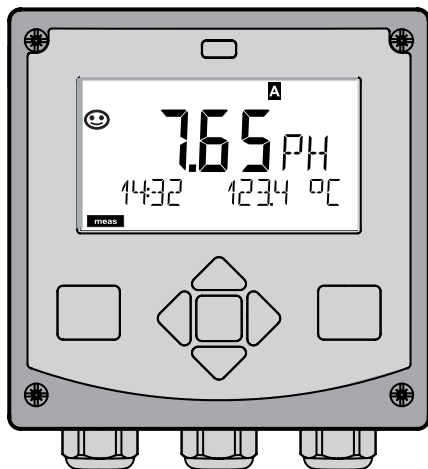


# Stratos® Pro A2... PH

## Instruction Manual



Latest Product Information:

[www.knick.de](http://www.knick.de)



77096

**Knick** ➤

# Warranty

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## Warranty

Defects occurring within 3 years from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender).  
Sensors, fittings, and accessories: 1 year.

Subject to change without notice.

## Return of Products Under Warranty

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

## Disposal

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



## CD-ROM

Complete documentation:

- Instruction manuals
- Safety instructions
- Short instructions



## Safety Information

In official EU languages and others.

- ATEX / IECEX / FM / CSA
- EC Declarations of Conformity



## Short Instructions

In German, English, French, Russian, Spanish, Portuguese, Swedish, and Dutch. More languages on CD-ROM and on our website: [www.knick.de](http://www.knick.de)

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

## Specific Test Report

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## Intended Use

The Stratos Pro A2... PH is used for pH/mV, ORP, and temperature measurement in industry, environment, food processing, and sewage treatment.

The sturdy molded enclosure can be fixed into a control panel or mounted on a wall or at a post. The protective hood, which is available as accessory, provides additional protection against direct weather exposure and mechanical damage.

The device has been designed for application with commercially available sensors with a nominal zero point at pH 7, ISFET sensors, or digital sensors.

Plain-text messages in a large, backlit display allow intuitive operation. The colored display backlighting signals alarm messages (red) or HOLD mode (orange).

The "Sensocheck" automatic monitoring of glass and reference electrode and the "Sensoface" function for clear indication of the sensor condition provide excellent diagnostics. The internal logbook can handle up to 100 entries – up to 200 with AuditTrail (TAN).

The device provides two parameter sets which can be switched manually or via a control input for different process adaptations or different process conditions (e.g. beer and CIP).

Password protection for granting access rights during operation can be configured.

Two floating, digital control inputs ("Hold" and "Control") are available for external control.

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

## Approvals for Measurement in Hazardous Locations:

**Stratos Pro A201/A211N PH:** General Safety.

**Stratos Pro A201/A211X PH:** Approved for operation in hazardous locations according to IECEx / ATEX / FM / CSA.

# Safety Information

---

## Safety information –

### **Be sure to read and observe the following instructions!**

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

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

See also separate document:

- “Safety Instructions”  
(EC Declaration of Conformity, FM, CSA, ATEX (if applicable) Certificates)



## **CAUTION!**

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

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

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

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

### **Please note:**

Before commissioning it must be proved that the device may be connected with other equipment.

## Information for Installation in Hazardous Locations (Stratos Pro A201/A211X PH)

- Be sure to observe the stipulations of EN 60079-10 / EN 60079-14 or the corresponding local regulations during installation and commissioning. See also separate "Safety Instructions" document.

## Approvals for application in hazardous locations (Stratos Pro A201/A211X PH)

- according to IECEx in Zone 0, 1, 20, 21
- according to ATEX in Zone 0, 1, 2, 20, 21
- according to cCSAus in Class I Div 1, 2 / Zone 1
- according to FM in Class I, Div 1, 2 / Zone 1



### Important Notice:

The operator must indicate the type of protection!

When the device provides different types of protection, the operator must specify the applied type of protection during installation.

To do so, use the checkboxes on the rating plate:

<b>Knick</b> >	<b>PH</b>	KEMA 08 ATEX 0100	IECEx KEM 08.0020
A2...X-...	<input type="checkbox"/> II 2(1) G Ex ib [ia] IIC T4/ <input type="checkbox"/> I G Ex ia IIC T4	<input checked="" type="checkbox"/> Ex ib [ia] IIC T4/ Zone 0 Ex ia IIC T4	
No. 12345 / 1234567 / 0832	<input type="checkbox"/> II 1 D Ex iaD 20 IP6x T85°C/ <input type="checkbox"/> II 2 D Ex iaD 21 IP6x T85°C	<input type="checkbox"/> Ex iaD 20 IP6x T85°C	
-20 ≤ T <sub>a</sub> ≤ +65°C	Electrical data see Control drawing 212.002-100		0044

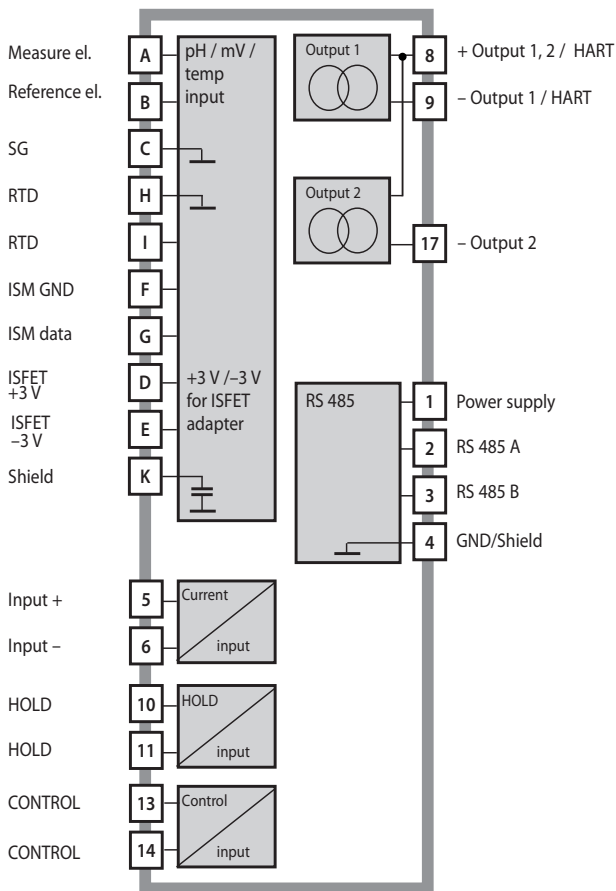
Stratos Pro A2...X rating plate at outside bottom of front with checkboxes for marking the respective application after installation

## Terminals:

Screw terminal, suitable for single wires / flexible leads up to 2.5 mm<sup>2</sup> (AWG 14). Recommended torque for the terminal screws: 0.5 ... 0.6 Nm.

# Overview

## Overview of Stratos Pro A2... PH



## Package Contents

Check the shipment for transport damage and completeness!

### The package should contain:

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

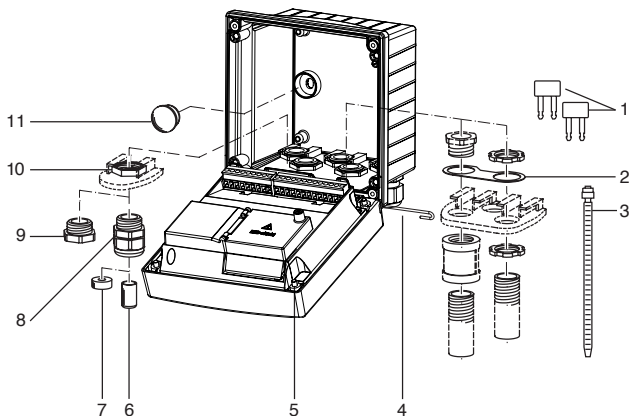


Fig.: Assembling the enclosure

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

## Mounting Plan, Dimensions

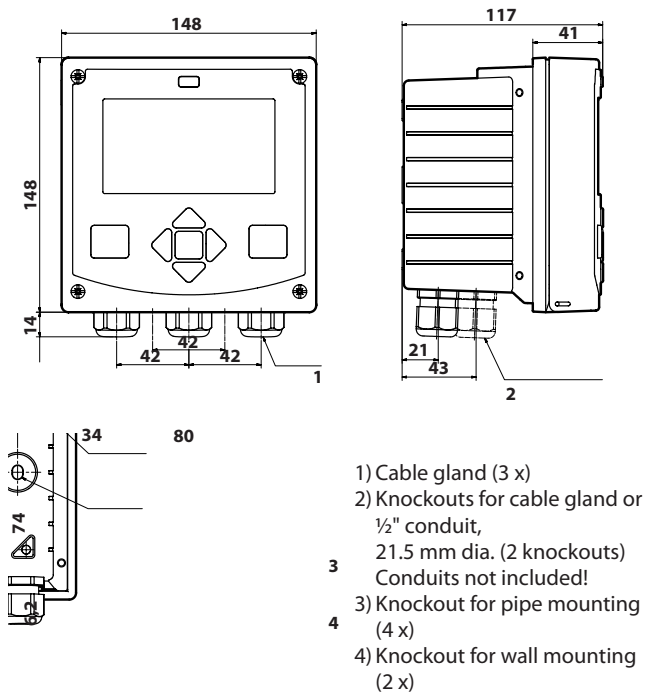
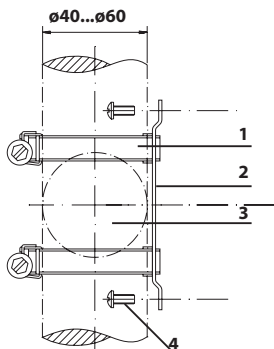


Fig.: Mounting plan (All dimensions in mm!)

