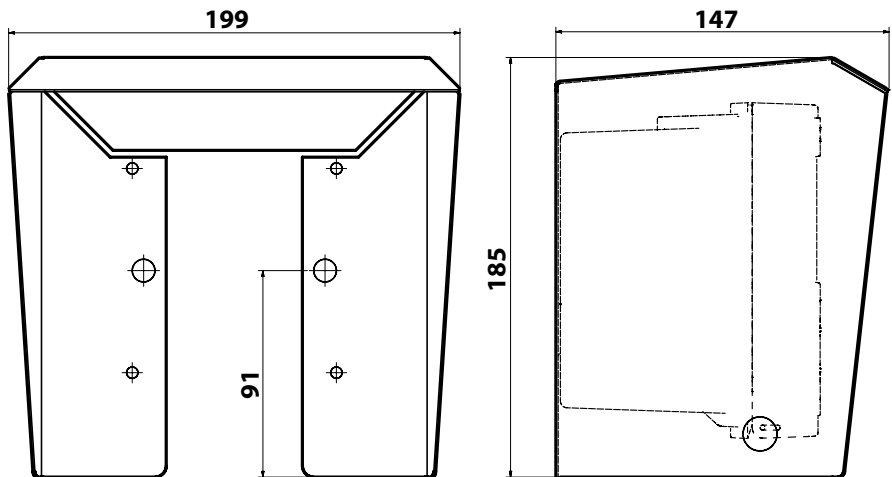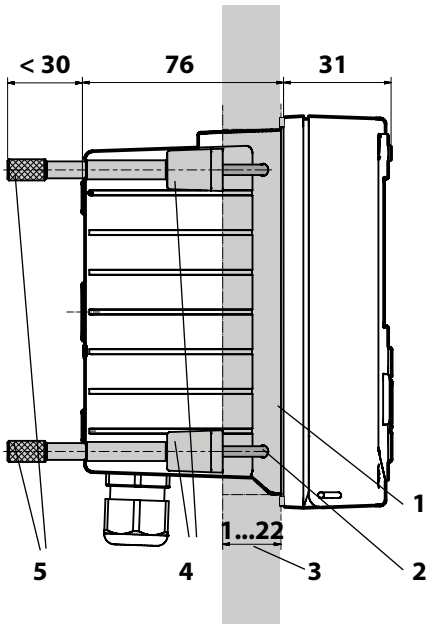Fig.: Pipe-mount kit, accessory ZU 0274 (All dimensions in mm!)

199   **147**

185

91

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

Panel Mounting

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

Cutout
138 x 138 mm (DIN 43700)

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

Electrical Installation

Before commencing with the installation, make sure that all lines to be connected are de-energized.

Observe the safety instructions; see page 7.

Cable Glands

In a hazardous location, only cable glands with suitable approvals may be used. The installation instructions of the manufacturer must be observed.

Cable glands	5 cable glands M20 x 1.5 A/F 24 mm
	WISKA type ESKE/1 M20
Clamping ranges	Standard sealing insert: 7 … 13 mm
	Reduction sealing insert: 4 … 8 mm
	Multiple sealing insert: 5.85 … 6.5 mm
Tensile strain	Not permitted; Only suitable for "fixed installation"

⚠ **CAUTION!** Risk of losing the specified ingress protection. Fasten the cable glands and screw together the housing correctly. Observe the permissible cable diameters and tightening torques. Only use original accessories and spare parts.

NOTICE! Strip the insulation from the wires using a suitable tool to prevent damage. For stripping length, see Specifications.

1) Wire the current outputs. Deactivate unused current outputs in the parameter settings or use jumpers.
2) Wire the inputs as necessary.
3) Connect the sensor.
4) Check whether all connections are correctly wired.
5) Close the housing and successively tighten the enclosure screws in a diagonal pattern.
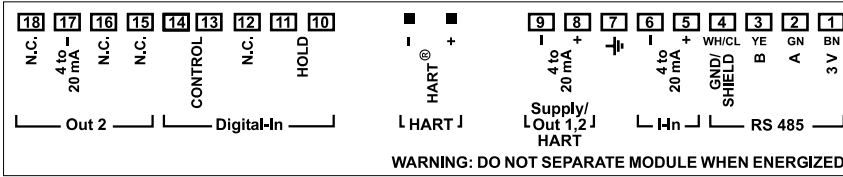
Rating Plates / Terminal Assignments

18	17	16	15	14	13	12	11	10
N.C.	4 to 20 mA −	N.C.	N.C.	CONTROL		N.C.		HOLD

└── Out 2 ──┘ └── Digital-In ──┘

■	■
− HART ®	+

└ HART ┘

9	8	7	6	5	4	3	2	1
− 4 to 20 mA +			− 4 to 20 mA +	WH/CL	YE	GN	BN	
				GND/SHIELD	B	A	3 V	

Supply/
└ Out 1,2 ┘ └ ⊣⊢n ┘ └── RS 485 ──┘
HART

WARNING: DO NOT SEPARATE MODULE WHEN ENERGIZED

Fig.: Terminal assignments of Stratos Pro A201

Knick › CONDI

A201N-CONDI-0

No. 12345 / 1234567 / 0832

-20 ≤ Ta ≤ +65°C

D-14163Berlin   Made in Germany
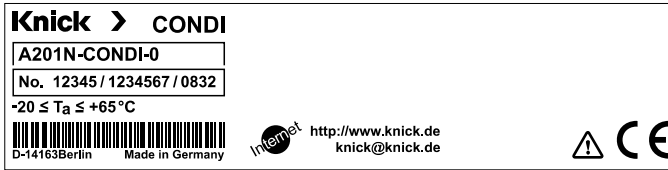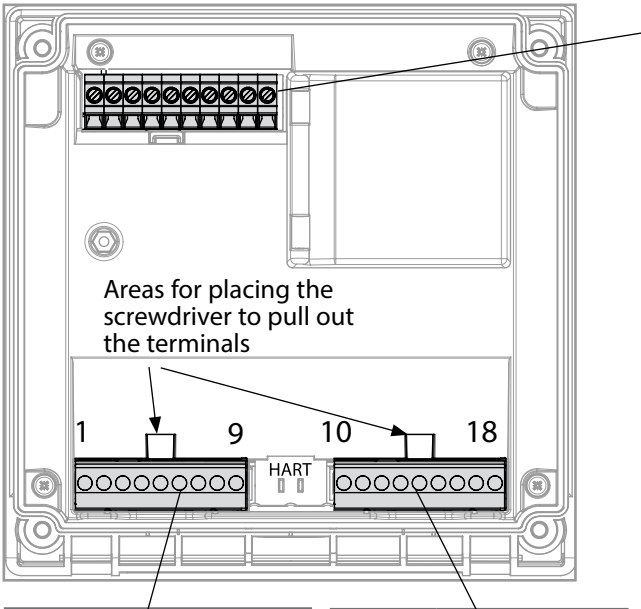
Internet   http://www.knick.de
            knick@knick.de

⚠ CE

Fig.: Stratos Pro A201N rating plate at outside bottom of front (illustrative example)

Wiring of Stratos Pro A201CONDI

Areas for placing the screwdriver to pull out the terminals

Sensor connection	
MK-CONDI module	
A	receive hi
B	receive lo
C	send lo
D	send hi
E	RTD (GND)
F	RTD
G	RTD (Sense)
H	Shield
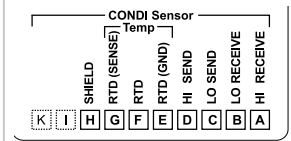
Fig.: MK-CONDI module terminal assignments

Terminal row 1	
1	+3 V
2	RS 485 A
3	RS 485 B
4	GND/shield
5	+ input
6	– input
7	PA
8	+ out 1,2/HART
9	– out1/HART

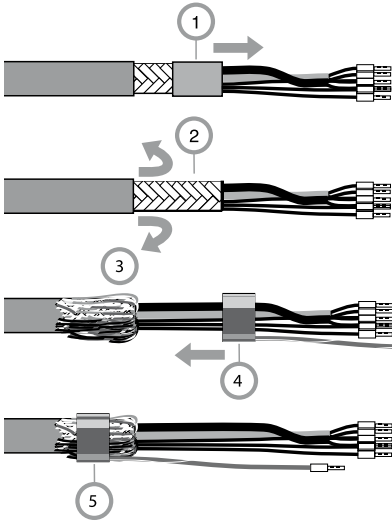| Terminal row 2	
10	hold
11	hold
12	n.c.
13	contr.
14	contr.
15	n.c.
16	n.c.
17	– out 2
18	n.c.

In addition:
2 HART pins (between terminal row 1 and 2)

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

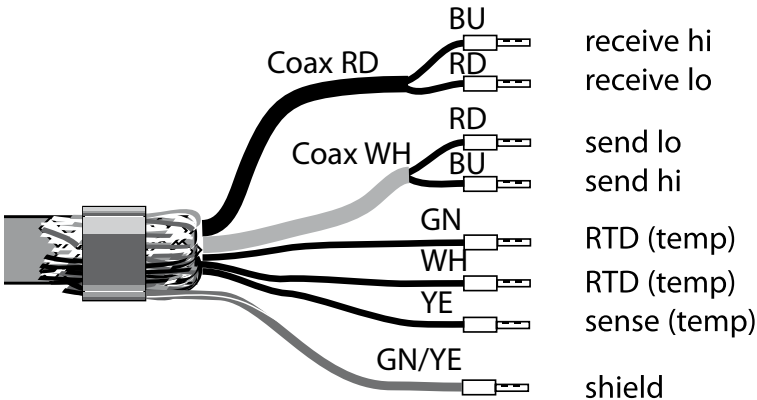**19**

Cable Preparation SE655 / SE656

Preparing the shield connection
Pre-assembled special cable for SE655 / SE656 sensors

- Insert the special cable through the cable entry into the terminal compartment.

- Remove the already separated part of the cable insulation (1).

- Turn the shielding mesh (2) over the cable insulation (3).

- Then shift the crimp ring (4) over the shielding mesh and tighten it using a pince (5)
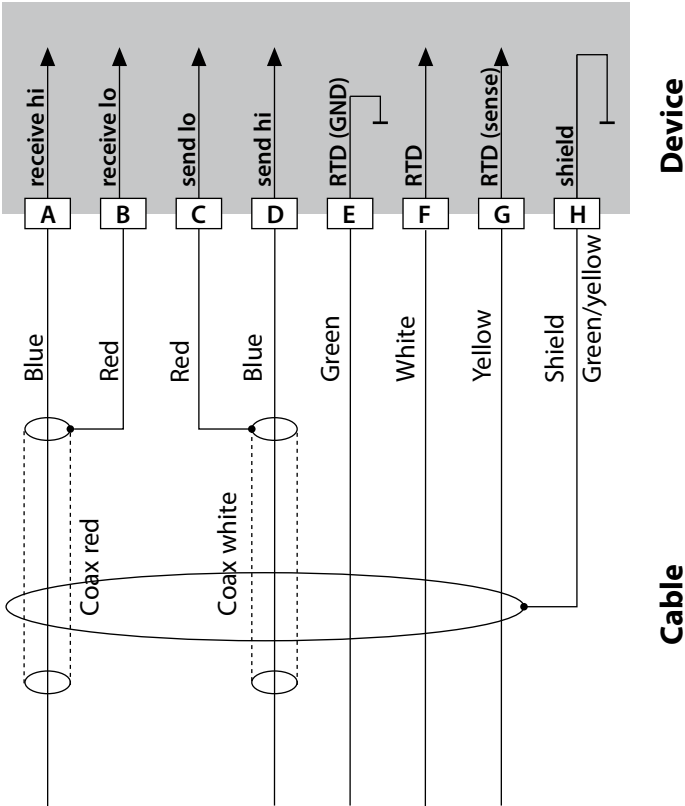
The pre-assembled special cable:

Color	Function
Coax RD → BU	receive hi
Coax RD → RD	receive lo
Coax WH → RD	send lo
Coax WH → BU	send hi
GN	RTD (temp)
WH	RTD (temp)
YE	sense (temp)
GN/YE	shield

Wiring Example: SE655 / SE656

Measuring task: Conductivity, temperature
Sensors: SE655/SE656 sensor
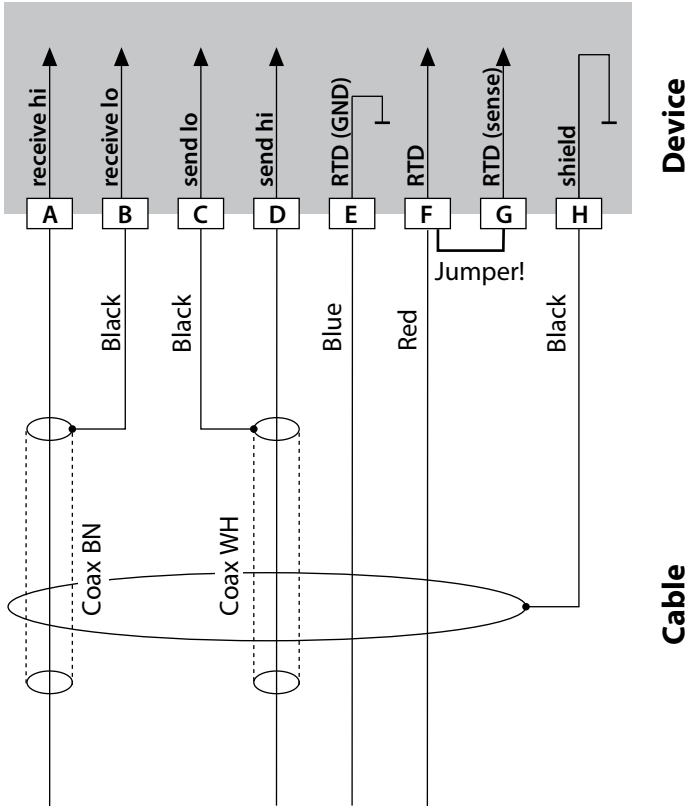   Connecting the pre-assembled cable

Device

A	B	C	D	E	F	G	H
receive hi	receive lo	send lo	send hi	RTD (GND)	RTD	RTD (sense)	shield

Blue | Red | Red | Blue | Green | White | Yellow | Shield | Green/yellow

Coax red   Coax white

Cable

Wiring Example: SE660

Measuring task: Conductivity, temperature
Sensor: SE660 sensor
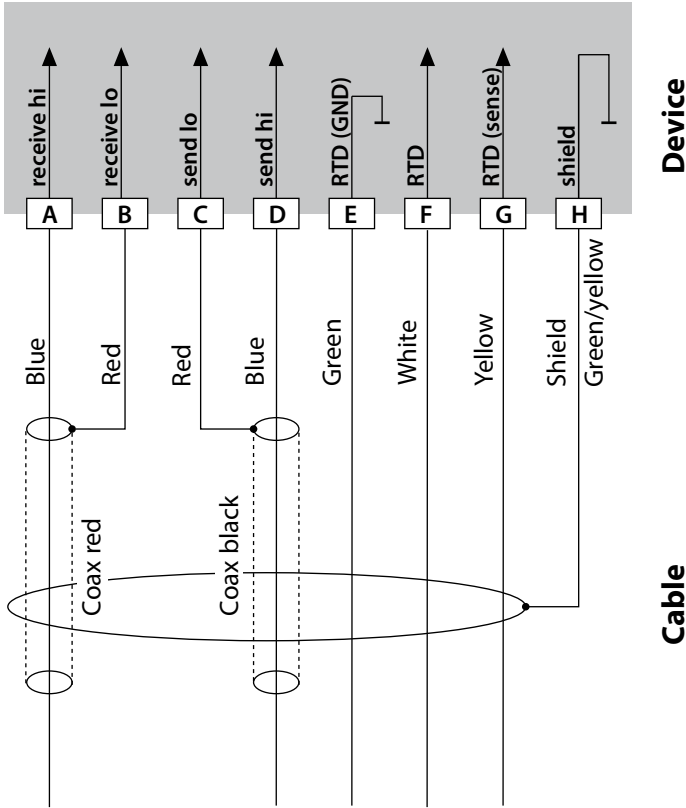
Wiring Example: Yokogawa ISC40

Measuring task: Conductivity, temperature
Sensor: Yokogawa ISC40 (Pt 1000)

Device

| A | B | C | D | E | F | G | H |

receive hi | receive lo | send lo | send hi | RTD (GND) | RTD | RTD (sense) | shield

Jumper!