## Pipe Mounting, Protective Hood



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

Fig.: ZU 0274 pipe-mount kit (All dimensions in mm!)

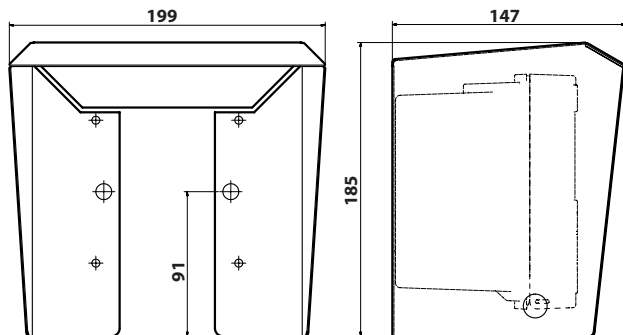


Fig.: ZU 0737 protective hood for wall and pipe mounting  
(All dimensions in mm!)

## Panel Mounting

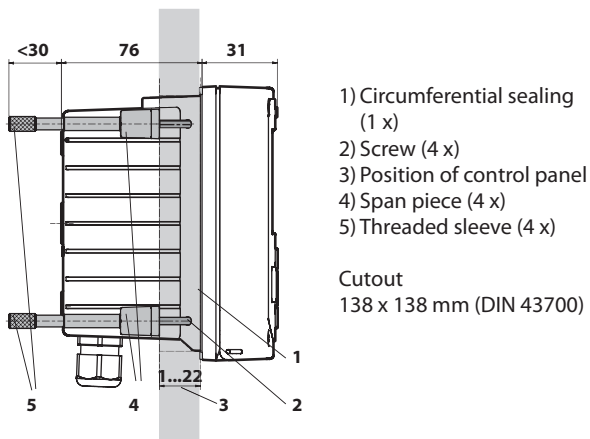


Fig.: ZU 0738 panel-mount kit (All dimensions in mm!)

## Installation Instructions

- Installation of the device must be carried out by trained experts in accordance with this instruction manual and as per applicable local and national codes.
- Be sure to observe the technical specifications and input ratings during installation!
- Be sure not to notch the conductor when stripping the insulation!
- The supplied current must be galvanically isolated. If not, connect an isolator module.
- All parameters must be set by a system administrator prior to commissioning!

## Terminals:

suitable for single wires / flexible leads up to 2.5 mm<sup>2</sup> (AWG 14)



Additional safety precautions have to be taken for applications in hazardous locations according to IECEx, ATEX, FM, CSA!  
(See also separate "Safety Instructions" document.)

## Rating Plates / Terminal Assignments

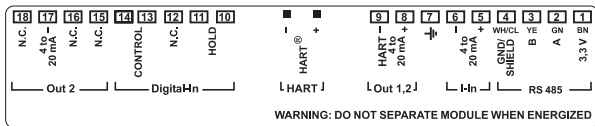


Fig.: Terminal assignments of Stratos Pro A2...

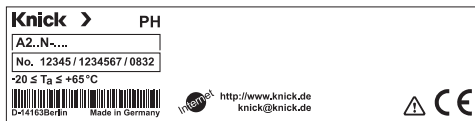


Fig.: Outer rating plate Stratos Pro A2...N at bottom of front

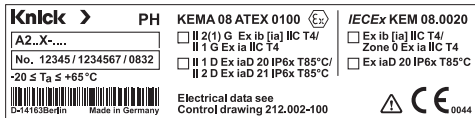


Fig.: Stratos Pro A2...X rating plate at outside bottom of front

### Important Notice:

#### The operator must indicate the type of protection!

When the device provides different types of protection, the operator must specify the applied type of protection during installation.

To do so, use the checkboxes on the rating plate.

See also "Safety Information" chapter.

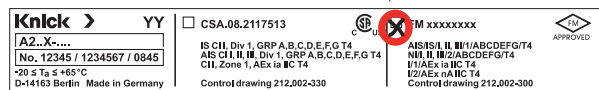
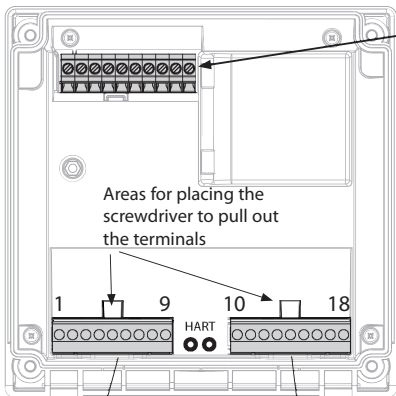


Fig.: Example of additional approval plate (cCSAus, FM)

The specifications refer to the respective device.

## Wiring of Stratos Pro A201/211 PH



### Sensor connection MK-PH module

A	meas. el.
B	ref. el.
C	SG
D	+3 V
E	-3 V
F	ISM GND
G	ISM data
H	RTD (GND)
I	RTD
K	Shield

### Terminal row 1

1	Power supply
2	RS 485 A
3	RS 485 B
4	GND/shield
5	+ input
6	- input
7	PA (equip. bonding)
8	+out 1,2/HART
9	- out 1/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

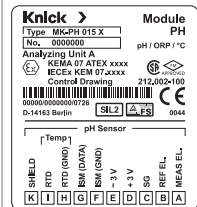


Fig.: MK-PH module terminal assignments

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

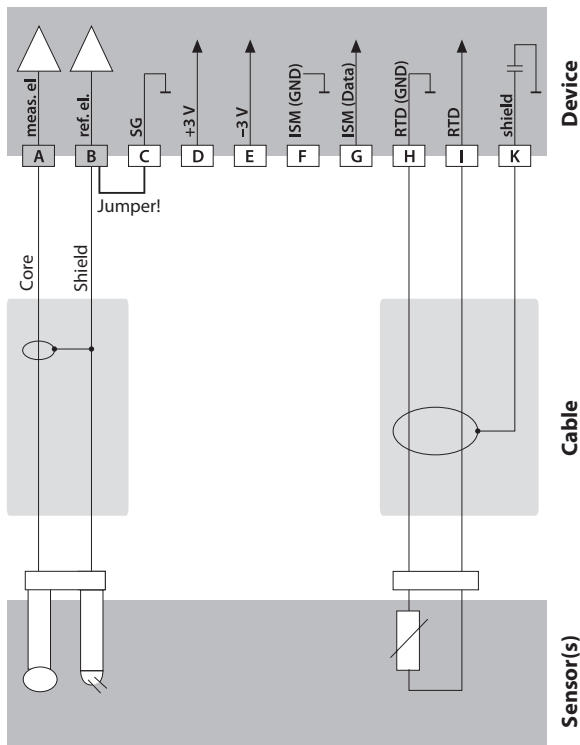
---

## Example 1:

Measuring task: pH, temperature, glass impedance

Sensors (example): HA 405-DXK-58 (Mettler-Toledo)

Cable (example): AS9 ZU 0318 (Knick)



# Wiring Examples

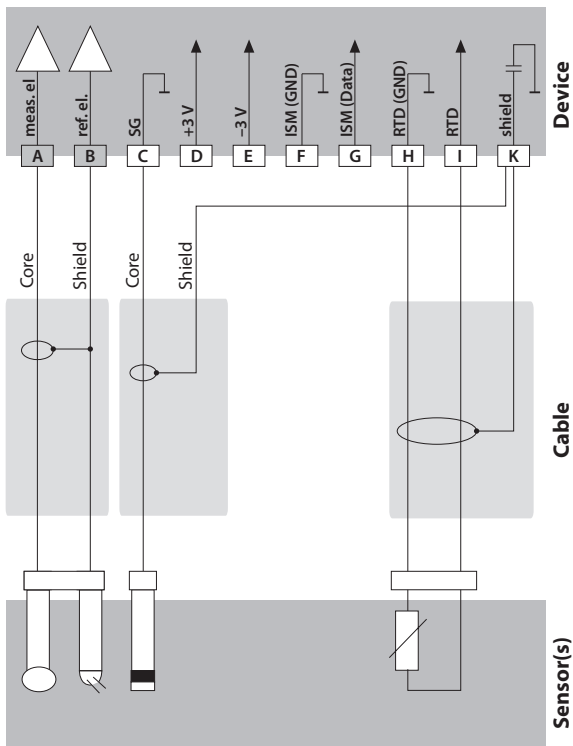
## Example 2:

Measuring task: pH/ORP, temp, glass impedance, ref. impedance

Sensors (example): pH: HA 405-DXK-58 (Mettler-Toledo),

Pt: ZU 0073 (Knick)

Cable (example): 2x AS9 ZU 0318 (Knick)