Black | Black | Blue | Red | Black

Coax BN | Coax WH

Cable

Configuration settings for this sensor:

SENSOR	OTHER
RTD TYPE	1000Pt
CELL FACTOR	1.88
TRANS RATIO	125

Wiring Example: Yokogawa IC40S

Measuring task: Conductivity, temperature
Sensor: Yokogawa IC40S (NTC 30k)
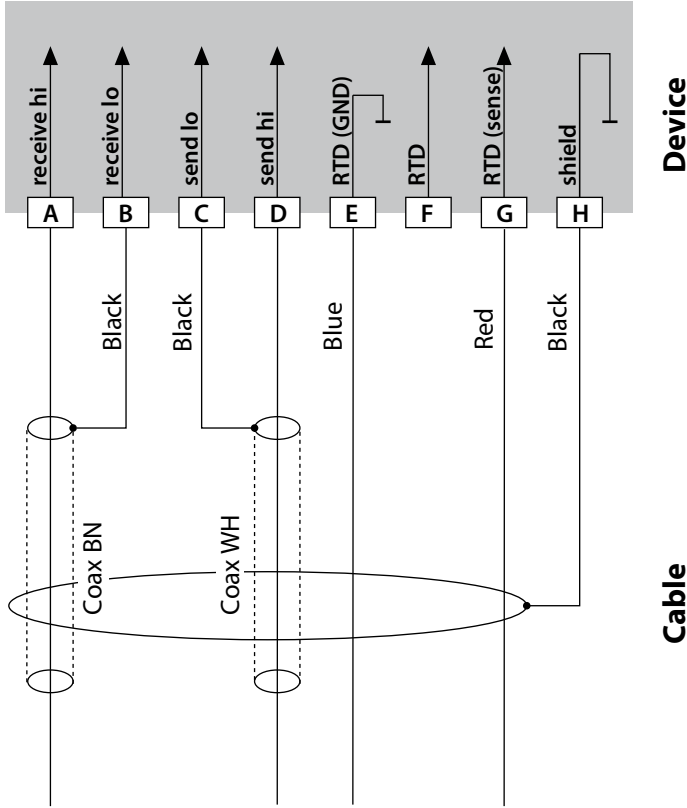
Configuration settings for this sensor:

SENSOR   OTHER
RTD TYPE   30 NTC
CELL FACTOR   Approx. 1.7
TRANS RATIO   125

Measuring task: Conductivity, temperature

Sensor: SE670

NOTICE! Connection to RS-485 interface.

Remove the measuring module.
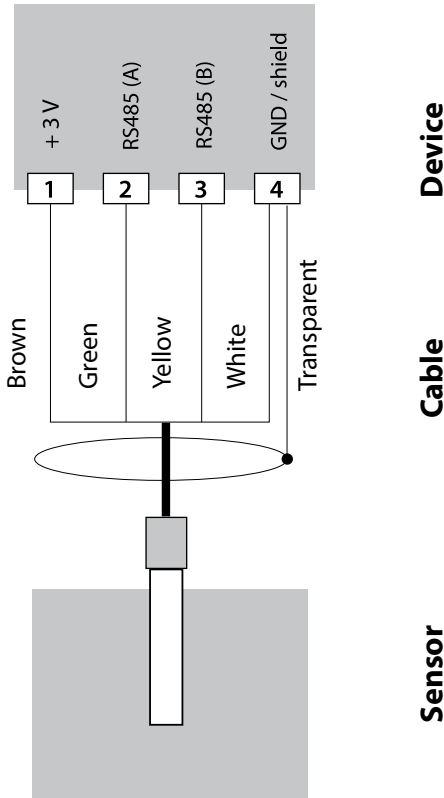
The SE670 / SE680 sensors are connected to the RS-485 interface of the device – for an A2... Series (2-wire) device, the measuring module slot must be empty. Therefore, first remove the measuring module from the slot (see next page). When the sensor model SE670 / SE680 is selected in the Configuration menu, the default values are taken as calibration data. They can then be modified by calibration.
All calibration data of the SE680-M sensor with Memosens protocol are stored in the sensor.

Connecting an SE670 / SE680 Sensor
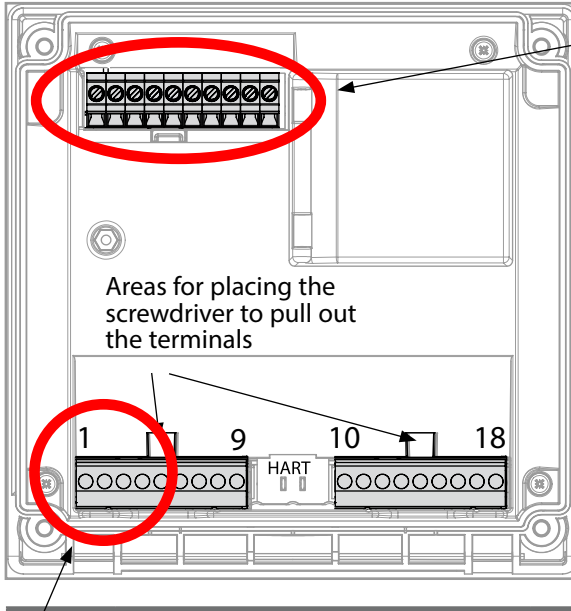
NOTICE!
The slot for the MK-CONDI module must be empty – be sure to remove the module!

Areas for placing the screwdriver to pull out the terminals

Connection of SE670 / SE680:		Wire color
1	+3 V	Brown
2	RS 485 A	Green
3	RS 485 B	Yellow
4	GND/shield	White, transparent shield
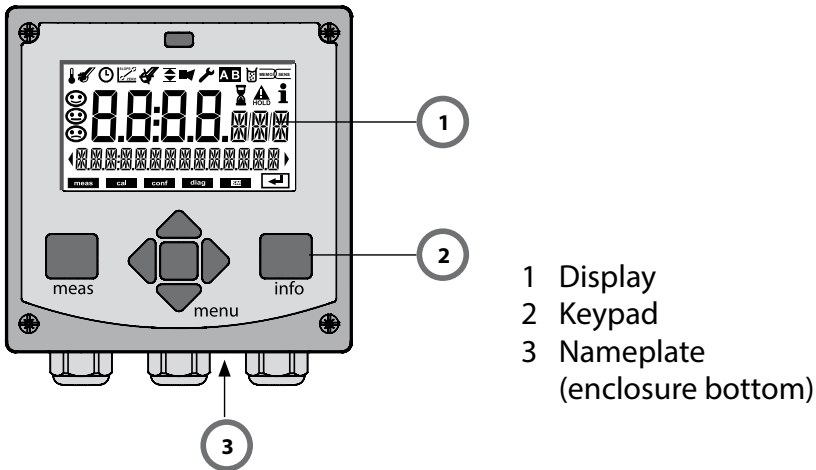
1 Display
2 Keypad
3 Nameplate
(enclosure bottom)

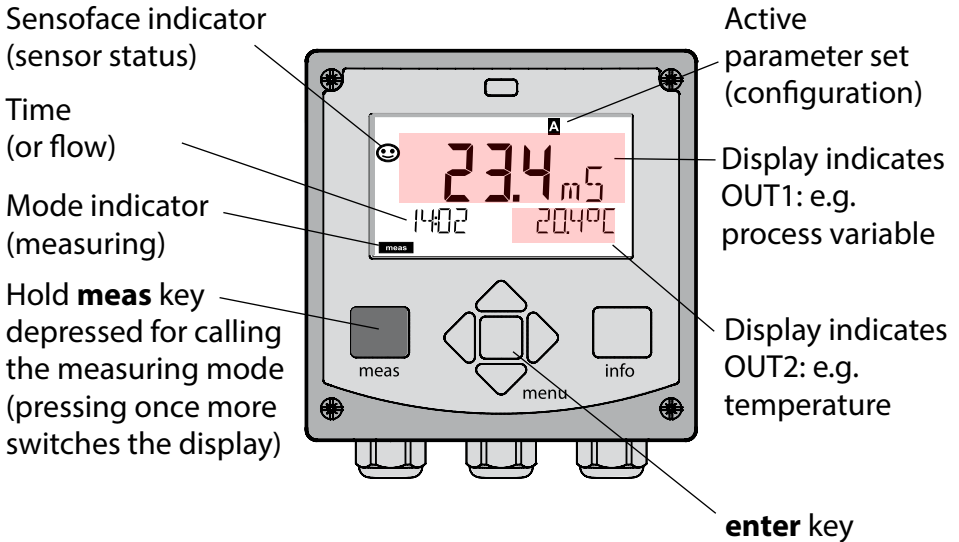| Key	Function
meas	• Return to last menu level • Directly to measuring mode (press > 2 s) • Measuring mode: other display
info	• Retrieve information • Show error messages
enter	• Configuration: Confirm entries, next configuration step • Calibration: Continue program flow
menu	• Measuring mode: Call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

27

Display

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

Signal Colors (Display Backlighting)

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

28

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
(or flow)

Mode indicator
(measuring)

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

Active
parameter set
(configuration)

Display indicates
OUT1: e.g.
process variable

Display indicates
OUT2: e.g.
temperature

enter key

Depending on the configuration, one of the following displays can be set as standard display for the measuring mode (see page 31):
• Measured value, time and temperature (default setting)
• Measured value and selection of parameter set A/B or flow
  Measured value and measuring point ("TAG")
• Time and date

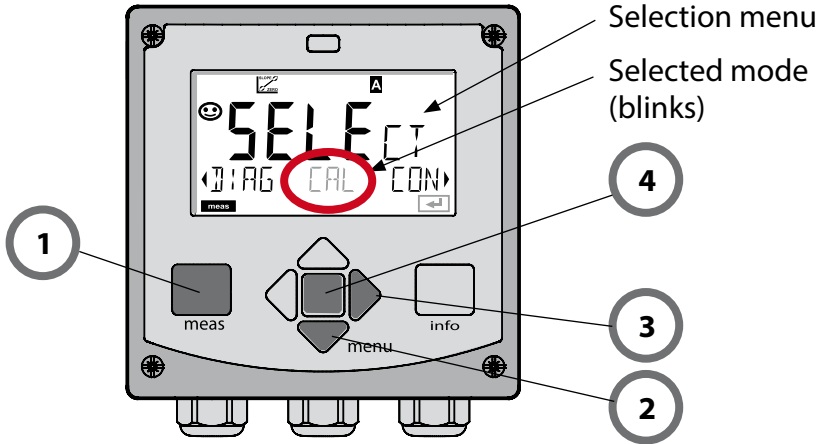**Note:** By pressing the **meas** key in measuring mode you can view the displays for approx. 60 sec.

The device must be configured for the respective measurement task, see page 39.

Selecting the Mode / Entering Values

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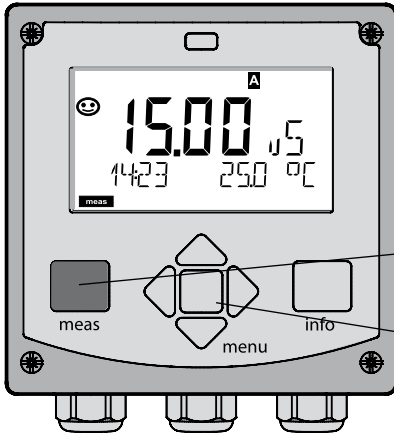4) Press **enter** to confirm the selected mode

Selection menu

Selected mode (blinks)

To enter a value:
5) Select numeral: left / right arrow key
6) Change numeral: up / down arrow key
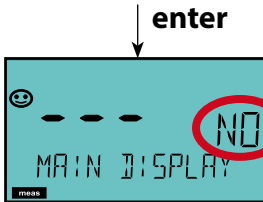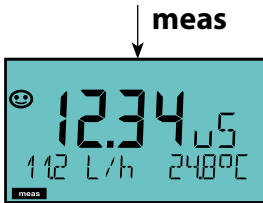7) Confirm entry by pressing **enter**
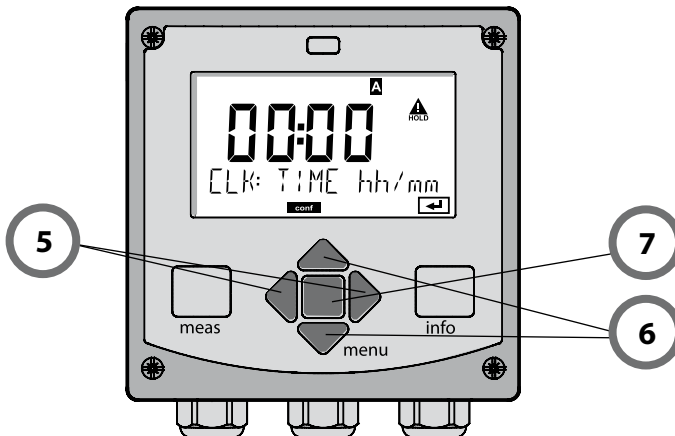
The MAIN DISPLAY is the display which is shown in measuring mode. To call the measuring mode from any other mode, hold the **meas** key depressed for at least 2 sec.

meas key

enter key

meas

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

meas

enter

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

approx. 2 s
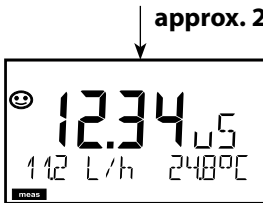
Color-Coded User Interface

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

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

The orange HOLD mode (e.g. during calibration) is quickly visible as is the magenta screen which indicates asset management messages for predictive diagnostics – such as maintenance request, pre-alarm and sensor wear.
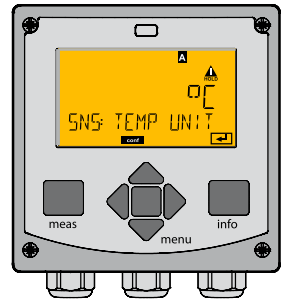
The alarm status has a particularly noticeable red display color and is also signaled by flashing display values. Invalid inputs or false passcodes cause the entire display to blink red so that operating errors are noticeably reduced.
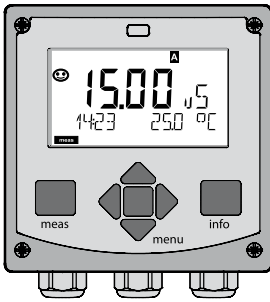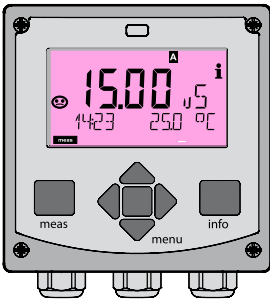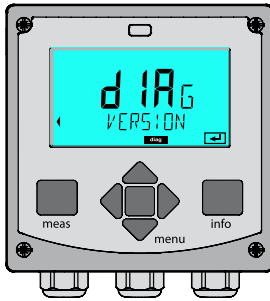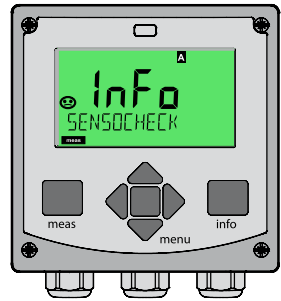
White:
Measuring mode
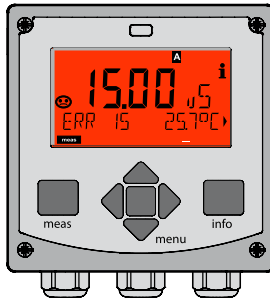
Red blinking:
Alarm, errors

Orange:
HOLD mode

Magenta:
Maintenance request

Turquoise:
Diagnostics

Green:
Information texts

32   * can be turned off

Diagnostics
Display of calibration data, display of sensor data, performing a device self-test, viewing the logbook entries, display of hardware/software versions of the individual components. The logbook (TAN SW-A002) can store 100 events (00...99). They can be displayed directly on the device. With AuditTrail (TAN SW-A003), the logbook can be extended to 200 entries.