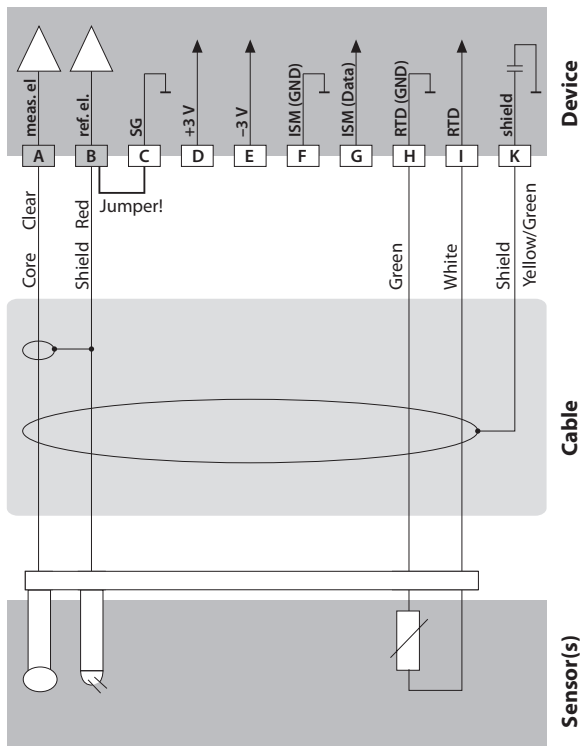


## Example 3:

Measuring task: pH, temp, glass impedance

Sensors (example): SE 533 (Knick)

Cable (example): VP6 ZU 0313 (Knick)



# Wiring Examples

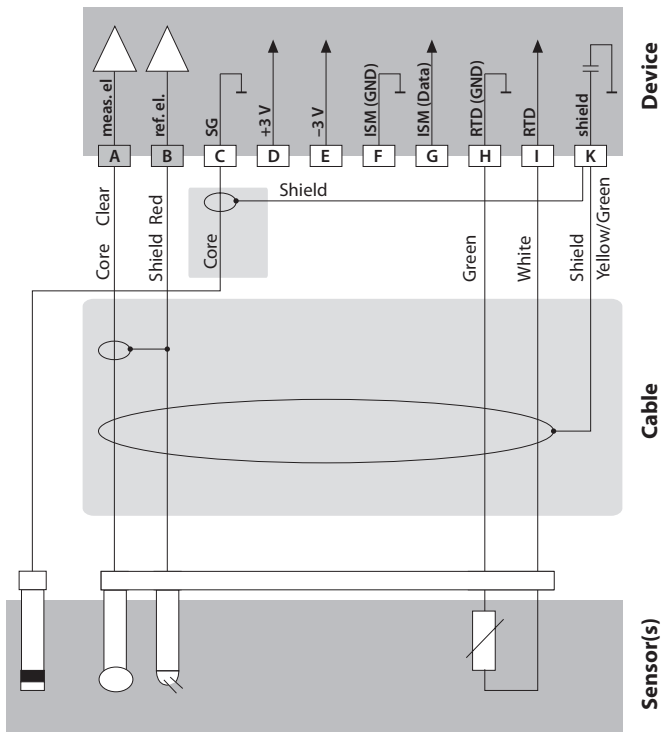
## Example 4:

Measuring task: pH/ORP, temp, glass impedance, ref. impedance

Sensors (example): pH: SE 533 (Knick)

Pt: ZU 0073 (Knick)

Cable (example): VP6 ZU 0313 (Knick) or AS9 ZU 0318 (Knick)

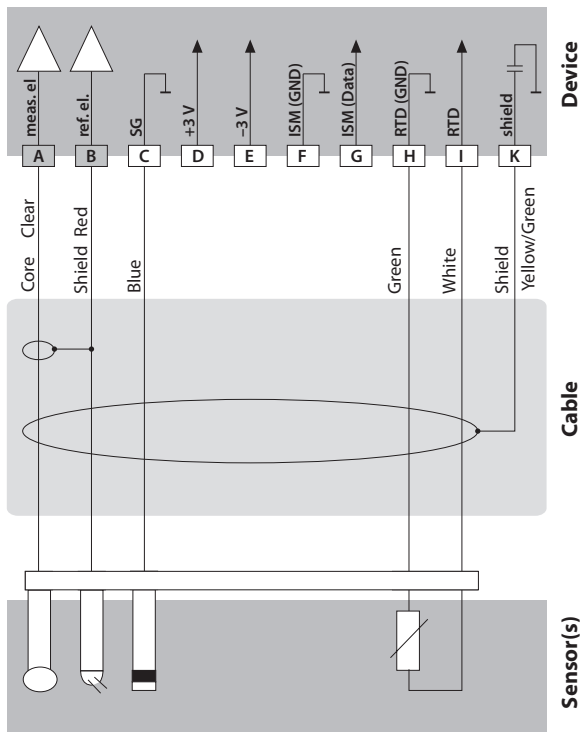


## Example 5:

Measuring task: pH/ORP, temp, glass impedance, ref. impedance

Sensors (example): InPro 4260 (Mettler-Toledo)

Cable (example): VP6 ZU 0313 (Knick)



# Wiring Examples

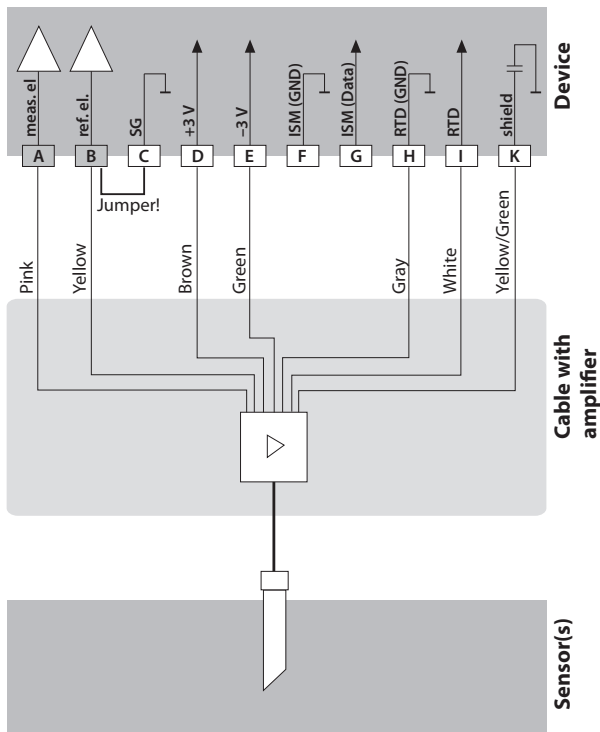
## Example 6:

Measuring task: pH, temp (safe areas only)

Sensors

(example): InPro 4260 ISFET (Mettler-Toledo)

Cable (example): ZU 0582 (Knick)



## Example 7:

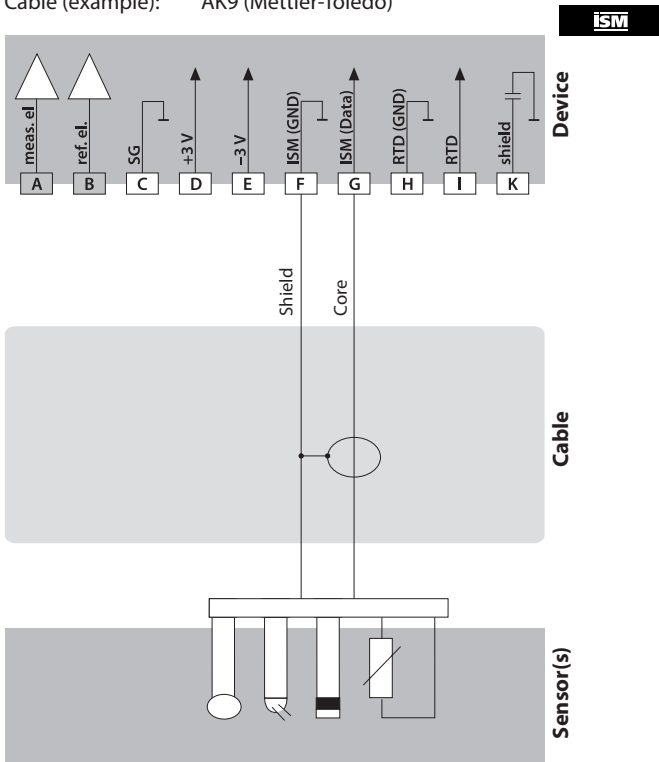
### Caution!

Do not connect an additional analog sensor!

Measuring task: pH/ORP, temp, glass impedance, ref. impedance

Sensors (example): ISM digital InPro 4260i (Mettler-Toledo)

Cable (example): AK9 (Mettler-Toledo)



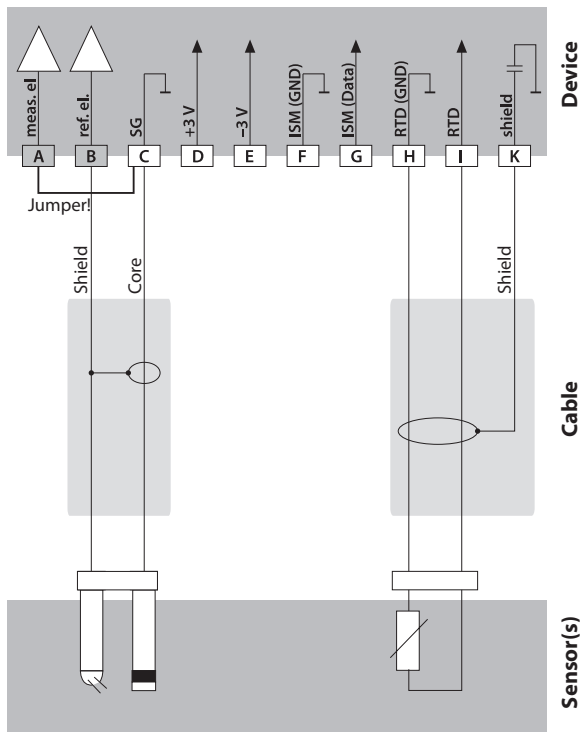
# Wiring Examples

## Example 8 - Note: Switch off Sensocheck!

Measuring task: ORP, temp, glass impedance, ref. impedance

Sensors (example): ORP: SE 535 (Knick)

Cable (example): AS9 ZU 0318 (Knick)

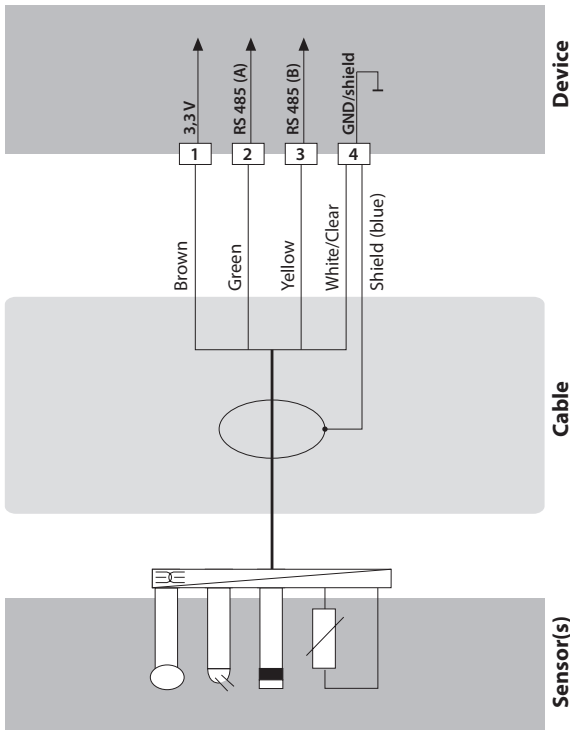


## Example 9:

Measuring task: pH/ORP, temp, glass impedance, ref. impedance

Sensors (example): SE 533/1-ADIN (Knick)

Cable (example): CA/003-NAADIN11 (Knick)



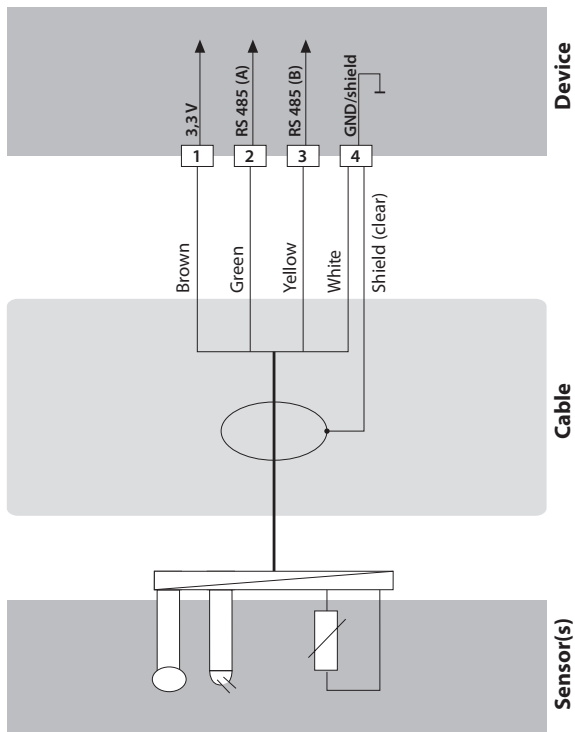


## Example 10: Memosens

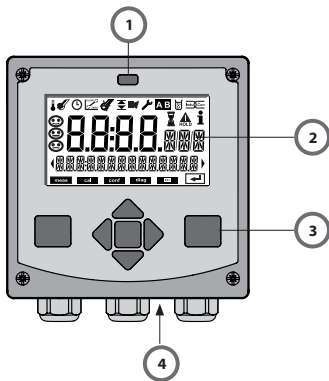
Measuring task: pH/ORP, temp, glass impedance, ref. impedance

Sensors (example): Orbisint CPS 11 D Memosens

Cable (example): CYK 10

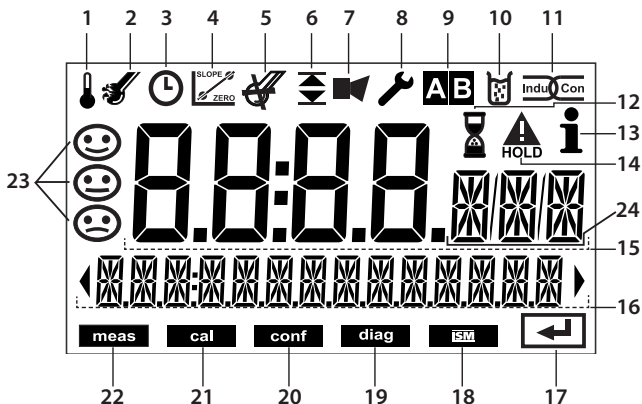


# User Interface, Keypad



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

Key	Function
<b>meas</b>	<ul style="list-style-type: none"><li>• Return to last menu level</li><li>• Directly to measuring mode (press &gt; 2 s)</li></ul>
<b>info</b>	<ul style="list-style-type: none"><li>• Retrieve information</li><li>• Show error messages</li></ul>
<b>enter</b>	<ul style="list-style-type: none"><li>• Configuration: Confirm entries, next configuration step</li><li>• Calibration: Continue program flow</li><li>• Measuring mode: Display output current</li></ul>
<b>Arrow keys up / down</b>	<ul style="list-style-type: none"><li>• Measuring mode: Call menu</li><li>• Menu: Increase/decrease a numeral</li><li>• Menu: Select</li></ul>
<b>Arrow keys left / right</b>	<ul style="list-style-type: none"><li>• Measuring mode: Call menu</li><li>• Menu: Previous/next menu group</li><li>• Number entry: Move between digits</li></ul>



- |                             |                       |
|-----------------------------|-----------------------|
| 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 Digital sensor devaluated | 17 Proceed with enter |
| 6 Limit values              | 18 Digital sensor     |
| 7 Alarm                     | 19 Diagnostics        |
| 8 Service                   | 20 Configuration mode |
| 9 Parameter sets A/B        | 21 Calibration mode   |
| 10 Calibration              | 22 Measuring mode     |
| 11 Digital sensor           | 23 Sensoface          |
| 12 Waiting time running     | 24 Measurement symbol |

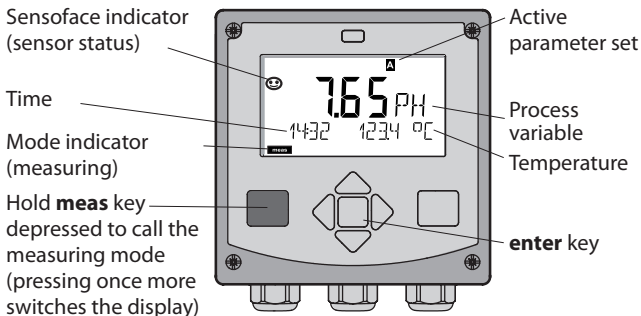
## Signal Colors (Display Backlighting)

- |           |   |
|-----------|---|
| Red       | Alarm   |
| Orange    | HOLD mode (Calibration, Configuration, Service) |
| Turquoise | Diagnostics                                     |
| Green     | Info  |
| Purple    | Sensoface message                               |

# Measuring Mode

---

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



In measuring mode the display indicates:

- Measured value and time (24/12 h AM/PM) as well as temperature in °C or °F (formats selected during configuration)

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

- Measured value and selection of parameter set A/B (if set to "Manual")
- Measured value and tag (point of measurement designation – entered during configuration)
- Time and date

Pressing the **enter** key shows the output currents. They are displayed as long as **enter** is held depressed, then the measured-value display will return after 3 sec.



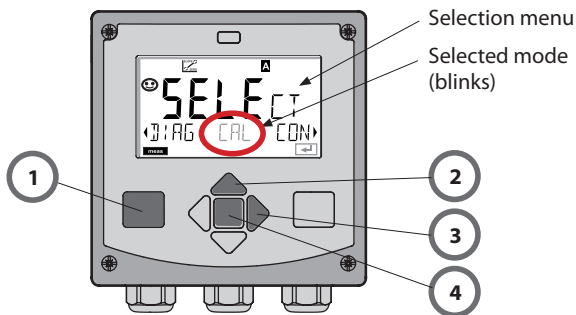
The device must be configured for the respective measurement task!

---

# Selecting the Mode / Entering Values

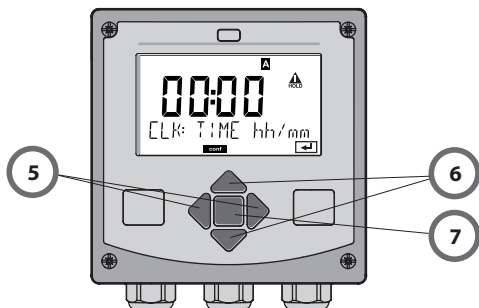
## To select the operating mode:

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



## To enter a value:

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



# Operating Modes

---

## **Diagnostics**

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

## **HOLD**

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

## **Calibration**

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

**During calibration the analyzer 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 measurement 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 (monitor, current source), IrDA operation, passcode assignment, reset to factory settings, enabling of options (TAN).

# Menu Structure of Modes and Functions



Pressing any arrow key opens the selection menu.  
 Select the menu group using the left/right arrow keys.  
 Press **enter** to open a menu. Press **meas** to return.