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

Calibration
Every sensor has typical characteristic values. 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. During calibration the device is in HOLD mode.
During calibration the device remains in the HOLD mode until it is stopped by the operator.
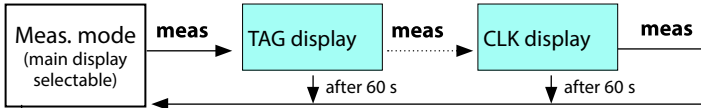
Configuration
The analyzer must be configured for the respective measurement task. In the "Configuration" mode you select the connected sensor, the measuring range to be transmitted, and the conditions for warning and alarm messages. During configuration the device is in HOLD mode.
Configuration mode is automatically exited 20 minutes after the last keystroke. The device returns to measuring mode.

Service
Maintenance functions (current source), passcode assignment, reset to factory settings, enabling of options (TAN).

Menu Structure of Modes and Functions

Meas. 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
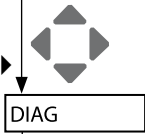
CALDATA	Display of calibration data
SENSOR	Display of sensor data
SELFTEST	Self test: RAM, ROM, EEPROM, module
LOGBOOK	Logbook: 100 events with date and time
MONITOR	Display of direct, uncorrected sensor signals
VERSION	Display of software version, model designation, serial number

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

CAL_SOL	Calibration with calibration solution
CAL_CELL	Calibration by input of cell factor
CAL_ZERO	Zero calibration
P_CAL	Product calibration
CAL_RTD	Adjustment of temperature probe

CONF

PARSET A	Configuring parameter set A
PARSET B	Configuring parameter set B

SERVICE

(Access via code, factory setting: 5555)

MONITOR	Display of measured values for validation (simulators)
OUT1	Current source, output 1
OUT2	Current source, output 2
CODES	Specifying access codes for operating modes
DEFAULT	Reset to factory setting
OPTION	Enabling an option via TAN

The HOLD mode is a safety state during configuration and calibration.
Output current is frozen (LAST) or set to a fixed value (FIX).
The HOLD mode is indicated by orange display backlighting.

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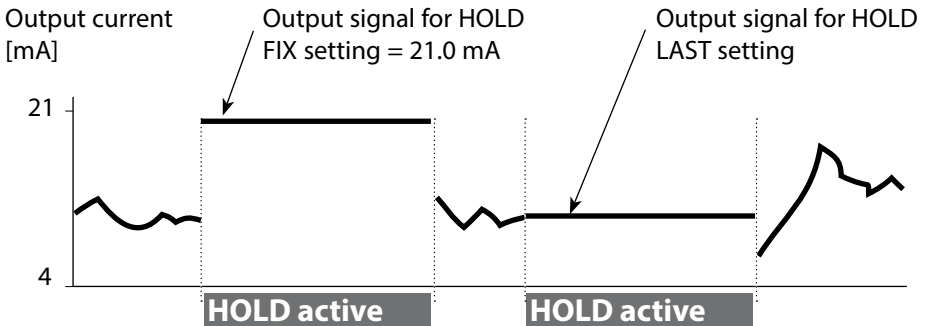
Terminating the HOLD mode
The HOLD mode is ended by switching to measuring mode (hold **meas** key depressed). The display reads "Good Bye", after that, the HOLD mode is exited.
When the calibration mode is exited, a confirmation prompt ensures that the installation is ready for operation (e.g.: sensor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

Alarm

External activation of HOLD (SW-A005)
The HOLD mode can be activated from outside by sending a signal to
the HOLD input (e.g. from the process control system).
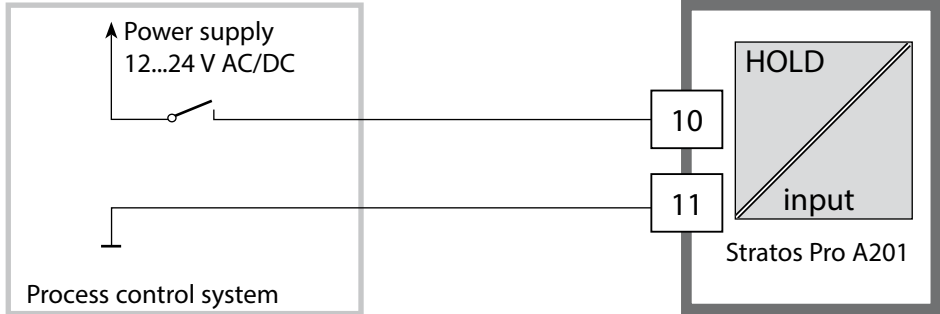
HOLD inactive	0...2 V AC/DC
HOLD active	10...30 V AC/DC

Manual activation of HOLD
The HOLD mode can be activated manually from the HOLD menu. This
allows checking or replacing a sensor, for example, without provoking
unintended reactions at the outputs.
Press **meas** key to return to selection menu.

Alarm
When an error has occurred, **Err xx** is displayed immediately.
Only after expiry of a user-defined delay time will the alarm be
registered and entered in the logbook.
During an alarm the display blinks, the display backlighting turns **red**.

Error messages can also be signaled by a 22 mA output current
(see Configuration).
2 sec after the failure event is corrected, the alarm status will be
deleted.

Message	Released by	Cause
Alarm (22 mA)	Sensocheck	Polarization / Cable
	Error Messages	Flow (CONTROL input)
		ERR 10: Conductance > 3500 mS
HOLD (Last/Fix)	HOLD	HOLD via menu or input
	CONF	Configuration
	CAL	Calibration
	SERVICE	Service

Generating a message via the CONTROL input (TAN SW-A005) (min. flow / max. flow)
The CONTROL input can be used for parameter set selection or for flow measurement (pulse principle), depending on its assignment in the "Configuration" menu.
When preset to flow measurement
CONF/CNTR_IN/CONTROL = FLOW
an alarm can be generated when the measured flow exceeds a specified range:
CONF/ALA/FLOW CNTR = ON
CONF/ALA/FLOW min (specify value, default: 5 liters/h)
CONF/ALA/FLOW max (specify value, default: 25 liters/h)

Power supply
12...24 V AC/DC

CONTROL

13

14   input
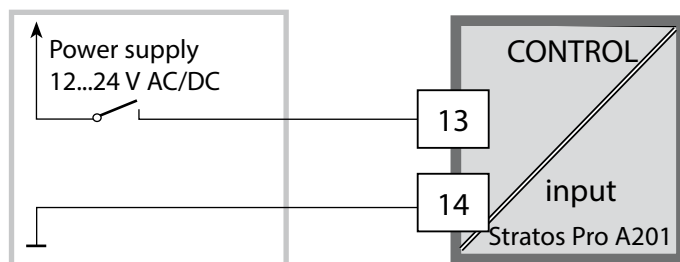
Stratos Pro A201

⚠ **CAUTION!** Incorrect parameter settings or adjustments can result in incorrect outputs. Stratos Pro 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

Menu Structure of Configuration

The device provides 2 parameter sets "A" and "B". By switching between the parameter sets you can adapt the device to different measurement situations, for example. Parameter set "B" only permits setting of process-related parameters.
The configuration steps are assigned to different menu groups.
With the left/right arrow keys you can jump between the individual menu groups.
Each menu group contains menu items for setting the parameters.
Pressing **enter** opens a menu item. Use the arrow keys to edit a value.
Press **enter** to confirm/save the settings.
Return to measurement: Hold **meas** key depressed (> 2 s).

Select menu group	Menu group	Code	Display	Select menu item
	Sensor selection	SNS:	⌂onF SENSOR	enter
	Menu item 1			enter
	⋮			enter
	Menu item ...			enter
▶	Current output 1	OT1:	⌂onF OUT1	
▶	Current output 2	OT2:	⌂onF OUT2	
▶	Compensation	COR:	⌂onF CORRECTION	
▶	...	...		◀
	Display backlighting	DSP:	⌂onF DISPLAY	

Configuration

Parameter Set A/B: Configurable Menu Groups

Menu group	Parameter set A	Parameter set B
SENSOR	Sensor selection	---
OUT1	Current output 1	Current output 1
OUT2	Current output 2	Current output 2
CORRECTION	Compensation	Compensation
CNTR_IN	Control input	---
ALARM	Alarm mode	Alarm mode
PARSET	Parameter set selection	---
CLOCK	Setting the clock	---
TAG	TAG of measuring point	TAG of measuring point
GROUP	GROUP of measuring points	GROUP of measuring points
DISPLAY	Display backlighting	---

Parameter Set Selection

Note: Manual selection of parameter sets must have been preset in the CONFIG > PARSET menu. Default setting is a fixed parameter set A. Wrong settings change the measurement properties!

Manual switchover of parameter sets A/B

Display	Action
	To switch between parameter sets: Press **meas**.
	PARSET blinks in the lower line. Select parameter set using ◀ and ▶ keys
	Press **enter** to confirm. Cancel by pressing **meas**.

External switchover of parameter sets A/B (TAN SW-A005)
You can switch between parameter sets A and B by applying a signal to the CONTROL input (parameter setting: CONTR-IN > PARSET).

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

41

Configuration

Configuration			Choices	Default
Sensor (SENSOR)				
SNS:			SE 655, SE 656 SE 660, SE 670, SE680-K, SE680-M MEMOSENS OTHER	SE 655
	OTHER	RTD TYPE	100PT / 1000PT / 30 NTC	1000PT
		CELL FACTOR	XX.XXx	01.980
		TRANS RATIO	XXX.Xx	120.0
	MEAS MODE		Cond Conc % Sal ‰	Cond
	Cond	MEAS RANGE	xxx.x µS/cm x.xxx mS/cm xx.xx mS/cm xxx.x mS/cm x.xxx S/m xx.xx S/m	x.xxx mS/cm
	Conc	Solution	-01- (NaCl) -02- (HCl) -03- (NaOH) -04- (H2SO4) -05- (HNO3) -06- (H2SO4) -07- (HCl) -08- (HNO3) -09- (H2SO4) -10- (NaOH) -U1-	-01- (NaCl)
	TEMP UNIT		°C / °F	°C
	TEMPERATURE		AUTO, MAN, EXT (EXT. only with TAN option SW-A005)	AUTO
	MAN	TEMPERATURE	–50 ... 250 °C (–58 ... 482 °F)	025.0 °C (077.0 °F)

42

Configuration			Choices	Default
Sensor (SENSOR)				
SNS:	CIP COUNT		ON/OFF	OFF
			ON	0 ... 9999 CYCLES
	SIP COUNT		ON/OFF	OFF
			ON	0 ... 9999 CYCLES
	CHECK TAG		ON/OFF	OFF
	CHECK GROUP		ON/OFF	OFF
Output 1 (OUT1)				
OT1:	Channel		Cond/TMP	Cond
	Output		LIN / BiLIN / LOG	LIN
	LIN	BEGIN 4 mA	xxxx	000.0 mS/cm
		END 20 mA	xxxx	100.0 mS/cm
	BiLIN	BEGIN 4 mA		
		END 20 mA		
		CORNER X	Input range: selected CHANNEL Vertex X : BEGIN ≤ CORNER X ≤ END (rising) BEGIN ≥ CORNER X ≥ END (falling)	
		CORNER Y	Input range: selected CHANNEL Default: 12 mA Vertex Y: (0) 4 mA ≤ CORNER Y ≤ 20 mA	
	LOG	BEGIN 4 mA	Decades	
		END 20 mA	Decades	
	TMP °C	BEGIN 4 mA	−50...250 °C	
		END 20 mA	−50...250 °C	
	TMP °F	BEGIN 4 mA	−58...482 °F	
		END 20 mA	−58...482 °F	
	FILTERTIME		0...120 SEC	0000 SEC
	22 mA FAIL		ON/OFF	OFF
	22 mA FACE		ON/OFF	OFF
	HOLD MODE		LAST/FIX	LAST
	FIX	HOLD-FIX	04.00...22.00 mA	021.0 mA

Configuration

Configuration			Choices	Default
Output 2 (OUT2)				
OT2:	CHANNEL		Cond/TMP	TMP
	... other steps like output 1			
Temperature compensation (CORRECTION)				
COR:	TC SELECT		OFF Compensation for ultrapure water: NaCl, HCL, NH3	OFF
	LIN	TC LIQUID	00.00 ...19.99%/K	00.00%/K
		REF TEMP	000.0 ... 199.9 °C	025.0 °C
	TEMP EXT *)		ON/OFF	OFF
	ON	I-INPUT	0–20 mA / 4–20 mA	4...20 mA
		°C BEGIN 4 mA	−50...250 °C	000.0 °C
		END 20 mA	−50...250 °C	100.0 °C
		°F BEGIN 4 mA	−58...482 °F	
		END 20 mA	−58...482 °F	
Control input (CNTR_IN)				
IN:	CONTROL		Parameter-set switchover (PARSET) or flow measurement (FLOW)	PARSET
	FLOW	FLOW ADJUST	12000 pulses/liter	0 ... 20000 pulses/liter
Alarm (ALARM)				
ALA:	DELAYTIME		0...600 SEC	0010 SEC
	SENSOCHECK		ON/OFF	OFF
	TEMP CHECK		ON/OFF	OFF
	FLOW CNTR **)		ON/OFF	OFF
	ON	FLOW MIN ***)	0 ... 99.9 L/h	005.0 L/h
		FLOW MAX ***)	0 ... 99.9 L/h	025.0 L/h

*) With TAN option SW-A005 and SENSOR "TEMP EXT" selected
**) These menu items appear only if selected.
***) Hysteresis fixed at 5% of threshold value

44

Configuration		Choices	Default
Parameter set (PARSET)			
PAR:	Select fixed parameter set (A) or switch between A/B via control input or manually in measuring mode	PARSET FIX / CNTR INPUT / MANUAL	PARSET FIX (fixed parameter set A)
Real-time clock (CLOCK)			
CLK:	FORMAT		24 h / 12 h	24 h
	24 h	TIME hh/mm	00..23:00...59	
	12 h	TIME hh/mm	00 ... 12:59 AM / 01 ... 11:59 PM	
	DAY/MONTH		01...31/01...12	
	YEAR		2000...2099	
Measuring points (TAG / GROUP)			
TAG:	(Input in text line)	A...Z, 0...9, – + < > ? / @	
GROUP:	(Input in text line)	0000...9999	0000
Display backlighting (DISPLAY)			
DSP:	BACKLIGHT	On, Off	On

Monitoring the sensor lines for breakage

The sensor lines are monitored for breakage when the temperature is used for calculating the conductivity or concentration. If the sensor or line is broken, an alarm will be generated (output current FIX or 22 mA, depending on the configuration).

If you want to output a conductivity value that is independent of the measured temperature (uncompensated), you can monitor the sensor lines for breakage by setting "TEMP CHECK" to "ON" in the ALARM menu.