 <b>DIAG</b>	<b>CALDATA</b> <b>SENSOR</b> <b>SELFTEST</b> <b>LOGBUCH</b> <b>MONITOR</b> <b>VERSION</b>	Display of calibration data Display of sensor data Self test: RAM, ROM, EEPROM, module 100 events with date and time Display of measured values (mV_pH, mV_ORP, RTD, resistances of glass electrode, reference electrode) Display of software version, model designation, serial number
<b>HOLD</b>		Manual activation of HOLD mode, e.g. for sensor replacement. The signal outputs behave as configured (e.g. last measured value, 21 mA)
<b>CAL</b>	<b>CAL_PH</b> <b>CAL_ORP</b> <b>P_CAL</b> <b>ISFET-ZERO</b> <b>CAL_RTD</b>	pH adjustment (as configured) ORP adjustment Product calibration Zero adjustment (for ISFET only) Adjustment of temperature probe
<b>CONF</b>	<b>PARSET A</b> <b>PARSET B</b>	Configuring parameter set A Configuring parameter set B
<b>SERVICE</b> (Access via code, factory setting: 5555)	<b>MONITOR</b> <b>OUT1</b> <b>OUT2</b> <b>IRDA</b> <b>CODES</b> <b>DEFAULT</b> <b>OPTION</b>	Display of measured values for validation (simulators) Current source, output 1 Current source, output 2 Activating the IrDA interface Specifying access codes for operating modes Reset to factory setting Enabling an option via TAN

# HOLD Mode

---

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.

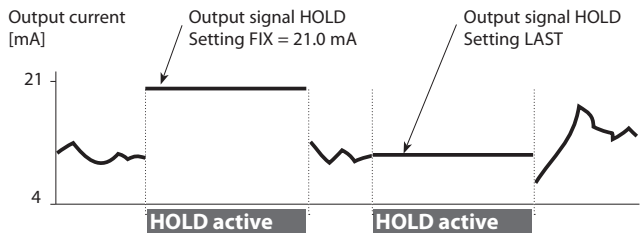
**HOLD mode**, display icon:



## 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:



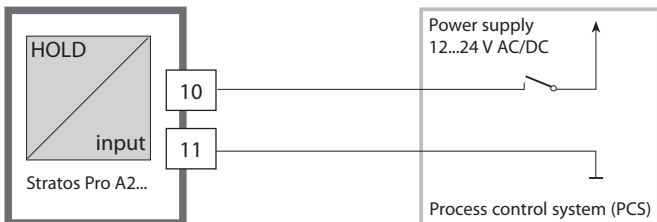
## Terminating the HOLD Mode

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).

## External Activation of HOLD

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



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

## Manual Activation of HOLD

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

## Alarm

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

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

# Configuration

## 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.

Using ◀ and ▶, you can jump between the individual menu groups. Each menu group contains menu items for setting the parameters.

Pressing **enter** opens a menu item.

The values are edited using ▲ and ▼.

Pressing **enter** confirms/stores the settings.

Return to measurement: Press **meas**.

Select menu group	Menu group	Code	Display	Select menu item
	Sensor selection	SNS:	Conf SENSOR	
		Menu item 1		↘ enter
		⋮		↘ enter
		Menu item ...		
	Current output 1	OT1:	Conf OUT 1	↘ enter
▶ ↘	Current output 2	OT2:	Conf OUT 2	↘ enter
▶ ↘	Compensation	COR:	Conf CORRECTION	
▶ ↘	Alarm mode	ALA:	Conf ALARM	
▶ ↘	Setting the clock	CLK:	Conf CLOCK	↘ ◀
▶ ↘	Tag number	TAG:	Conf TAG	↘ ◀

## Parameter Set A/B: Configurable Menu Groups



(Some parameters are identical in A and B. They are configured in parameter set A only.)

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
ALARM	Alarm mode	Alarm mode
PARSET	Parameter set selection	---
CLOCK	Setting the clock	---
TAG	Tag number	---

# Configuration

## Parameter Set A/B

### Manual selection

Display	Action	Remark
	To switch between parameter sets: Press <b>meas</b> (must have been selected in CONFIG)	Wrong settings change the measurement properties!
	PARSET blinks in the lower line. Select parameter set using ◀ and ▶ keys	
	Select PARSET A / PARSET B	
	Confirm with <b>enter</b> Cancel with <b>meas</b>	

Configuration		Choices	Default
<b>Sensor (SENSOR)</b>			
SNS:		STANDARD ISFET INDUCON ISM MEMOSENS	STANDARD
	RTD TYPE	100 PT 1000 PT 30 NTC	100 PT
	TEMP UNIT	°C / °F	°C
	TEMP MEAS	AUTO MAN EXT (only if enabled via TAN)	AUTO
	MAN	-20...200 °C (-4...392 °F)	025.0 °C (077.0 °F)
	TEMP CAL	AUTO MAN EXT (only if enabled via TAN)	AUTO
	MAN	-20...200 °C (-4...392 °F)	025.0 °C (077.0 °F)
	CAL MODE	AUTO MAN DAT	AUTO
	AUTO BUFFER SET	-00-...-09-, -U1- Please note: Pressing <b>info</b> displays nominal buffer values and manufacturers	-00-
	U1 (specifiable buffer set)	EDIT BUFFER 1 (NO, YES) Enter values for buffer 1	NO
		EDIT BUFFER 2 (NO, YES) Enter values for buffer 2	NO

# Configuration

Configuration		Choices	Default		
<b>Sensor (SENSOR)</b>					
SNS:	CAL TIMER		OFF FIX ADAPT	OFF	
	ON	CAL-CYCLE	0...9999 h	0168 h	
	DS (InduCon)	CIP COUNT		ON/OFF	OFF
		ON	CIP CYCLES	0...9999 CYC	0025 CYC
		SIP COUNT		ON/OFF	OFF
		ON	SIP CYCLES	0...9999 CYC	0025 CYC
<b>Output 1 (OUT1)</b>					
OT1:	CHANNEL		PH/ORP/TMP	PH	
	PH	BEGIN	-2.00...16 PH	00.00 PH	
		END	-2.00...16 PH	14.00 PH	
	ORP	BEGIN	-1999...1999 mV		
		END	-1999...1999 mV		
	TMP °C	BEGIN	-20...300 °C		
		END	-20...300 °C		
	TMP °F	BEGIN	-4...572 °F		
		END	-4...572 °F		
	FILTERTIME		0...120 SEC	0000 SEC	
	22mA-FAIL		ON/OFF	OFF	
	HOLD MODE		LAST/FIX	LAST	
	FIX	HOLD-FIX	4...22 mA	021.0 mA	

Configuration		Choices	Default	
<b>Output 2 (OUT2)</b>				
OT2:	CHANNEL	PH/ORP/TMP	TMP	
	... other steps like output 1			
<b>Temperature compensation (CORRECTION)</b>				
COR:	TC LIQUID		-19.99...19.99%/K	00.00%/K
	TEMP EXT*		ON/OFF	OFF
	ON	I-INPUT	0...20 mA/ 4...20 mA	4...20 mA
		°C	BEGIN 4 mA	-20...200 °C
		END 20 mA	-20...200 °C	100.0 °C
	°F	BEGIN 4 mA	-4...392 °F	032.0 °F
		END 20 mA	-4...392 °F	212.0 °F
<b>Alarm (ALARM)</b>				
ALA:	DELAYTIME	0...600 SEC	0010 SEC	
	SENSOCHECK	ON/OFF	OFF	
<b>Parameter set (PARSET)</b>				
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 (parameter set A fixed)	
<b>Real-time clock (CLOCK)</b>				
CLK:	FORMAT		24 h / 12 h	
	24 h	TIME hh/mm	00...23:00...59	00:00
	12 h	TIME hh/mm	00...11 AM/ PM:00...59	00.00
	DAY/MONTH		01...31/01...12	31.12.
	YEAR		2000...2099	2006
<b>Tag number (TAG)</b>				
TAG:	(Input in text line)		XXXXXXXXXX	

\*) is only displayed if enabled and SENSOR TEMP EXT has been selected.

# Configuration (Original for Copy)

---

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

## Please note:

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

Parameter	Parameter set A	Parameter set B
SNS: Sensor type		--- *)
SNS: RTD type		---
SNS: Temperature unit		---
SNS: Temp measurement		---
SNS: Manual meas. temp		---
SNS: Calibration temp		---
SNS: Manual cal temp		---
SNS: Calibration mode		---
SNS: Buffer set selection (-U1-, see Appendix)		---
SNS: Calibration timer		---
SNS: Calibration cycle		---
SNS: CIP counter		---
SNS: CIP cycles		---
SNS: SIP counter		---
SNS: SIP cycles		---
OT1: Process variable		
OT1: Current start		
OT1: Current end		

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

## (Original for Copy) Configuration

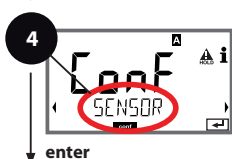
Parameter	Parameter set A	Parameter set B
OT1: Filter time		
OT1: 22 mA error current		
OT1: HOLD mode		
OT1: HOLD-FIX current		
OT2: Process variable		
OT2: Current start		
OT2: Current end		
OT2: Filter time		
OT2: 22 mA error current		
OT2: HOLD mode		
OT2: HOLD-FIX current		
COR: Temp coefficient		
COR: Ext. temp input		
COR: Current range		
COR: Current start		
COR: Current end		
ALA: Alarm on/off		
ALA: Delay		
ALA: Sensocheck on/off		
PAR: Parameter set selection		---
CLK: Time format		---
CLK: Time hh/mm		---
CLK: Day/month		---
CLK: Year		---
TAG: Tag number		---

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

# Configuration

## Sensor

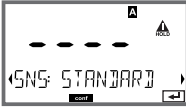

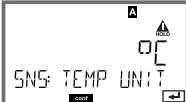
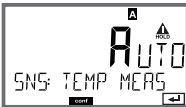
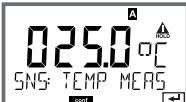
Select: sensor type, temperature probe, temperature unit, temp detection during measurement



- 1 Press any arrow key.
- 2 Select **CONF** using ◀ ▶ keys, 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 with arrow keys (see next page). Confirm (and proceed) with **enter**.
- 6 End: Press **meas** key until the [meas] mode indicator is displayed.

5

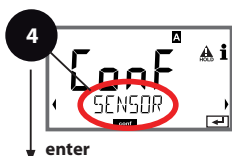
Select sensor type	enter
Select type of temp probe	enter
Temperature unit	enter
Temp detection during measurement (Man. temperature)	
Temp detection during calibration (Man. temperature)	
Calibration mode	
(AUTO: Buffer set)	
Calibration timer	
Calibration cycle	
Cleaning cycles	
Cleaning cycle counter	
Sterilization cycles	
Sterilization cycle counter	

Menu item	Action	Choices
Select sensor type 	Select sensor type using ▲ ▼ keys.  Confirm with <b>enter</b>	<b>STANDARD</b> ISFET INDUCON (DS) ISM-DISO (DS) MEMOSENS (DS)
Select type of temp probe 	(not for digital sensors) Select type of temperature probe using ▲ ▼ keys.  Confirm with <b>enter</b>	<b>100 PT</b> 1000 PT 30 NTC
Temperature unit 	Select °C or °F using ▲ ▼ keys.  Confirm with <b>enter</b>	°C / °F
Temp detection during measurement 	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) Confirm with <b>enter</b>	<b>AUTO</b> MAN EXT
(Manual temp) 	Modify digit using ▲ ▼ , select next digit using ◀ ▶ keys. Confirm with <b>enter</b>	-20...200 °C (-4...+392 °F)

# Configuration

## Sensor

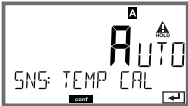
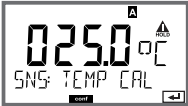


Select: temp detection during calibration, calibration mode



- 1 Press any arrow key.
- 2 Select **CONF** using ◀ ▶ keys, 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 with arrow keys (see next page). Confirm (and proceed) with **enter**.
- 6 End: Press **meas** key until the [meas] mode indicator is displayed.

5

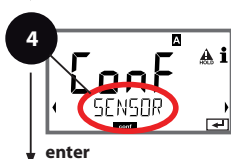
Select sensor type	enter
Select type of temp probe	enter
Temperature unit	enter
Temp detection during measurement (Man. temperature)	
Temp detection during calibration (Man. temperature)	
Calibration mode	
(AUTO: Buffer set)	
Calibration timer	
Calibration cycle	
Cleaning cycles	
Cleaning cycle counter	
Sterilization cycles	
Sterilization cycle counter	

Menu item	Action	Choices
Temp detection during calibration 	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) Confirm with <b>enter</b>	<b>AUTO</b> <b>MAN</b> <b>EXT</b>
(Manual temp) 	Modify digit using ▲ ▼ , select next digit using ◀ ▶ keys. Confirm with <b>enter</b>	-20...200 °C (-4...+392 °F)
Calibration Mode 	Select CALMODE using ▲ ▼ keys: AUTO: Calibration with Calimatic buffer set recognition MAN: Manual input of buffer solutions. DAT: Input of adjustment data of premeasured sensors Confirm with <b>enter</b>	<b>AUTO</b> <b>MAN</b> <b>DAT</b>
(AUTO: Buffer set) 	Select buffer set using ▲ ▼ keys (see buffer tables for nominal values). Confirm with <b>enter</b>	-00-...-09-, -U1- (see Appendix)  Pressing the <b>info</b> key displays the manufacturer and nominal values in the lower line.

# Configuration

## Sensor



### Adjust: calibration timer, calibration cycle



- 1 Press any arrow key.
- 2 Select **CONF** using ◀ ▶ keys, 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 with arrow keys (see next page). Confirm (and proceed) with **enter**.
- 6 End: Press **meas** key until the [meas] mode indicator is displayed.





5

Select sensor type	enter
Select type of temp probe	enter
Temperature unit	enter
Temp detection during measurement (Man. temperature)	
Temp detection during calibration (Man. temperature)	
Calibration mode (AUTO: Buffer set)	
Calibration timer	
Calibration cycle	
Cleaning cycles	
Cleaning cycle counter	
Sterilization cycles	
Sterilization cycle counter	

Menu item	Action	Choices
Calibration timer 	Adjust CALTIMER using ▲ ▼ keys: OFF: No timer ADAPT: Maximum cal cycle (adjust in the next step) FIX: Fixed cal cycle (adjust in the next step) Confirm with <b>enter</b>	<b>OFF/ADAPT/FIX</b>  With ADAPT, the calibra- tion cycle is automatically reduced depending on the sensor load (high temperatures and pH values) and for digital sensors also depending on the sensor wear
Calibration cycle 	Only with FIX/ADAPT: Modify digit using ▲ ▼ , select next digit using ◀ ▶ keys. Confirm with <b>enter</b>	0...9999 h

### Note for the calibration timer:

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

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

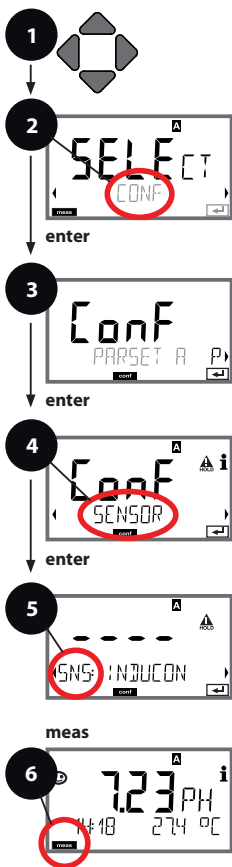
The calibration timer settings apply to both parameter sets A and B.

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

# Configuration





## Sensor

### Adjust: CIP cleaning cycles, SIP sterilization cycles



- 1 Press any arrow key.
- 2 Select **CONF** using ◀ ▶ keys, 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 with arrow keys (see next page). Confirm (and proceed) with **enter**.
- 6 End: Press **meas** key until the [meas] mode indicator is displayed.

	5	enter
Select sensor type		↙
Select type of temp probe		↙
Temperature unit		↙
Temp detection during measurement (Man. temperature)		
Temp detection during calibration (Man. temperature)		
Calibration mode (AUTO: Buffer set)		
Calibration timer		
Calibration cycle		
Cleaning cycles		
Cleaning cycle counter		
Sterilization cycles		
Sterilization cycle counter		

Menu item	Action	Choices
<b>CIP / SIP</b> The following adjustments are possible for digital sensors (INDUCON, ISM-DIGITAL):		
Cleaning cycle counter  	Select ON or OFF using ▲ ▼ keys. Activates/deactivates logging in extended logbook and counters (if provided)  Confirm with <b>enter</b>	<b>ON/OFF</b>
Cleaning cycles  	Only with CIP COUNT ON: Enter value using ▲ ▼ ◀ ▶ keys.  Confirm with <b>enter</b>	0...9999 CYC <b>(0025 CYC)</b>
Sterilization cycle counter  	Select ON or OFF using ▲ ▼ keys. Activates/deactivates logging in extended logbook and counters (if provided)  Confirm with <b>enter</b>	<b>ON/OFF</b>
Sterilization cycles  	Only with SIP COUNT ON: Enter value using ▲ ▼ ◀ ▶ keys.  Confirm with <b>enter</b>	0...9999 CYC <b>(0025 CYC)</b>

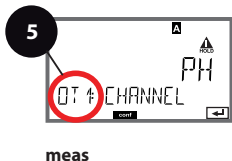
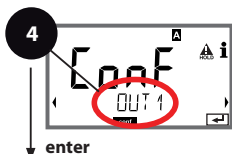
The cleaning and sterilization cycles are counted to measure the load on the sensor.

Suitable for biochemical applications (process temp approx. 0...50 °C, CIP temperature > 55 °C, SIP temperature > 115 °C).