Configuration (Original for Copy)

Parameter	Parameter set A	Parameter set B
SNS: Sensor type		--- *)
SNS: RTD type		---
SNS: Cell factor		---
SNS: Transfer ratio		---
SNS: Measuring mode		---
SNS: Measuring range		---
SNS: Concentration determination		---
SNS: Temperature unit		---
SNS: Temp detection		---
SNS: Manual temp		---
SNS: CIP counter		---
SNS: SIP counter		---
SNS: CHECK TAG		
SNS: CHECK GROUP		
OT1: Process variable		
OT1: Lin/bilin/log output		
OT1: Current start		
OT1: Current end		
OT1: Vertex X (bilinear curve only)		
OT1: Vertex Y (bilinear curve only)		
OT1: Filter time		
OT1: FAIL 22 mA (error messages)		
OT1: FACE 22 mA (Sensoface messages)		
OT1: HOLD mode		
OT1: HOLD FIX current		
OT2: Process variable		
OT2: Lin/bilin/log output		
OT2: Current start		
OT2: Current end		

Parameter	Parameter set A	Parameter set B
OT2: Vertex X (bilinear curve only)		
OT2: Vertex Y (bilinear curve only)		
OT2: Filter time		
OT2: FAIL 22 mA (error messages)		
OT2: FACE 22 mA (Sensoface messages)		
OT2: HOLD mode		
OT2: HOLD FIX current		
COR: TC SELECT		
COR: Temp coefficient		
COR: Reference temperature		
COR: Current range		
COR: Current start		
COR: Current end		
IN: Parameter set A/B or flow		
IN: (Flow meter) Adjusting pulses/liter		
ALA: Delay		
ALA: Sensocheck on/off		
ALA: Tempcheck on/off		
ALA: Flow control FLOW CNTR on/off		
ALA: Minimum flow (hysteresis fixed at 5 %)		
ALA: Maximum flow (hysteresis fixed at 5 %)		
PAR: Parameter set selection		---*)
CLK: Time format		---
TAG: Measuring point (tag number)		
GROUP: Group of measuring points		
DISPLAY: Display backlighting		---

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

Configuration
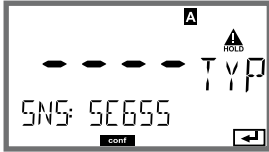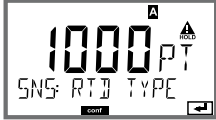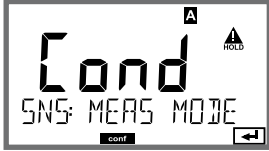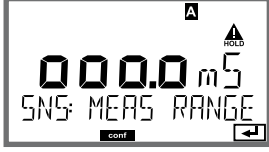
Sensor
Select: Sensor type, temperature probe, cell factor, transfer ratio, measuring mode, range
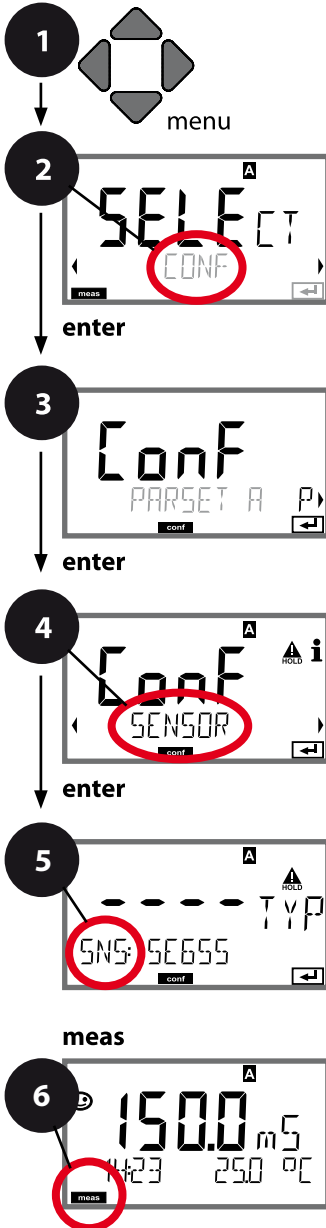
1) Press **menu** key.
2) Select **CONF** using ◂ ▸ , press **enter**.
3) Select parameter set using ◂ ▸ keys, press **enter**.
4) Select **SENSOR** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "SNS:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) by pressing **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

Sensor type	**enter**
Temperature probe	
Cell factor	
Transfer ratio	
Measuring mode	
Measuring range	
Concentration determination	
Temperature unit	
Temperature detection	
Cleaning cycles	
Sterilization cycles	
CHECK TAG	
CHECK GROUP	

Menu item	Action	Choices
Sensor type	Select sensor type using ▲ ▼ keys. Press **enter** to confirm.	**SE 655** SE 656, SE 660 SE 670, SE 680-K, SE 680-M, MEMOSENS, OTHER
Temperature probe	**Only with OTHER:** Select type of temperature probe using ▲ ▼ keys. Press **enter** to confirm.	**1000PT** 100PT 30 NTC
Cell factor	Enter cell factor using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	**01.980** XX.XXx
Transfer ratio	Enter transfer ratio using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	**120.00** XXX.Xx
Measuring mode	Select desired measuring mode using ▲ ▼ keys. Press **enter** to confirm.	**Cond** Conc % Sal ‰
Measuring range	**For cond measurement only** Select desired range using ▲ ▼ keys. Press **enter** to confirm.	**x.xxx mS/cm**, xx.xx mS/cm xxx.x mS/cm, x.xxx S/m xx.xx S/m

Configuration
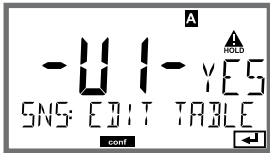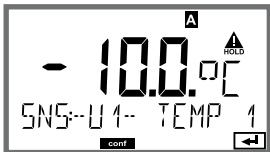
Sensor
Select: Concentration determination

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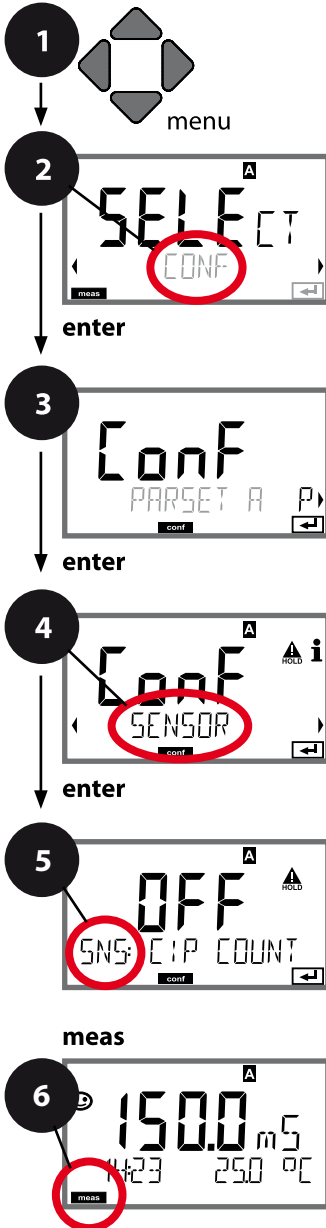6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

Sensor type
Temperature probe
Cell factor
Transfer ratio
Measuring mode
Measuring range
Concentration determination
Temperature unit
Temperature detection
Cleaning cycles
Sterilization cycles
CHECK TAG
CHECK GROUP

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

	Action	Choices
	Press **enter** to confirm	
	Use the arrow keys ▲ ▼ ◀ ▶ to enter temperature values 1 ... 5. Press **enter** to confirm.	Input range: –50...250 °C / –58...482 °F
	Use the arrow keys ▲ ▼ ◀ ▶ to enter concentration value 1. Press **enter** to confirm.	
	For concentration value 1: Use the arrow keys ▲ ▼ ◀ ▶ to enter conductivity values for temperatures 1 ... 5. Press **enter** to confirm.	
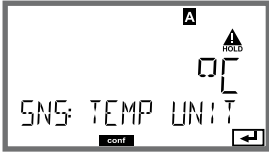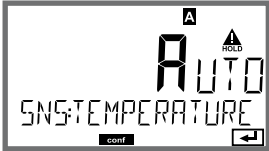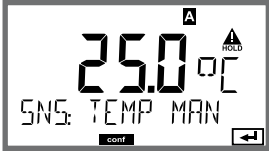
Sensor
Select: Temperature unit, temperature detection

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

Sensor type
Temperature probe
Cell factor
Transfer ratio
Measuring mode
Measuring range
Concentration determination
Temperature unit
Temperature detection
Cleaning cycles
Sterilization cycles
CHECK TAG
CHECK GROUP

52

Menu item	Action	Choices
Temperature unit	Select °C or °F using ▲ ▼ keys.	**°C** / °F
	Press **enter** to confirm.	
Temperature detection	Select mode using ▲ ▼: AUTO: Measured by sensor MAN: Direct input of temperature, no measurement (see next step) EXT: Temperature specified via current input (only if TAN E enabled) Press **enter** to confirm.	**AUTO** MAN EXT
(Manual temperature)	Modify digit using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm.	–50...250 °C (–58...+482 °F)
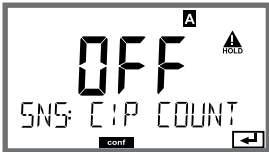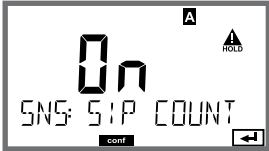
Sensor
Adjust: Cleaning cycles, sterilization cycles

1

menu

2

SELECT
CONF
meas

enter

3

ConF
PARSET A   P▸
conf

enter

4

ConF   ⚠ i
HOLD
SENSOR   ▸
conf

enter

5

OFF   ⚠
HOLD
SNS: CIP COUNT
conf

meas

6

150.0 mS
1:23   25.0 °C
meas

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

5   **enter**

| |
|---|
| Select sensor type |
| Select temp probe |
| Select cell factor |
| Select transfer ratio |
| Select measuring mode |
| Select range |
| Concentration determination |
| Temperature unit |
| Temperature detection |
| Cleaning cycles |
| Sterilization cycles |
| CHECK TAG |
| CHECK GROUP |

54

Menu item	Action	Choices
CIP / SIP		
Cleaning cycles **OFF** ⒶHOLD SNS: CIP COUNT conf ↵	Select ON or OFF using ▲ ▼ keys. Activates/deactivates log- ging in extended logbook (TAN SW-A003). Press **enter** to confirm.	ON/**OFF**
Sterilization cycles **On** ⒶHOLD SNS: SIP COUNT conf ↵	Select ON or OFF using ▲ ▼ keys. Activates/deactivates log- ging in extended logbook (TAN SW-A003). Press **enter** to confirm.	ON/**OFF**

Logging the cleaning and sterilization cycles with connected sensor
helps measuring the load on the sensor.
Suitable for biochemical applications (process temp approx.
0 ... +50 °C / +32 ... +122 °F, CIP temp > +55 °C / +131 °F,
SIP temp > +115 °C / +239 °F).

Note:
A CIP or SIP cycle is only entered into the extended logbook (TAN
SW-A003) 2 hours after the start to ensure that the cycle is complete.
With Memosens (e.g., SE680-M), an entry is also made in the sensor.

Memosens Sensor
Sensor Verification (TAG, GROUP)

1

menu

2

SELECT
CONF

enter

3

ConF
PARSET A P▸

enter

4

ConF
SENSOR

enter

5

SNS: MEMOSENS

meas

6

150.0 mS
N23 25.0 °C

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

5

Select sensor type	**enter**
Select temp probe	
Select cell factor	
Select transfer ratio	
Select measuring mode	
Select range	
Concentration determination	
Temperature unit	
Temperature detection	
Cleaning cycles	
Sterilization cycles	
CHECK TAG	
CHECK GROUP	

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

Sensor Verification (TAG, GROUP)

When Memosens sensors are calibrated in the lab, it is often useful and sometimes even mandatory that these sensors will be operated again at the same measuring points or at a defined group of measuring points. To ensure this, you can save the respective measuring point (TAG) or group of measuring points (GROUP) in the sensor. TAG and GROUP can be specified by the calibration tool or automatically entered by the transmitter. When connecting an MS sensor to the transmitter, it can be checked if the sensor contains the correct TAG or belongs to the correct GROUP. If not, a message will be generated, Sensoface gets "sad", and the display backlighting turns magenta (purple). 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.
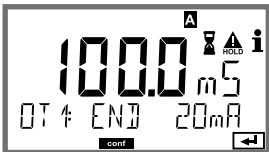
Current Output 1
Output current range. Linear/Logarithmic. Current start.

1

menu

2

SELECT
CONF

enter

3

ConF
PARSET A P▸

enter

4

ConF
OUT 1

enter

5

Cond
OT 1 CHANNEL

meas

6

150.0 mS
1423   25.0 °C

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

5

Process variable	**enter**
LIN/biLIN/LOG output	
Current start	
Current end	
Time averaging filter	
Output current for error message	
Output current for Sensoface	
Output current during HOLD	
Output current for HOLD FIX	

58

Menu item	Action	Remark
Process variable **Cond** OT ↑ CHANNEL	Select using ▲ ▼ keys: Cond: Conductivity TMP: Temperature Press **enter** to confirm. Then select characteristic (LIN/biLIN/LOG).	Selectable decades with logarithmic setting (LOG): S/cm: 0.001 mS/cm, 0.01 mS/cm, 0.1 mS/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
Current start **000.0** mS OT ↑ BEGIN 4mA	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 OT ↑ END 20mA	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: Range 0...200 mS/cm
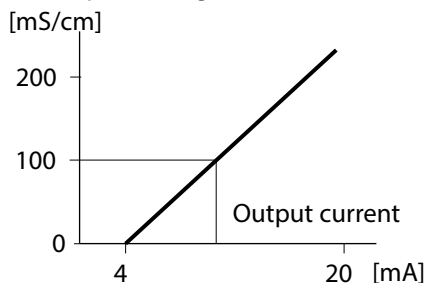
Example 2: Range 100...200 mS/cm
Advantage: Higher resolution in range of interest
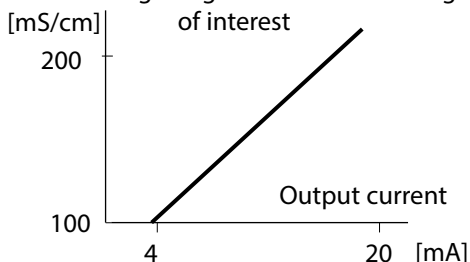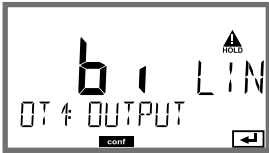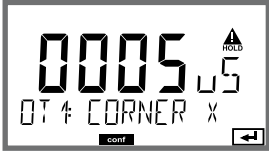
Current Output 1
Output current curve, bilinear

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

1

menu

2

SELECT
CONF
meas

enter

3

ConF
PARSET A P▸
conf

enter

4

ConF
OUT 1
conf

enter

5

bi LIN
OT 1: OUTPUT
conf

meas

6

150.0 mS
4:23   25.0 °C
meas

5

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

60

Menu item	Action	Choices
Output current curve b LIN OT 4 OUTPUT conf	Select using ▲ ▼ keys. Press **enter** to confirm.	**LIN** Linear characteristic biLIN Bilinear curve LOG Logarithmic curve
Current start and current end 000.0 mS OT 4 BEGIN 4mA 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)
Bilinear curve: Vertex X/Y 0005 uS OT 4 CORNER X conf	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]

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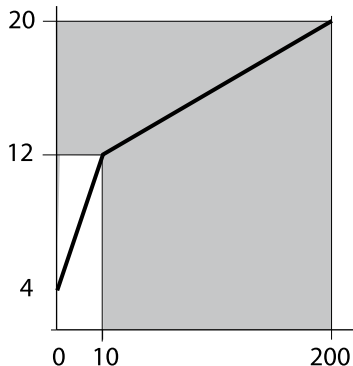
Example:
Current range 4 ... 20 mA,
Current start: 0 µS/cm
Current end: 200 µS/cm
Vertex:
"CORNER X": 10 µS/cm (process variable)
"CORNER Y": 12 mA (output current)
Result: The output current change in the range 0 ... 10 µS/cm is much greater than in the range 10 ... 200 µS/cm.

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):

0.001 mS/cm	0.001 S/m
0.01 mS/cm	0.01 S/m
0.1 mS/m	0.1 S/m
	1.0 S/m
	10.0 S/m
	100 S/m

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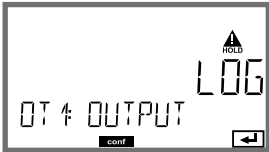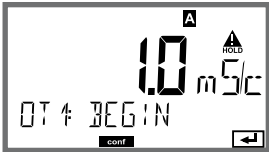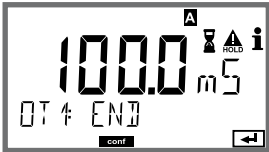
The number of decades results from:
Number of decades = log (end value) – log (start value)

The output current value is defined as follows:

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

2				800	mS/cm	**Measured values**

1	10	100	**1000** mS/cm	**Decades**
Start value			**End value**	
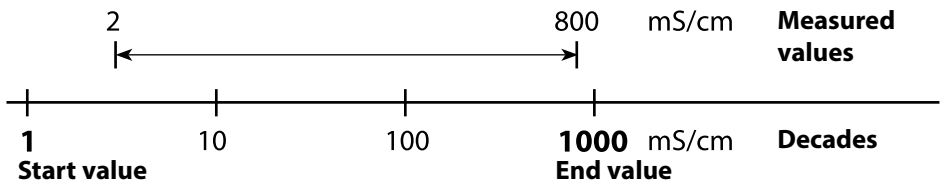
Menu item	Action	Choices

Logarithmic curve of output current
 	
 `LOG`
 `OT1 OUTPUT` `HOLD` `conf`
	Select using ▲ ▼ keys. Press **enter** to confirm.	**LOG**
		 Logarithmic curve
		
		 biLIN
		 Bilinear curve
		
		 LIN
		 Linear characteristic

Start value
 	
 `1.0 mS/c`
 `OT1 BEGIN` `A` `HOLD` `conf`
	Enter value using ▲ ▼ ◄ ► keys.
	
	 Press **enter** to confirm.
		Start value of logarithmic output curve

End value
 	
 `100.0 mS`
 `OT1 END` `A` `HOLD` `i` `conf`
	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:
0.001 mS/cm, 0.01 mS/cm, 0.1 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

Configuration

Current Output 1
Adjusting the time interval of the output filter

1

menu

2

SELECT
CONF

enter

3

ConF
PARSET A   P

enter

4

ConF
OUT 1

enter

5

0000 SEC
OT1: FILTERTIME

meas

6

150.0 mS
14:23   25.0 °C

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

5

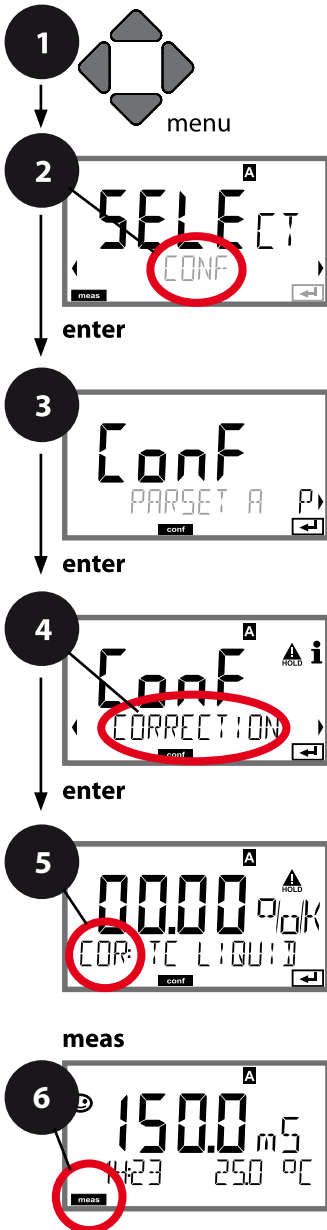|	enter
Process variable	
LIN/biLIN/LOG output	
Current start	
Current end	
Time averaging filter	
Output current for error message	
Output current for Sensoface	
Output current during HOLD	
Output current for HOLD FIX	

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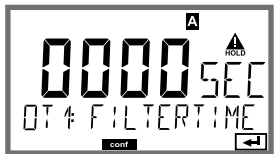
Time averaging filter

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 value!

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

Current Output 1
Output current during Error and HOLD

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

Process variable	enter
LIN/biLIN/LOG output	
Current start	
Current end	
Time averaging filter	
Output current for error message	
Output current for Sensoface	
Output current during HOLD	
Output current for HOLD FIX	

Menu item	Action	Choices
Output current during error message OFF OT1 FAIL 22mA	Select ON (22 mA for error message) or OFF using ▲ ▼ keys. Press **enter** to confirm.	ON/**OFF**
Output current during Sensoface messages **OT1: FACE 22 mA**	Select ON or OFF using ▲ ▼ keys. Confirm by pressing **enter**	ON/**OFF**
Output current during HOLD LAST OT1 HOLD MODE	LAST: During HOLD the last measured value is maintained at the output. FIX: During HOLD a value (to be entered) is maintained at the output. Select using ▲ ▼ Press **enter** to confirm.	**LAST**/FIX
Output current for HOLD FIX 12.00 mA OT1 HOLD FIX	Only with FIX selected: Enter current which is to flow at the output during HOLD Enter value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	04.00...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

21

4

HOLD active   HOLD active
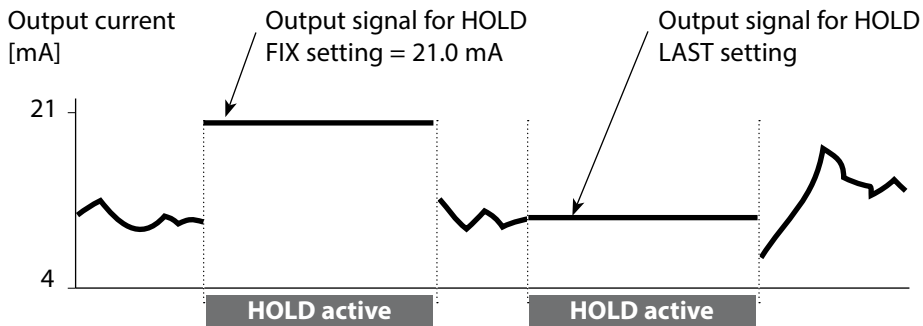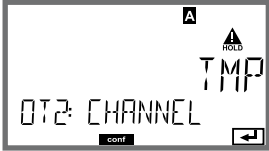
Current Output 2
Output current range. Process variable . . .
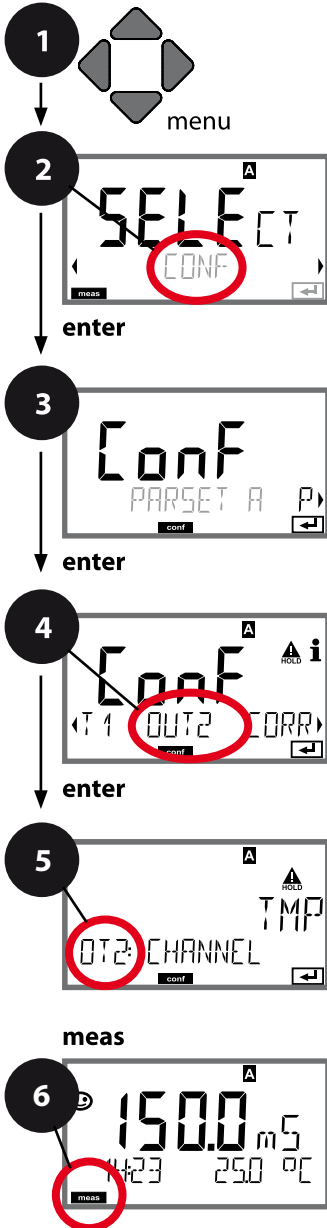
1

menu

2

SELECT
CONF
meas

enter

3

ConF
PARSET A   P

enter

4

ConF
T 1 OUT2 CORR

enter

5
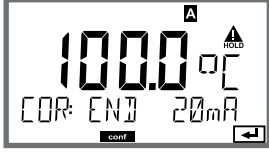
TMP
OT2: CHANNEL

meas

6

150.0 mS
423   25.0 °C
meas

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

5

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

Menu item	Action	Choices
Process variable	Select using ▲ ▼ keys: Cond: Conductivity TMP: Temperature Press **enter** to confirm.	Cond/**TMP** Begin: 0 °C End: 100°C
. . .		

In the menu item display:

```
         A
           ⚠
         HOLD
              T MP
OT2: CHANNEL
    conf      ↵
```

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

Configuration
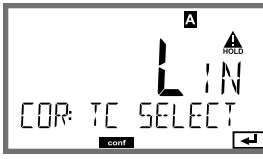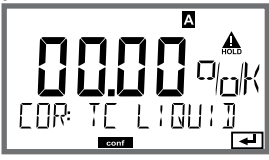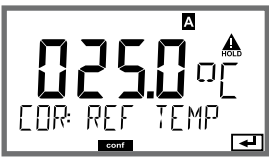
Temperature Compensation
Selecting the compensation method. TC process medium.

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

Temperature compensation	**enter**
Temperature compensation, process medium	
Enter reference temperature	
Current input, external temp measurement	
Current start	
Current end	

Menu item	Action	Choices
Temperature compensation	Select desired compensation using ▲ ▼ keys: **OFF:** Temp compensation **LIN:** Linear temperature compensation with entry of temperature coefficient **nLF:** Temperature compensation for natural waters to EN 27888 **NaCl:** Ultrapure water with NaCl traces (0 ... +120 ℃ / +32 ... +248 °F) **HCL:** Ultrapure water with HCl traces (0 ... +120 ℃ / +32 ... +248 °F) **NH3:** Ultrapure water with NH$_3$ traces (0 ... +120 ℃ / +32 ... +248 °F) **NaOH:** Ultrapure water with NaOH traces (0 ... +120 ℃ / +32 ... +248 °F) Press **enter** to confirm.	
Temperature compensation of process medium Enter reference temperature 	**With linear compensation only:** Step 1: Enter temperature compensation of the process medium. Step 2: Enter reference temperature. Enter value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm. Permissible range 0 ... 199.9 ℃	00.00...19.99 %/K

Configuration

Temperature Compensation
Current input for temp measurement.

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

Temperature compensation	enter
Temperature compensation, process medium	
Enter reference temperature	
Current input, external temp measurement (if enabled via TAN)	
Current start	
Current end	

72

Menu item	Action	Choices
With external temp measurement (current input enabled / TAN):		
Current range `4-20`mA `COR: I-INPUT` `conf`	Select desired range using ▲ ▼ keys. Press **enter** to confirm.	**4-20 mA** / 0-20 mA
Current start `000.0`°C `COR: BEGIN 4mA` `conf`	Modify digit using ▲ ▼ keys, select next digit using ◄ ► keys. Press **enter** to confirm.	Input range: −50...250 °C / −58...482 °F
Current end `100.0`°C `COR: END 20mA` `conf`	Enter value using ▲ ▼ ◄ ► keys. Press **enter** to confirm.	Input range: −50...250 °C / −58...482 °F

Configuration

CONTROL Input (TAN SW-A005)
Parameter set selection via external signal or
flow measurement
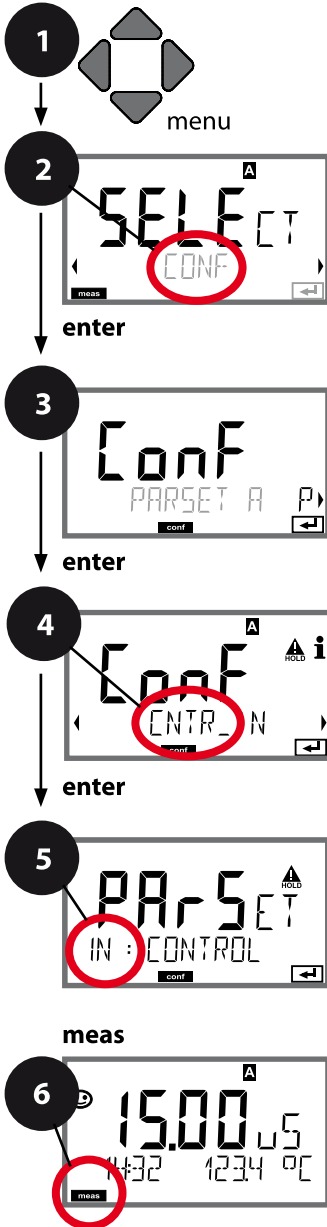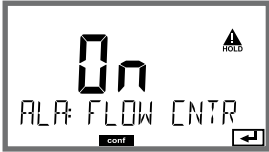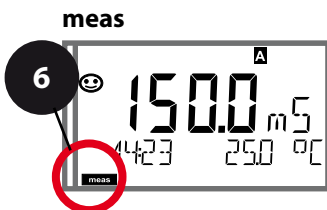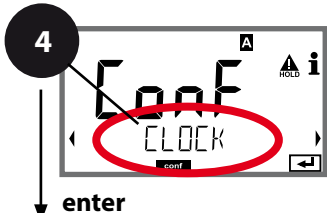

1) Press **menu** key.
2) Select **CONF** using ◀ ▶ keys, press **enter**.
3) Select parameter set using ◀ ▶ , press **enter**.
4) Select **CNTR_IN** menu using ◀ ▶ keys, press **enter**.
5) All items of this menu group are indicated by the "IN:" code.
   Press **enter** to select menu,
   edit using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

CONTROL input (function)

PARSET / FLOW

FLOW: ADJUST

Menu item	Action	Choices

Select function of CONTROL input
 	
`PArSEt`
`IN : CONTROL`
`conf`
	Select using ▲ ▼ keys. Press **enter** to confirm.	**PARSET**
		(selecting parameter set A/B via signal at CONTROL input)

`FLoW`
`IN : CONTROL`
`conf`
		Flow
		(for connecting a pulse-output flow meter)

Adjust to flow meter:
 	
`1200o/L`
`IN ADJUST FLOW`
`conf`
	With "Flow" selected, you must adjust the device to the flow meter used.
	Enter value using arrow keys. Press **enter** to confirm.
		12000 pulses/liter

In the alarm menu you can configure flow monitoring. When you have set CONTROL to FLOW, you can specify 2 additional limit values for maximum and minimum flow.
If the measured value lies outside this range, an alarm message and a 22-mA error signal (if configured) will be generated.

Display
Flow measurement in measuring mode

`12.34 uS`
`7.3 L/h  1327 uS`
`meas`

Display
Flow measurement (sensor monitor)

`7.3 L/h`
`FLOW`
`diag`

75

Configuration
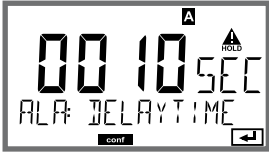
Alarm Settings
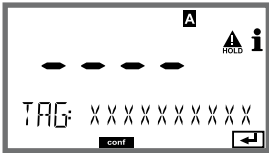**Delay. Sensocheck. Tempcheck.**

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

Delay
Sensocheck
Tempcheck
CONTROL input
For flow monitoring: Max. flow alarm
For flow monitoring: Min. flow alarm

Menu item	Action	Choices
Delay	Enter value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0...600 SEC (**010 SEC**)
Sensocheck	Select Sensocheck (continuous monitoring of sensor). 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 (see page 45)	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**

Error messages can be signaled by a 22 mA output current
(see Error Messages and Configuration of Output 1/Output 2).
The alarm delay time delays the color change of the display back-
lighting to red and the 22 mA signal (if configured).

Configuration

Alarm Settings
CONTROL input (TAN SW-A005)

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

| Delay |
| Sensocheck |
| Tempcheck |
| CONTROL input |
| For flow monitoring: Max. flow alarm |
| For flow monitoring: Min. flow alarm |

78

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

Configuration

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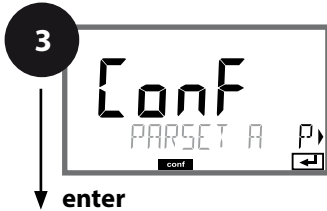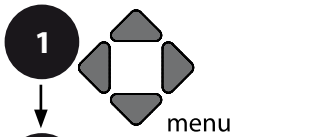
1) Press **menu** key.
2) Select **CONF** using ◀ ▶ ,
   press **enter**.
3) Select parameter set A using ◀ ▶ keys,
   press **enter**.
4) Select **CLOCK** using ◀ ▶ keys,
   press **enter**.
5) All items of this menu group are indicated by
   the "CLK:" code.
   Press **enter** to select menu,
   edit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

Time format
Time
Day and month
Year
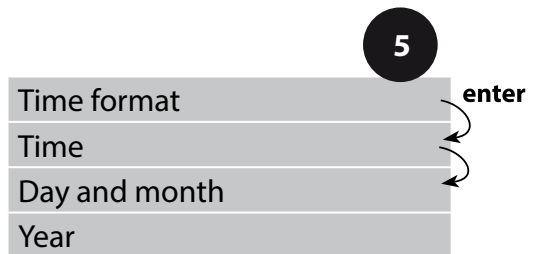
Time and Date

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!

Measuring Points (TAG/GROUP)
Display Backlighting
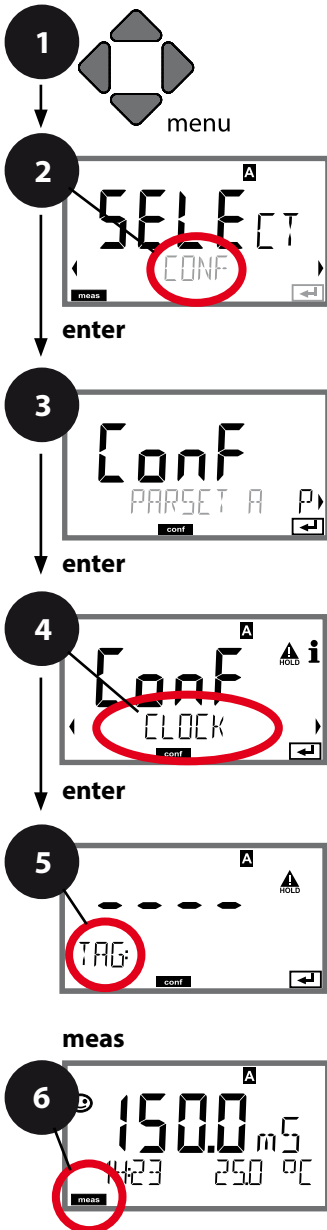
1

menu

2

SELECT
CONF
A
meas

enter

3

ConF
PARSET A P
conf

enter

4

ConF
CLOCK
A i
HOLD
conf

enter

5

- - - -
TAG:
A
HOLD
conf

meas

6

150.0 mS
14:23   25.0 °C
A
meas

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

5

TAG of measuring point	**enter**
GROUP of measuring points	
Display backlighting	

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, Sensoface gets "sad", and the display backlighting turns purple (magenta). 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
Measuring point (TAG) ⬛ A ⚠ i HOLD – – – – 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. Select character using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm. By pressing **meas** (repeatedly) in the measuring mode you can view the tag number.	A...Z, 0...9, – + < > ? / @ The first 10 characters are seen in the display without scrolling.