# Configuration

## Current Output 1




Process variable, current start, current end



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

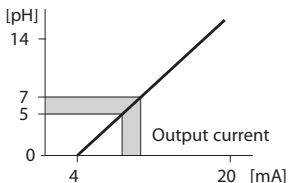
5

Process variable	enter
Current start	enter
Current end	enter
Time constant of output filter	
Output current during error message	
Output current during HOLD	
Output current for HOLD FIX	

Menu item	Action	Choices
Process variable 	Select using $\blacktriangle$ $\blacktriangledown$ keys: PH: pH value ORP: Redox potential TMP: Temperature Confirm with <b>enter</b>	<b>PH/ORP/TMP</b>
Current start 	Modify digit using $\blacktriangle$ $\blacktriangledown$ , select next digit using $\blacktriangleleft$ $\blacktriangleright$ keys.  Confirm with <b>enter</b>	-2...16 pH (PH) -1999...1999 mV (ORP) -20...300 °C / -4...572 °F (TMP)
Current end 	Enter value using $\blacktriangle$ $\blacktriangledown$ $\blacktriangleleft$ $\blacktriangleright$ keys.  Confirm with <b>enter</b>	-2...16 pH (PH) -1999...1999 mV (ORP) -20...300 °C / -4...572 °F (TMP)

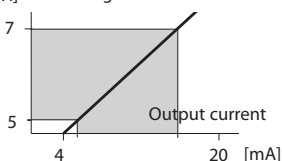
### Assignment of Measured Values: Current Start and Current End

Example 1: Range pH 0...14



Example 2: Range pH 5...7

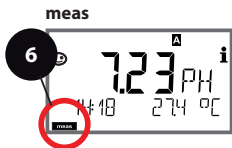
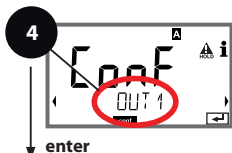
Advantage: Higher resolution in  
[pH] range of interest



# Configuration

## Current Output 1


### Adjust time constant of output filter



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

5

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

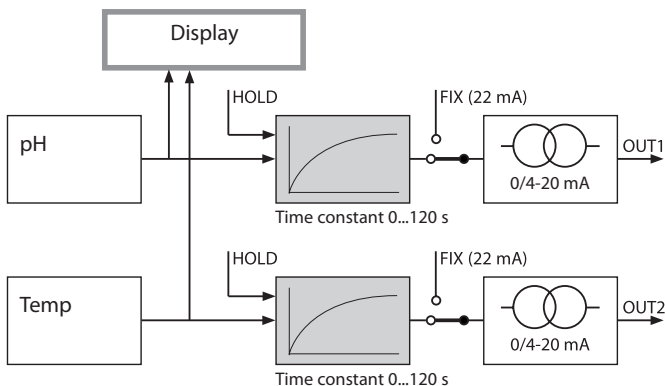
Menu item	Action	Choices
Time constant of output filter	Enter value using $\blacktriangle$ $\blacktriangleright$ $\blacktriangleleft$ $\blacktriangleleft$ keys.	0...120 SEC (0000 SEC)
		Confirm with <b>enter</b>

### Time Constant of Output 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 constant has been reached. The time constant can be set from 0 to 120 sec. If the time constant is set to 0 sec, the current output directly follows the input.

#### Please note:

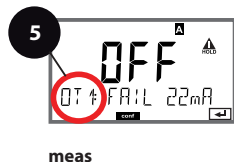
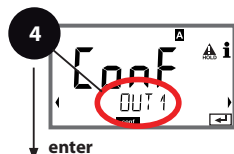
The filter only acts on the current output, not on the display!  
During HOLD the filter is not applied. This prevents a jump at the output.



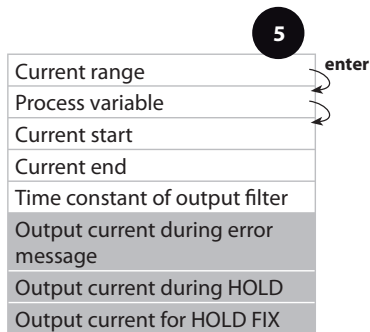
# Configuration




## Current Output 1

### Output current during Error and HOLD

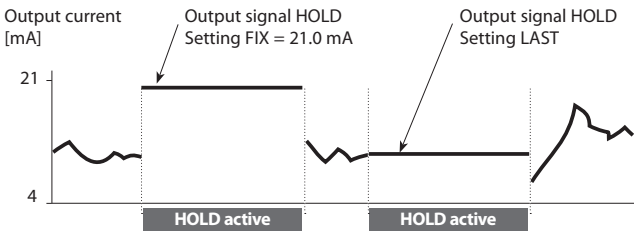


- 1 Press any arrow key.
- 2 Select **CONF** using ◀ ▶ keys, press **enter**.
- 3 Select parameter set using ◀ ▶ keys, press **enter**.
- 4 Select **OUT1** menu using ◀ ▶ keys, press **enter**.
- 5 All items of this menu group are indicated by the "OT1:" code.  
Press **enter** to select menu, edit with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



Menu item	Action	Choices
Output current during error message	Select ON or OFF using $\uparrow$ $\downarrow$ keys. Confirm with <b>enter</b>	ON/OFF
		
Output current during HOLD	LAST: During HOLD the last measured value is maintained at the output. FIX: During HOLD a value (to be entered) is maintained at the output. Select using $\uparrow$ $\downarrow$ keys. Confirm with <b>enter</b>	LAST/FIX
		
Output current for HOLD FIX	Only with FIX selected: Enter current which is to flow at the output during HOLD Enter value using $\uparrow$ $\downarrow$ $\leftarrow$ $\rightarrow$ keys. Confirm with <b>enter</b>	00.00...22.00 mA (21.00 mA)
		

### Output Signal During HOLD:



# Configuration

## Current Output 2

### Output current range, current start, current end




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

5

Process variable
Current start
Current end
Time constant of output filter
Output current during error message
Output current during HOLD
Output current for HOLD FIX

enter

Menu item	Action	Choices
Process variable 	Select using ▲ ▼ keys: PH: pH value ORP: Redox potential TMP: Temperature Confirm with <b>enter</b>	PH/ORP/TMP
. . .		

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

# Configuration

## Temperature Compensation

### TC process medium, current input for temp measurement



enter



enter



enter



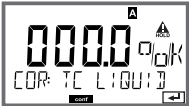
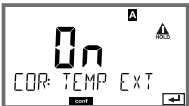



meas



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

5

Temperature compensation, process medium	enter
Current input for ext. temperature measurement	
Current range	
Current start	
Current end	

Menu item	Action	Choices
Temp compensation, process medium  	For pH measurement only: Enter temperature compensation of the process medium. Enter value using $\blacktriangle$ $\blacktriangledown$ $\blacktriangleleft$ $\blacktriangleright$ keys. Confirm with <b>enter</b>	-19.99...+19.99 %/K
Current input for ext. temperature measurement  	Only if enabled via TAN and selected during configuration (SENSOR). Select ON or OFF using $\blacktriangle$ $\blacktriangledown$ keys. Confirm with <b>enter</b>	<b>ON/OFF</b>
Current range  	Select desired range using $\blacktriangle$ $\blacktriangledown$ keys. Confirm with <b>enter</b>	<b>4-20 mA / 0-20 mA</b>
Current start  	Modify digit using $\blacktriangle$ $\blacktriangledown$ , select next digit using $\blacktriangleleft$ $\blacktriangleright$ keys. Confirm with <b>enter</b>	Input range: -20...200 °C / -4...392 °F
Current end  	Enter value using $\blacktriangle$ $\blacktriangledown$ $\blacktriangleleft$ $\blacktriangleright$ keys. Confirm with <b>enter</b>	Input range: -20...200 °C / -4...392 °F

# Configuration

## Alarm

### Alarm delay, Sensocheck



enter



enter



enter



meas





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

Delay

Sensocheck

5

enter

Menu item	Action	Choices
Alarm delay 	Only with Alarm ON selected: Enter value using ▲ ▼ ◀ ▶ keys. Confirm with <b>enter</b>	0...600 SEC <b>(010 SEC)</b>
Sensocheck 	Select Sensocheck (continuous monitoring of glass and reference electrode) Select ON or OFF using ▲ ▼ keys. Confirm with <b>enter</b> . (At the same time, Sensoface is activated. With OFF, Sensoface is also switched off.)	<b>ON/OFF</b>

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 backlighting to red and the 22 mA signal (if configured).

# Configuration

## Time and Date Tag Number



enter



enter



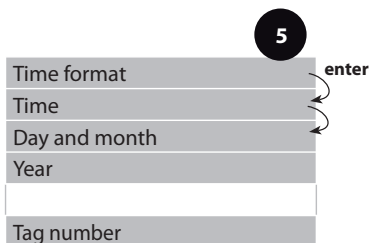
enter



meas



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



## Time and Date

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

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

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

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

### Please note:

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

## Tag Number ("TAG")

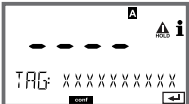
You can enter a designation for the point of measurement (tag number) in the lower display line. Up to 32 digits are possible.

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

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

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

5

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

# Digital Sensors

---

## Operation

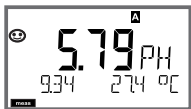
Stratos Pro can be operated with three different types of digital sensors: Memosens, InduCon, ISM.

The following display examples refer to a transmitter and a digital pH sensor (slight variations for other combinations).

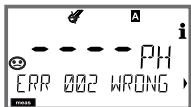
The sensor type is selected during **configuration**, the selected type is indicated by a display icon:






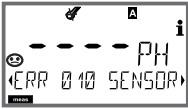
The device only switches to measuring mode when the connected sensor corresponds to the type configured (Sensoface is happy):



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





## Connecting a Digital Sensor

Step	Action/Display	Remark
Connect sensor		Before a digital sensor is connected, the error message "No sensor" is displayed.
Wait until the sensor data are displayed.		The hourglass in the display blinks.
Check sensor data	 <p>View sensor information using ◀ ▶ keys, confirm with <b>enter</b>.</p>	<p>The display color changes to <b>green</b>, the InduCon or ISM icon is displayed, if applicable.</p> <p>Sensoface is happy.</p>
Go to measuring mode	Press <b>meas</b> , <b>info</b> , or <b>enter</b>	After 60 sec the device automatically returns to measuring mode (timeout).
Possible error messages		
Sensor devaluated Replace sensor		When this error message appears, the sensor cannot be used any more. Sensoface is sad.
Sensor defective Replace sensor		When this error message appears, the sensor cannot be used. Sensoface is sad.