Switch Off the Display Backlighting

The display backlighting can be switched off in the DISPLAY menu.

Note: If the display backlighting is off, color signaling of error events is not possible.

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

Calibration can be performed by:
- Determining the cell factor with a known calibration solution
taking account of the temperature
- Input of cell factor (e.g. for ultrapure-water sensors)
- Entering an installation factor*⁾
- Sampling (product calibration)
- Zero calibration in air or with calibration solution
- Temperature probe adjustment
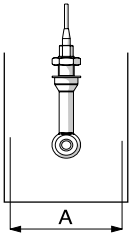
Note:
If measurements are performed in fittings with
A < 110 mm, be sure to choose a calibration beaker
with the same cross-section and of the same material
(metal/plastic)!

Selecting a Calibration Mode

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 entry of cell factor
CAL_INSTALL	Calibration by entry of an installation factor*⁾
P_CAL	Product calibration (calibration with sampling)
CAL_ZERO	Zero calibration
CAL_RTD	Temperature probe adjustment

*) with Memosens sensors only

Calibration with Calibration Solution
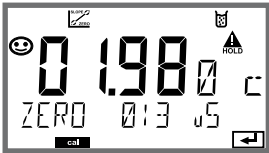
Input of temperature-corrected value of calibration solution with simultaneous display of cell factor.

Be sure to use known calibration solutions and the respective temperature-corrected conductivity values (see calibration solution tables in the appendix). During the calibration procedure the temperature must be kept constant.

Note:
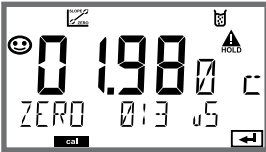
When using an ARF 210/215 flow-through fitting, you should use the inluded calibration beakers (identical dimensions and materials) for calibration to prevent calibration errors.

Display	Action	Remark
SELECT ◄DIAG CAL CON►	Select Calibration. Press **enter** to proceed. Select CAL_SOL calibration method. Press **enter** to proceed.	
CAL SOLUTION	Ready for calibration. Hourglass blinks.	Display (3 sec) Now the device is in HOLD mode.
12.88 mS 0 1002 1c 25.3°C	Immerse sensor in calibration solution. Enter the temperature-corrected value of the calibration solution using the arrow keys (see table in the appendix). Press **enter** to confirm.	Lower line: display of cell factor and temperature

Display	Action	Remark
01.98 ☺ °C ZERO 013 µS cal	The cell factor and zero point are displayed. The "hourglass" icon is blinking.	
12.65 ☺ mS MEAS REPE▸ cal	Use the arrow keys to select: • Repeat (repeat calibration) or • Measuring. Press **enter** to confirm.	
12.65 ☺ mS --- GOOD BYE --- meas	With MEAS selected: End calibration by pressing **enter**.	Display of measured variable, 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.

87

Calibration by Input of a Cell Factor

You can directly enter the value for the cell factor of a sensor. This value must be known, e.g. 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 1200mS/c 23.4°C cal	Enter 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 cell factor and zero point (at 25 °C). Sensoface is active.	
12.65 mS 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 sensor specifications for the nominal cell factor. When measuring in a restricted space, the individual cell factor must be determined.

Calibration by Input of an Installation Factor

When using a Memosens sensor in a tight space, the installation factor is entered.

Display	Action	Remark
°SELEct DIAG CAL CON meas	Select Calibration. Press **enter** to proceed. Select CAL_INSTALL calibration method. Press **enter** to proceed.	
CAL CELLFACTOR cal	Ready for calibration. Hourglass blinks.	Display (3 sec) Now the device is in HOLD mode.
1.000 12.68mS 23.4°C cal	Enter installation factor. Press **enter** to proceed.	The selected pro- cess variable and the temperature are displayed.
12.65mS MEAS REPE cal	**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 (mS/cm, S/m) is used. During product calibration the sensor remains in the process. The measurement process is only interrupted briefly.

Procedure:
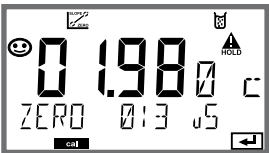
1) The sample is measured in the lab or directly on the site using a portable meter. To ensure an exact calibration, sample temperature and process temperature should be the same.
   During sampling the device saves the currently measured value and then returns to measuring mode. Then, the "calibration" 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 factor.

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 ◀DIAG CAL CON▶	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 STORE VALUE	Take sample and save value. Press **enter** to proceed.	Now the sample can be measured in the lab.

90

Display	Action	Remark
°☺ **12.82** mS 1227 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 2 LAB VALUE cal	The stored value is displayed (blinking) and can be overwritten with the lab value. Press **enter** to proceed.	
☺**01.98** Ø C ZERO 013 µS cal ☺**12.65** mS i MEAS REPE▸ cal	Display of new cell factor and zero point (based on 25°C). Sensoface is active. Press **enter**. To end calibration: Select MEAS, then **enter**	To repeat calibration: Select REPEAT, then **enter**
☺**12.65** mS --- GOOD BYE --- meas	After calibration is ended, the device will switch to measuring mode.	After end of calibration, the outputs remain in HOLD mode for a short time.

Zero Calibration in Air / with Calibration Solution

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 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. **Calibration with solution** Edit digits until the lower display indicates the solution value. Press **enter** to proceed.	
0 1.980 c ZERO 013 uS	The device shows the cell factor (at 25 °C) and the zero point. Sensoface is active.	
12.65 mS MEAS REPE▷	**Use the arrow keys to select:** • MEAS (exit) • REPEAT Press **enter** to proceed.	Exit: HOLD is deactivated after a short time.

92

Temp Probe Adjustment

Display	Action	Remark
SELECT ◀DIAG CAL CON▶ meas	Select Calibration. Press **enter** to proceed. Select CAL_RTD calibration method. Press **enter** to proceed.	Wrong settings change the measurement properties!
CAL HOLD TEMP ADJUST cal	Measure the tempera- ture of the process medium using an external thermometer.	Display (3 sec) Now the device is in HOLD mode.
25.0°C HOLD ADJUST 23.5°C▶ cal	Enter the measured temperature value. Maximum difference: 10 K. Press **enter** to proceed.	Display of actual temperature (un- compensated) in the lower display.
☺ **25.0**°C HOLD i MEAS ▶ cal	The corrected tempera- ture value is displayed. Sensoface is active. To end calibration: Select MEAS, then **enter** To repeat calibration: Select REPEAT, then **enter**	After end of calibra- tion, the outputs re- main in HOLD mode for a short time.
☺ **12.65**mS A HOLD --- GOOD BYE --- meas	After calibration is ended, the device will switch to measuring mode.	

Measurement

Display	Remark
 150.0 mS 14:32 12:34 °C meas or AM/PM and °F: **150.0** mS 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 or temperature), the lower display line shows the time and the second configured process variable (Cond or temperature). The [meas] mode indicator lights and the active parameter set (A/B) is indicated. A/B is not displayed with parameter set "Fix A".
By pressing the **meas** key you can step through the following displays. When no key has been pressed for 60 sec, the device returns to the standard display.	
 150.0 mS ‹PARSET–B meas **150.0** mS TAG: GQ 123PH–C2 meas	1) Selecting the parameter set (if set to "manual" in the configuration). Select the desired parameter set using the ‹ › arrow keys (PARSET A or PARSET B blinks in the lower display line). Press **enter** to confirm. Further displays (each with **meas**). 2) Display of measuring point ("TAG") 3) Display of time and date 4) Display of output current(s)

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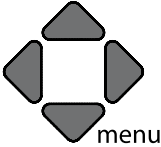
In the Diagnostics mode you can access the following menus without interrupting the measurement:

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. (Display color changes to turquoise.) Select DIAG using ◀ ▶ keys, press **enter** to confirm.
Select diagnostics option		Use ◀ ▶ keys to select from: CALDATA SENSOR SELFTEST LOGBOOK MONITOR VERSION See next pages for further proceeding.
Exit	**meas**	Exit by pressing **meas**.

Diagnostics

Display	Menu item
d IAG K CALDATA LO diag	**Displaying the calibration data** Select CALDATA using ◀ ▶ , press **enter** to confirm. Use the ◀ ▶ keys to select the desired parameter from the bottom line of the display (LAST_CAL CELLFACTOR ZERO). The selected parameter is shown in the main display.
27.09. 07 CK LAST_CAL CE diag	Press **meas** to return to measurement.

Diagnostics
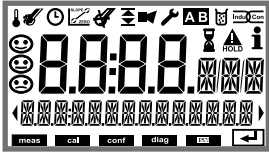
Display | Menu item

Device self-test
(To abort, you can press **meas**.)

1) **Display test**: Display of all segments with changing background colors white/green/red. Press **enter** to proceed.

2) **RAM test:** Hourglass blinks, then display of --PASS-- or --FAIL--
Press **enter** to proceed.

3) **EEPROM test:** Hourglass blinks, then display of --PASS-- or --FAIL--
Press **enter** to proceed.

4) **FLASH test:** Hourglass blinks, then display of --PASS-- or --FAIL--
Press **enter** to proceed.

5) **Module test:** Hourglass blinks, then display of --PASS-- or --FAIL--
Press **enter** or **meas** to return to measuring mode.

97

Diagnostics

Display	Menu item
d IAg ‹TA LOGBOOK ⏎	**Displaying the logbook entries (TAN SW-A002)** Select LOGBOOK using ◂ ▸ , press **enter** to confirm. By using the ▲ ▼ keys, you can scroll backwards and forwards through the logbook (entries -00-...-99-), -00- being the last entry.
-00- LOG 14:09 30092005›	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›	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.
☺**009** CFR 9:23 23112007›	**Extended logbook / Audit Trail (TAN SW-A003)** By using the ▲ ▼ keys, you can scroll backwards and forwards through the extended logbook (entries -000-...-199-), -000- being the last entry. **Display: CFR** Audit Trail also records function activations (CAL CONFIG SERVICE), some Sensoface messages, and opening of the enclosure.
d IAg ‹ MONITOR › ⏎ Display example: **25.03** HOLD ‹ R_COND › ⏎	**Displaying the currently measured values (sensor monitor)** Select MONITOR using ◂ ▸ , press **enter** to confirm. Use the ◂ ▸ keys to select the desired parameter from the bottom line of the display (R_COND G_COND RTD TEMP I-INPUT (Option) OPERATION TIME CIP SIP). The selected parameter is shown in the main display. Press **meas** to return to measurement.

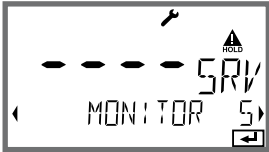| Display	Menu item
	Version Here, you find the data you require for requesting a device-specific Option. Display of **device type, software/hardware version**, and **serial number** for all device components. Use the ▲ ▼ keys to switch between software and hardware version. Press **enter** to proceed to next device component.
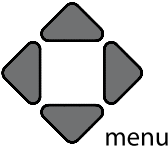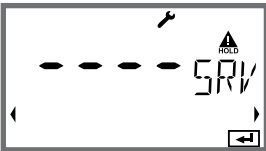
Service

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.
                 (Only if equipped with 2nd current output.)
CODES   Assigning and editing passcodes.
DEFAULT   Resetting the device to factory settings.
OPTION   Enabling options via TAN.

Note:
HOLD is active during Service mode!

Action	Key/Display	Remark
Activate Service	menu	Press **menu** key to call the selection menu. Select SERVICE using ◄ ► keys, press **enter** to confirm.
Passcode	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: • [diag] mode indicator • HOLD triangle • Service (wrench)
Exit	**meas**	Exit by pressing **meas**.

100

Menu item	Remark
	Displaying currently measured values (sensor monitor) with HOLD mode activated: Select MONITOR using ◄ ►, press **enter** to confirm. Select variable in the bottom text line using ◄ ►. The selected parameter is shown in the upper display line. As the device is in HOLD mode, you can perform validations using simulators without influencing the signal outputs. Return to Service menu: Hold **meas** depressed for longer than 2 sec. Press **meas** once more to return to measurement.
	Specifying the current at outputs 1 and 2: Select OUT1 or OUT2 using the ◄ ► keys, press **enter** to confirm. Enter a valid current value for the respective output using ▲ ▼ ◄ ► keys. Press **enter** to confirm. For checking purposes, the actual output current is shown in the bottom right corner of the display. End by pressing **enter** or **meas**. OUT2: Only if equipped with 2nd current output.

Service

Menu item	Remark
`0000` PWD DIAG HOL▸	**Assigning passcodes:** In the "SERVICE - CODES" menu you can assign passcodes to DIAG, HOLD, CAL, CONF and SERVICE modes (Service preset to 5555). **When you have lost the Service passcode**, you have to request an "Ambulance TAN" from the manufacturer specifying the serial number of your device. To enter the "Ambulance TAN", call the Service function and enter passcode 7321. After correct input of the ambulance TAN the device signals "PASS" for 4 sec and resets the Service passcode to 5555.
`- - -` NO FACTORY SETTIN▸	**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!
`0000` TAN OPT: LOGBOOK	**Option request:** Communicate the serial number and hardware/software version of your device to the manufacturer. These data can be viewed in the Diagnostics/Version menu. The "transaction number" (TAN) you will then receive is only valid for the device with the corresponding serial number. **Releasing an option:** Options come with a "transaction number" (TAN). To release the option, enter this TAN and confirm by pressing **enter**.

Operating status	OUT 1	OUT 2	Time out
Measuring	gray	gray	-
Diag	gray	gray	60 s
CAL_SOL Calibration solution	black	black	No
CAL_CELL Cell factor	black	black	No
P_CAL Product cal S1	gray	gray	No
P_CAL Product cal S2	black	black	No
CAL_ZERO Zero cal	black	black	No
CAL_RTD Temp adjustment	black	black	No
CONF ParSet A	black	black	20 min
CONF ParSet B	black	black	20 min
SERVICE MONITOR	black	black	20 min
SERVICE OUT 1	hatched	black	20 min
SERVICE OUT 2	black	hatched	20 min
SERVICE IRDA	black	black	20 min
SERVICE CODES	black	black	20 min

Operating status	OUT 1	OUT 2	Time out
SERVICE DEFAULT	■	■	20 min
SERVICE OPTION	■	■	20 min
HOLD input	■	■	No

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

▩ active　▨ manual

Maintenance

Stratos Pro does not require maintenance.

If maintenance work (e.g., sensor replacement) has to be performed at the measuring point, you must activate the function check (HOLD) mode on the device as follows:

- Opening the Calibration menu
- Opening the Service menu
- Opening the Confiuration menu

Repair

The Stratos Pro and the measuring modules cannot be repaired by the user. To request a repair, please contact Knick Elektronische Messgeräte GmbH & Co. KG by visiting www.knick.de.

A201B/X: Supply Units and Connection

Recommended Power Supply Units	Order No.
Stratos Pro A201X, Zone 1:	
Repeater power supply, Ex, 90...253 V AC, output 4...20 mA	WG 21 A7
Repeater power supply, Ex, 90...253 V AC, HART, output 4...20 mA	WG 21 A7 Opt. 470
Repeater power supply, Ex, 24 V AC/DC, output 4...20 mA	WG 21 A7 Opt. 336
Repeater power supply, Ex, 24 V AC/DC, HART, output 4...20 mA	WG 21 A7 Opt. 336, 470
Stratos Pro A201B, Zone 2:	
Repeater power supply, non-Ex, 24 V DC, output 4...20 mA	IsoAmp PWR B 10116
Repeater power supply, non-Ex, 24 V DC, HART, output 0/4...20 mA / 0...10 V	IsoAmp PWR A 20100

Connection to Supply Units

+ out — 8

- out 1 — 9

- out 2 — 17

Stratos Pro

Hazardous-area requirements for cable:
Between the wires:
Solid insulation ≥ 0.5 mm
Test voltage ≥ 500 V

+ / - Supply unit 1

+ / - Supply unit 2
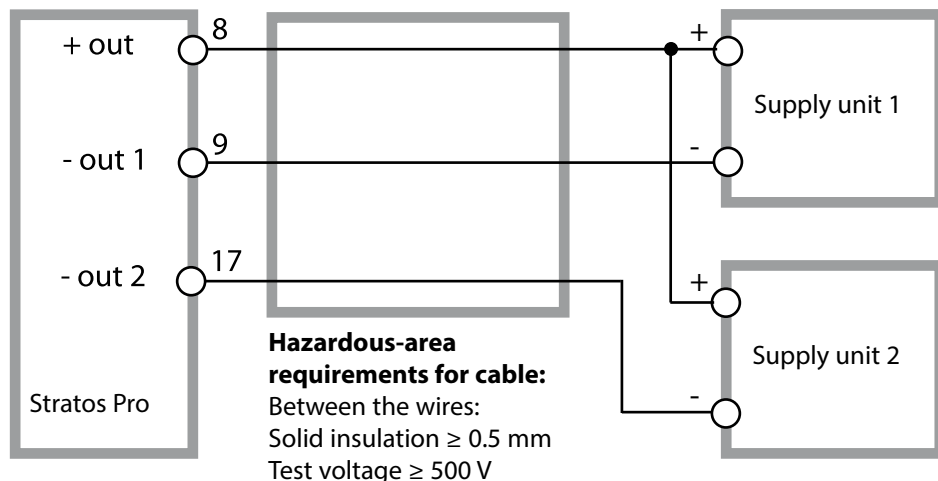
Product Line and Accessories

Order Code Stratos Pro A201

									TAN
Example	A	2	0	1	X	-	CONDI	- 1	
2-wire / 4-20 mA	A	2							B,C,E
Communication									
Without (HART retrofittable via TAN)			0						A
Version number									
Version				1					
Approvals									
General Safety					N				
ATEX / IECEx Zone 2					B				
ATEX / IECEx / FM Zone 1 / Cl 1 Div 1					X				

Measuring channel

Memosens pH / Redox	digital	MSPH	G
Memosens Cond	digital	MSCOND	
Memosens CondI	digital	MSCONDI	
Memosens Oxy	digital	MSOXY	
Dual COND (2x2-electrode sensors, analog)	N	CC	
pH / ORP value	Measuring module	PH	F, G
(ISM digital per TAN)			
Cond, 2-/4-electrode	Measuring module	COND	
Conductivity, electrodeless	Measuring module	CONDI	
Oxygen (ISM digital and	Measuring module	OXY	D, F
traces per TAN)			

Options

Without 2nd current output	0
With 2nd current output	1

TAN options

HART	SW-A001	(A)
Logbook	SW-A002	(B)
Extended logbook (Audit Trail)	SW-A003	(C)
Trace oxygen measurement	SW-A004	(D)
Current input + 2 digital inputs	SW-A005	(E)
ISM digital	SW-A006	(F)
Pfaudler	SW-A007	(G)

Mounting accessories

Pipe-mount kit	ZU 0274
Protective hood	ZU 0737
Panel-mount kit	ZU 0738

Specifications

CONDI input	Input for toroidal conductivity sensors SE655, SE656, SE660, SE670, SE680-K, SE680-M, MEMOSENS	
Measuring range	Conductivity	0.000 ... 1999 mS/cm
	Concentration	0.00 ... 100.0 wt%
	Salinity	0.0 ... 45.0 % (0 ... 35 °C / 32 ... 95 °F)
Display ranges	Conductivity	0.000 ... 9.999 mS/cm (not with SE 660 / SE 670 / SE 680)
		00.00 ... 99.99 mS/cm
		000.0 ... 999.9 mS/cm
		0000 ... 1999 mS/cm
		0.000 ... 9.999 S/cm
		00.00 ... 99.99 S/cm
	Concentration	0.00 ... 9.99 % / 10.0 ... 100.0 %
	Salinity	0.0 ... 45.0 % (0 ... +35 °C / +32 ... +93 °F)
	Response time (T90)	Approx. 1 s
Measurement error[1,2,3]	< 1% meas. val. + 0.005 mS	
Temp compensation *	(OFF)	Without
	(LIN)	Linear characteristic 00.00 ... 19.99%/K (reference temp user-defined)
	(NLF)	Natural waters to EN 27888 (reference temp 25 °C)
	(NACL)	Ultrapure water with NaCl traces (0 ... 120 °C / 32 ... 248 °F), reference temp 25 °C / 77 °F
	(HCL)	Ultrapure water with HCl traces (0 ... 120 °C / 32 ... 248 °F), reference temp 25 °C / 77 °F
	(NH3)	Ultrapure water with NH3 traces (0 ... 120 °C / 32 ... 248 °F), reference temp 25 °C / 77 °F
	(NaOH)	Ultrapure water with NaOH traces (0 ... 120 °C / 32 ... 248 °F), reference temp 25 °C / 77 °F

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)

108

Concentration determination (continued)	-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)
	-U1-	Specifiable concentration table	

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

Permissible cell factor	00.100 ... 19.9999 cm^{-1}
Permissible transfer ratio	010.0 ... 199.99 cm
Permissible zero offset	± 0.5 mS

| **Sensocheck** | Monitoring of primary and secondary coils and lines for open circuit and of primary coil and lines for short circuit |
| Delay | Approx. 30 s |

| **Sensoface** | Provides information on the sensor condition (zero point, Sensocheck) |

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

| **Temperature input** [*] | Pt100/Pt1000/NTC 30 kΩ |
| | 3-wire connection, adjustable |

| Measuring range | Pt 100/Pt 1000 | –50 ... 250 °C / –58 ... 482 °F |
| | NTC 30 kΩ | –20 ... 150 °C / –4 ... 302 °F |

| Resolution | 0.1 °C / 0.1 °F |
| Measurement error [1,2,3)] | < 0.5 K (< 1 K for Pt100; < 1 K for NTC > 100 °C / 212 °F) |

| **Calibration data** | Calibration date, cell factor, zero point, installation factor |

Specifications

I input (TAN)	Current input 0/4 ... 20 mA / 50 Ω for external temperature signal
Start/end of scale	Configurable –50 ... 250 °C / –58 ... 482 °F
Characteristic	Linear
Measurement error [1,3]	< 1% current value + 0.1 mA
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
CONTROL input	Galvanically separated (optocoupler)
Function	Selecting parameter set A/B or flow measurement
Parameter set A/B	Control input 0 ... 2 V AC/DC Parameter set A
	10 ... 30 V AC/DC Parameter set B
FLOW	Pulse input for flow measurement 0 ... 100 pulses/s
Message	via 22 mA
Display	00.0 … 99.9 l/h
Output 1	Current loop, 4 ... 20 mA, floating, protected against inverse polarity HART communication (see further below for specifications)
Supply voltage	14 ... 30 V
Process variable *	Conductivity, resistivity, concentration, salinity, or temperature
Characteristic	Linear, bilinear or logarithmic
Overrange *	22 mA in the case of error messages
Output filter *	PT_1 filter, time constant 0 ... 120 s
Measurement error [1]	< 0.25 % current value + 0.025 mA
Start/end of scale *	Configurable within selected range
Bilinear: Vertex X/Y *	Configurable within selected range

Output 2 For version with 2nd current output only	Current loop, 4 ... 20 mA, floating, reverse polarity protected
Supply voltage	14 ... 30 V
Process variable *	Conductivity, resistivity, concentration, salinity, or temperature
Characteristic	Linear, bilinear or logarithmic
Overrange *	22 mA in the case of error messages
Output filter *	PT_1 filter, time constant 0 ... 120 s
Measurement error [1]	< 0.25 % of current value + 0.05 mA
Start/end of scale *	Configurable within selected range
Bilinear: Vertex X/Y *	Configurable within selected range
Real-time clock	Different time and date formats selectable
Power reserve	> 5 days
Display	LC display, 7-segment with icons
Main display	Character height approx. 22 mm, unit symbols approx. 14 mm
Secondary display	Character height approx. 10 mm
Text line	14 characters, 14 segments
Sensoface	3 status indicators (friendly, neutral, sad face)
Mode Indicators	meas, cal, conf, diag
	Further icons for configuration and messages
Alarm indication	Display blinks, red backlighting
Keypad	Keys: meas, menu, info, 4 cursor keys, enter
HART communication (TAN)	HART version 6 Digital communication by FSK modulation of output current 1
	Device identification, measured values, status and messages, parameter setting, calibration, records
FDA 21 CFR Part 11	Access control by editable passcodes Logbook entry and flag via HART Message and logbook entry when enclosure is opened

Specifications

Diagnostic functions

Calibration data	Calibration date, sensor parameters
Device self-test	Display test, automatic memory test (RAM, FLASH, EEPROM), module test
Logbook (TAN)	100 events with date and time
Extended logbook (TAN)	Audit Trail: 200 events with date and time

Service functions

Sensor monitor	Display of direct sensor signals
Current source	Current specifiable for output 1 and 2 (04.00 ... 22.00 mA)
Passcodes	Assigning passcodes for menu access
Factory setting	Resetting all parameters to factory setting
TAN	Enabling optionally available additional functions

Data retention	Parameters, calibration data, logbook > 10 years (EEPROM)

Housing	Molded enclosure, glass fiber reinforced
	Front unit material: PBT
	Rear unit material: PC
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	148 mm x 148 mm
Control panel cutout	138 mm x 138 mm acc. to DIN 43 700
Weight	approx. 1200 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 mm^2
Tightening torque	0.5 … 0.6 Nm

Wiring

Stripping length	Max. 7 mm
Temperature resistance	> 75 °C / 167 °F

Rated 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	5 ... 95 %
Supply voltage	14 ... 30 V

Transport and storage

Transport / storage temperature	−30 ... 70 °C / −22 ... 158 °F

EMC

Emitted interference	Class A (industrial applications) [4]
Immunity to interference	Industrial applications

*) User-defined   1) At rated operating conditions

2) ± 1 count   3) Plus sensor error

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

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

Concentration Measurement

Ranges

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

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, a separate temperature probe with fast response should be used.

When measuring processes such as dilution or intensification of CIP solutions (Clean-In-Place), it is helpful to switch between the parameter sets for measuring the process medium and for measuring the CIP solution.

For specification of a concentration solution for conductivity measurement, see page 51.

Concentration Curves

-01- Sodium chloride solution NaCl

<----------------- -01- ----------------->
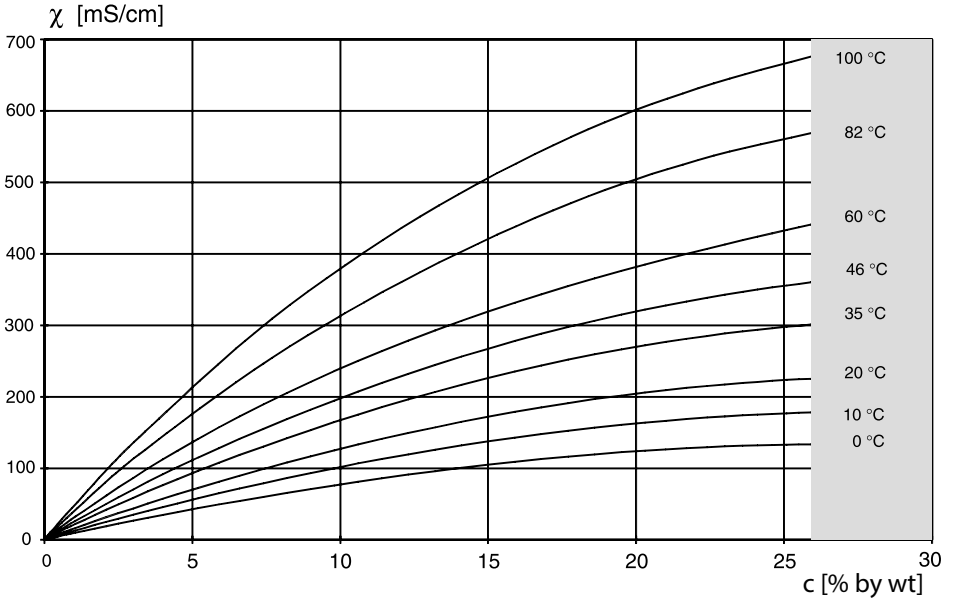
χ [mS/cm]

Concentration measurement not possible in this range.

Conductivity versus substance concentration and process temperature for sodium chloride solution (NaCl)
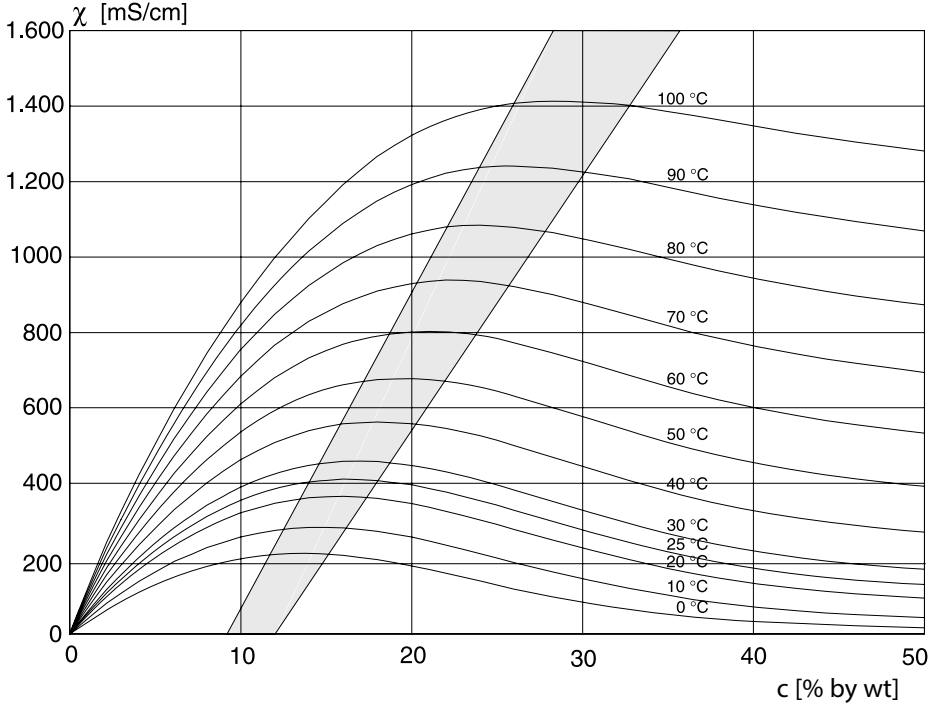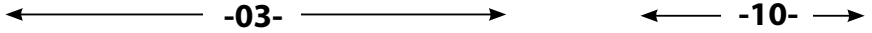
117

-02- Hydrochloric acid HCl
-07-
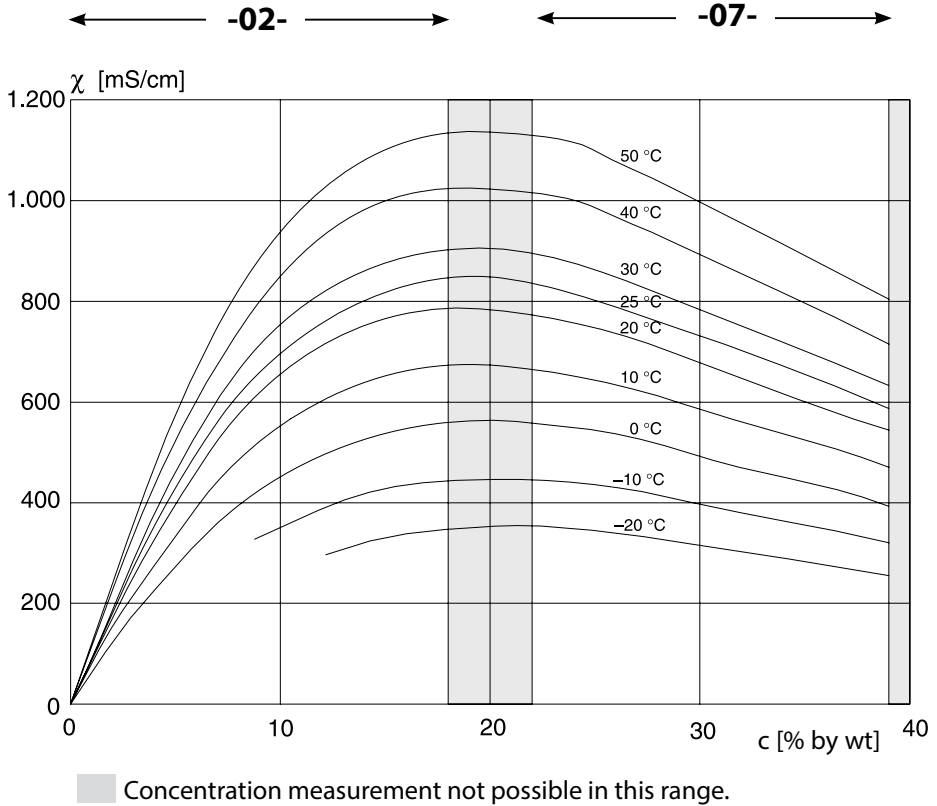
Conductivity versus substance concentration and process
temperature for hydrochloric acid (HCl)
Source: Haase/Sauermann/Dücker; Z. phys. Chem. New Edition, Vol. 47 (1965)

-03- Sodium hydroxide solution NaOH
-10-

-03- ⟶   ⟵ -10- ⟶

χ [mS/cm]

1.600

1.400   100 °C

1.200   90 °C

1000   80 °C

800   70 °C

600   60 °C

                                                     50 °C

400   40 °C

                                                     30 °C
                                                     25 °C
200   20 °C
                                                     10 °C
                                                     0 °C
0
  0   10   20   30   40   50

c [% by wt]

Concentration measurement not possible in this range.

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

Concentration Curves

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

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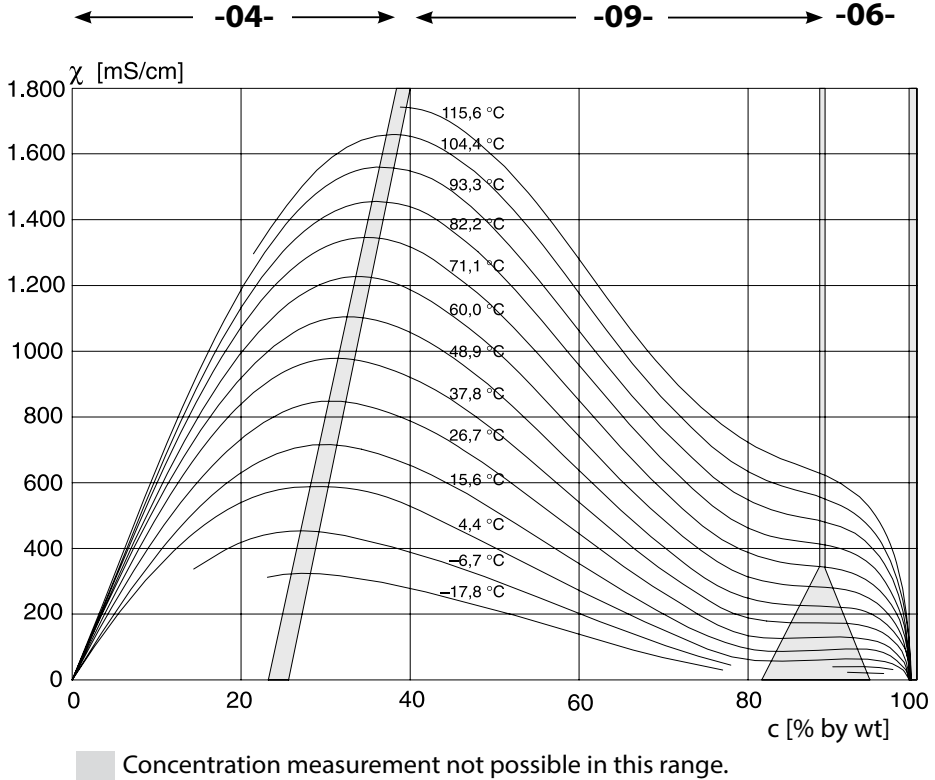
Conductivity versus substance concentration and process
temperature for sulfuric acid (H$_2$SO$_4$)
Source: Darling; Journal of Chemical and Engineering Data; Vol.9 No.3, July 1964

-05- Nitric acid HNO$_3$
-08-

Concentration measurement not possible in this range.
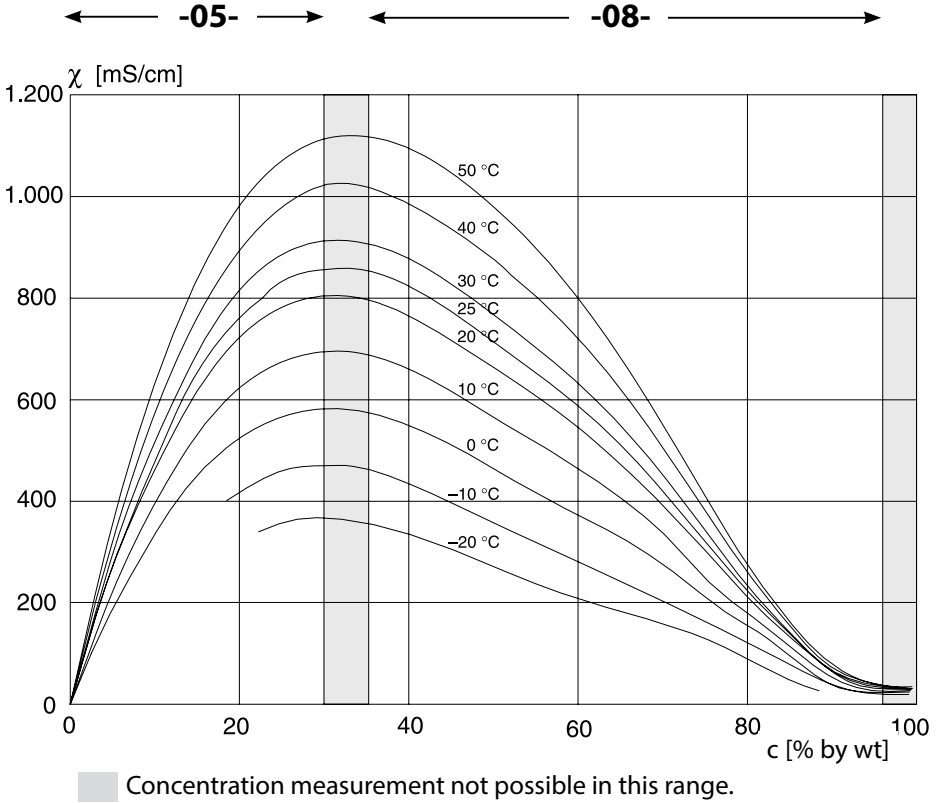
Conductivity versus substance concentration and process
temperature for nitric acid (HN0$_3$)
Source: Haase/Sauermann/Dücker; Z. phys. Chem. New Edition, Vol. 47 (1965)

Error Handling

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

Press the [**info**] key to view a short error text:
- The error text appears in the lower menu line
- The main display reads "**InFo**".

Parameter errors:
Configuration data such as current range, limit values, etc are checked during the input.
If they are out of range,
- "**ERR xxx**" is displayed for 3 sec,
- the display backlighting flashes red,
- the respective maximum or minimum value is shown,
- input must be repeated.

If a faulty parameter arrives through the interface (HART),
- an error message will be displayed: "**ERR 100...199**"
- the faulty parameter can be localized by pressing the [**info**] key

Calibration errors:
If errors occur during calibration,
- an error message will be displayed

Sensoface:
If the Sensoface becomes sad,
- the display backlighting will turn magenta (purple)
- the cause can be seen by pressing the **info** key
- the calibration data can be seen in the Diagnostics menu

Error Messages

Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
ERR 99	DEVICE FAILURE	**Error in factory settings** EEPROM or RAM defective This error message only occurs in the case of a total defect. The device must be repaired and recalibrated at the factory.
ERR 98	CONFIGURATION ERROR	**Error in configuration or calibration data** Memory error in device program Configuration or calibration data defective; completely reconfigure and recalibrate the device.
ERR 97	NO MODULE INSTALLED	**No module** Please have the module replaced at the factory.
ERR 96	WRONG MODULE	**Wrong module** Please have the module replaced at the factory.
ERR 95	SYSTEM ERROR	**System error** Restart required. If error still persists, send in the device for repair.

Error Messages

Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
ERR 10	CONDUCTANCE TOO HIGH	**Measuring range of conductance exceeded** > 3500 mS
ERR 11		**Display range limits exceeded**
	CONDUCTIVITY RANGE	Cond > 1999 mS/cm > 99.99 S/m
	CONCENTRATION RANGE	Conc > 99.9 %
	SALINITY RANGE	SAL > 45.0 ‰
ERR 13	TEMPERATURE RANGE	**Temperature range limits exceeded** Connect the sensor, check the sensor cable and replace if necessary, check the sensor connection, adjust the parameter settings.
ERR 15	SENSOCHECK	**Sensocheck**
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
ERR 69	TEMP. OUTSIDE TABLE	Temperature value outside table (e.g., for concentration or TC)

Error	**Info text** (is displayed in case of fault when the Info key is pressed)	**Problem** **Possible causes**
ERR 72	FLOW TOO LOW	Flow too low
ERR 73	FLOW TOO HIGH	Flow too high
ERR 100	INVALID SPAN OUT1	**Span Out1 configuration error** Selected span too small
ERR 101	INVALID SPAN OUT2	**Span Out2 configuration error** Selected span too small
ERR 105	INVALID SPAN I-INPUT	**Configuration error** Current input
ERR 108	OUT1 INVALID CORNER X/Y	Bilinear characteristic:
ERR 109	OUT2 INVALID CORNER X/Y	Invalid vertex point

Decommissioning

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.

(Sensocheck must have been activated during configuration.)

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

Sensocheck
Continuously monitors the sensor and leads for short circuits or open circuits. Critical values make the Sensoface "sad" and the corresponding icon blinks:

The Sensocheck message is also output as error message Err 15.
The display backlighting turns red, output current 1 is set to 22 mA (when configured correspondingly).
Sensocheck can be switched off during configuration (then Sensoface is also disabled).
Exception:
After a calibration a smiley is always displayed for confirmation.

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

Sensoface

Display	Problem	Status	
🖋	Sensor defect	😕	Wrong or defective sensor or excessive cable capacitance (see also error message Err 15).
🌡	Temperature	😕	Temperature outside range for TC, conc, sal

(SW-A001)

HART Terminal

```
+ out          8                                      +
                          4 ... 20mA      250 Ω          Power supply

                                                          Uout
- out 1        9                                      -   min 19 V

- out 2       17

A201
```

HART Terminal   HART Terminal

```
+ out          8          1   Repeater       5
                          4 ... 20mA  power
                              supply
- out 1        9          2                  6

- out 2       17

A201
```
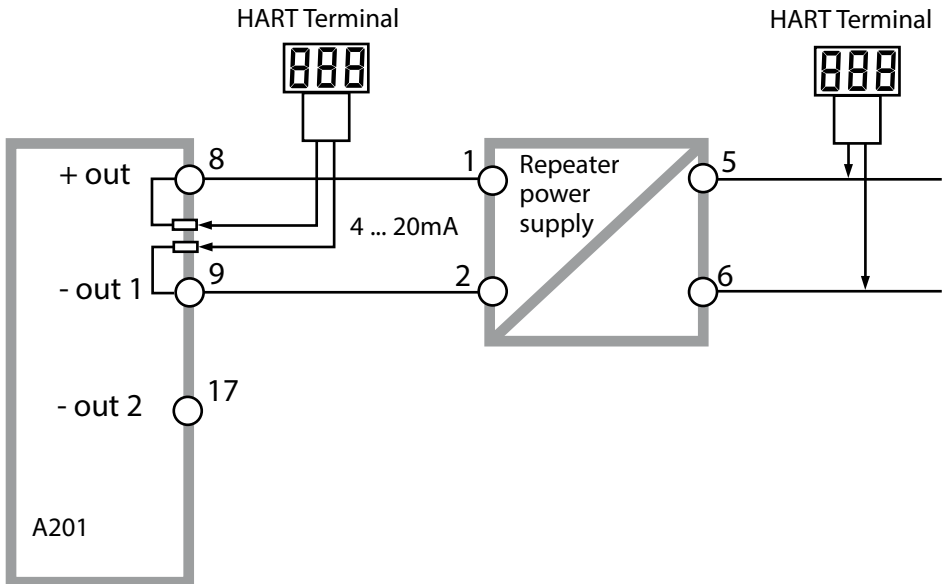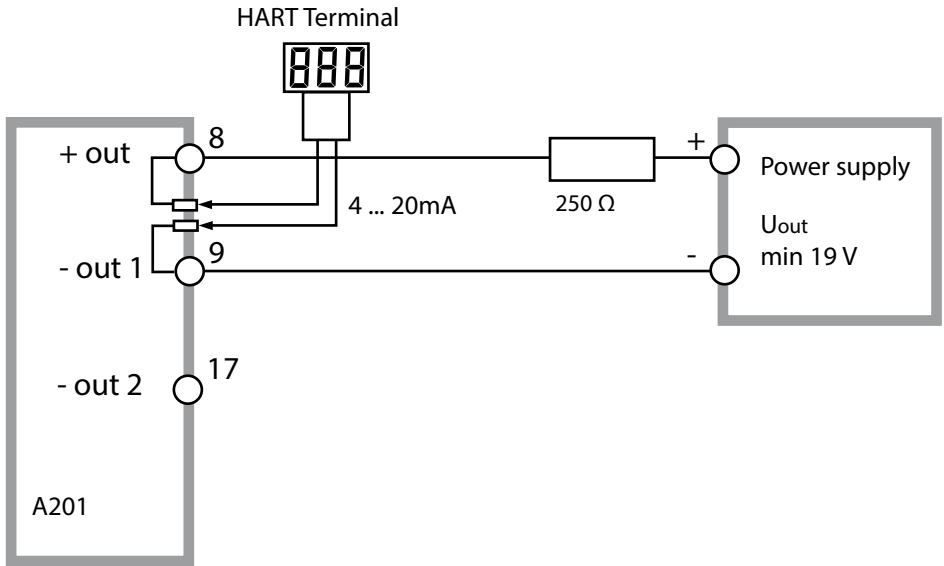
FDA 21 CFR Part 11

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

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

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

Extended logbook (TAN SW-A003)
Audit Trail also records function activations (CAL, CONFIG, SERVICE), some Sensoface messages (cal timer, wear, SIP, CIP) and opening of the enclosure.

Index

Index

Index

Index

R
RAM test 97
Rated operating conditions 113
Rating plates 18
Repair 105
Reset to factory settings 102
Returns 126

S
Safety 7
Safety guide 3
SE670/680 sensor, connection via RS-485 26
Selection menu 30
Sensocheck, configuration 76
Sensocheck, description 127
Sensoface, description 127
Sensoface, troubleshooting 122
Sensor connection, assignments 19
Sensor connection, examples 21
Sensor monitor, diagnostics 98
Sensor monitor (Service) 101
Sensor type selection 48
Sensor verification (TAG, GROUP) 57
Serial number, display 99
Service 100
Service, factory setting 102
Service, general 33
Service, output current, specify value 101
Service, passcode assignment 102
Service passcode lost 102
Service, sensor monitor 101
Setting the passcodes 102
Signal colors 28, 32
Signal lines 19
Signal outputs 11
Software version, display 99
Specifications 108
Supplemental directives 2
Supply units 106

Knick ›

Knick
Elektronische Messgeräte
GmbH & Co. KG

Headquarters
Beuckestraße 22 • 14163 Berlin
Germany
Phone: +49 30 80191-0
Fax: +49 30 80191-200
info@knick.de
www.knick.de

Local Contacts
www.knick-international.com

099485   TA-212.135-KNEN04