## Sensor Replacement

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

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

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

# Calibration

---

## **Please note:**

- All calibration procedures must be performed by trained personnel. Incorrectly set parameters may go unnoticed, but change the measuring properties.
- The response time of the sensor and temperature probe is considerably reduced when the sensor is first moved about in the buffer solution and then held still.
- The device can only operate properly when the buffer solutions used correspond to the configured set. Other buffer solutions, even those with the same nominal values, may demonstrate a different temperature response. This leads to measurement errors.

**When using ISFET sensors or sensors with a zero point other than pH 7**, the nominal zero point must be adjusted each time a new sensor is connected. This is important if you want to obtain reliable Sensoface messages. The Sensoface messages issued during all further calibrations are based on this basic calibration.

# Selecting a Calibration Mode

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

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

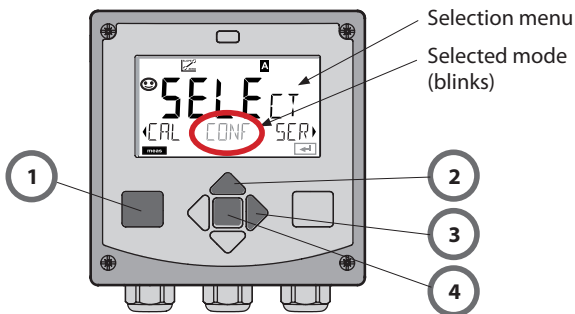
First, you open the calibration menu and select the calibration mode:

CAL_PH	Depending on configuration setting: AUTO Automatic buffer recognition (Calimatic) MAN Manual buffer input DAT Input of premeasured electrode data
CAL_ORP	ORP calibration
P_CAL	Product calibration (calibration with sampling)
ISFET-ZERO	Zero adjustment. Required for ISFET sensors, subsequently you can conduct either a one or a two-point calibration.
CAL_RTD	Temperature probe adjustment

## To preset CAL\_PH (CONF menu / configuration):

- 1) Hold **meas** key depressed (> 2 s) (measuring mode)
- 2) Press any arrow key: the selection menu appears
- 3) Select CONF mode using left / right arrow key
- 4) Select "SENSOR" – "CALMODE": AUTO, MAN, or DAT.

Press **enter** to confirm







## Zero Adjustment (ISFET)

This adjustment allows the use of ISFET sensors with differing nominal zero (pH only). The function is available when Sensor selection = ISFET has been set during configuration. Zero adjustment is disabled for any other sensors.




The adjustment is made using a zero buffer (pH 7.00).

Permitted range for buffer value: pH 6.5 ... 7.5.

Temperature-corrected input. Maximum zero offset:  $\pm 200$  mV.

Display	Action	Remark
 The screen displays 'CAL' in large digits, with 'ISFET-ZERO' below it. There are arrow keys on the left and right sides, and a 'CAL' button at the bottom left and a right arrow button at the bottom right.	Select Calibration. Press <b>enter</b> to proceed.	
 The screen displays 'CAL' in large digits, with 'ISFET-ZERO' below it. An hourglass icon is visible in the top right corner. There are arrow keys on the left and right sides, and a 'CAL' button at the bottom left and a right arrow button at the bottom right.	Ready for calibration. Hourglass blinks.	Display (3 sec) Now the device is in HOLD mode.
 The screen displays '7.00' in large digits, with 'BUF' to its right. Below the digits, it shows '127mV' and '27.3°C'. There are arrow keys on the left and right sides, and a 'CAL' button at the bottom left and a right arrow button at the bottom right.	Immerse sensor in a pH 7.00 buffer. Enter the temperature-corrected pH value in the range 6.50 to 7.50 using the arrow keys (see buffer table). Confirm with <b>enter</b> .	If the zero offset of the sensor is too large ( $> \pm 200$ mV), a CAL ERR error message is generated. In that case the electrode cannot be calibrated.
 The screen displays '7.00' in large digits, with 'BUF' to its right. Below the digits, it shows '128mV' and '27.3°C'. An hourglass icon is visible in the top right corner. There are arrow keys on the left and right sides, and a 'CAL' button at the bottom left and a right arrow button at the bottom right.	Stability check. The measured value [mV] is displayed. The "hourglass" icon is blinking.	Please note: Stability check can be stopped (by pressing <b>enter</b> ). However, this reduces calibration accuracy.

## Zero Adjustment (ISFET)






Display	Action	Remark
 <p>The display shows a large '129' with 'mV' to its right. Below it, 'ISFET-ZERO' is displayed. There are small icons in the top corners and a 'CAL' label at the bottom left.</p>	<p>At the end of the adjustment procedure the zero offset [mV] of the sensor is displayed (based on 25 °C). Sensoface is active. Press <b>enter</b> to proceed.</p>	<p>This is not the final calibration value of the sensor! Asymmetry potential and slope must be determined with a complete 2-point calibration.</p>
 <p>The display shows '7.23 PH' in large digits. Below it, 'MEAS REPE' is visible. There are small icons in the top corners and a 'CAL' label at the bottom left.</p>	<p>Use the arrow keys to select:</p> <ul style="list-style-type: none"> <li>• Repeat (repeat calibration) or</li> <li>• Measuring.</li> </ul> <p>Confirm with <b>enter</b>.</p>	
 <p>The display shows '7.23 PH' in large digits. Below it, 'GOOD BYE' is visible. There are small icons in the top corners and a 'CAL' label at the bottom left.</p>	<p>Place sensor in process. End zero calibration with <b>enter</b>.</p>	<p>After end of calibration, the outputs remain in HOLD mode for a short time.</p>

### Note for Zero Adjustment



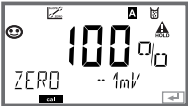

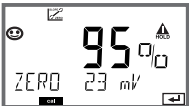


After having adjusted the zero offset, be sure to calibrate the sensor following one of the procedures as described on the next pages.

## Automatic Calibration (Calimatic)

The AUTO calibration mode and the type of temperature detection are selected during **configuration**. Make sure that the buffer solutions used correspond to the configured buffer set. Other buffer solutions, even those with the same nominal values, may demonstrate a different temperature response. This leads to measurement errors.






Display	Action	Remark
	Select Calibration. Press <b>enter</b> to proceed.	
	Ready for calibration. Hourglass blinks. Select calibration method: CAL_PH Press <b>enter</b> to proceed.	Display (3 sec) Now the device is in HOLD mode.
	Remove the sensor and temperature probe, clean them, and immerse them in the first buffer solution (in any order). Start with <b>enter</b>	When manual input of temperature has been configured, the temp value in the display blinks and can be edited using the arrow keys.
	Buffer recognition. While the "hourglass" icon is blinking, the sensor and temperature probe remain in the first buffer solution.	The response time of the sensor and temperature probe is considerably reduced when the sensor is first moved about in the buffer solution and then held still.
	Buffer recognition terminated, the nominal buffer value is displayed.	

## Automatic Calibration (Calimatic)


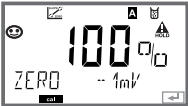




Display	Action	Remark
	<p>At the end of the stability check, the value will be saved and the asymmetry potential will be displayed.</p> <p>Calibration with the first buffer is terminated.</p>	<p>Please note: Stability check can be stopped after 10 sec (by pressing <b>enter</b>). However, this reduces calibration accuracy. Display for 1-point cal:</p>
	<p>Remove the sensor and temp probe from the first buffer solution and rinse them thoroughly.</p> <p><b>Use the arrow keys to select:</b></p> <ul style="list-style-type: none"> <li>• END (1-point cal)</li> <li>• CAL2 (2-point cal)</li> <li>• REPEAT</li> </ul> <p>Press <b>enter</b> to proceed.</p>	 <p>Sensoface is active. End with <b>enter</b></p>
	<p>2-point calibration: Immerse sensor and temperature probe in the second buffer solution. Start with <b>enter</b></p>	<p>The calibration process runs as for the first buffer.</p>
	<p>Retract sensor and temp probe out of second buffer, rinse off, re-install.</p> <p>Press <b>enter</b> to proceed.</p>	<p>The slope and asymmetry potential of the sensor (based on 25 °C) are displayed.</p>
	<p><b>Use the arrow keys to select:</b></p> <ul style="list-style-type: none"> <li>• MEAS (end)</li> <li>• REPEAT</li> </ul> <p>Press <b>enter</b> to proceed. End: HOLD is deactivated with delay.</p>	<p>When 2-point cal is ended:</p> 

## Manual Calibration with Buffer Entry

The MAN calibration mode and the type of temperature detection are selected during **configuration**. For calibration with manual buffer specification, you must enter the pH value of the buffer solution used in the device for the proper temperature. Any desired buffer solution can be used for calibration.

Display	Action	Remark
 The display shows 'CAL' in large characters, 'CAL_PH' below it, and a battery icon in the top right corner.	Select Calibration. Press <b>enter</b> to proceed.	
 The display shows 'CAL' in large characters, 'BUFFER MANUAL' below it, a smiley face icon on the left, and a battery icon in the top right corner.	Ready for calibration. Hourglass blinks.	Display (3 sec) Now the device is in HOLD mode.
 The display shows 'CAL M 1' in large characters, '14.31' on the left and '27.40C' on the right, and a battery icon in the top right corner.	Remove the sensor and temperature probe, clean them, and immerse them in the first buffer solution. Press <b>enter</b> to start.	When manual input of temperature has been configured, the temp value in the display blinks and can be edited using the arrow keys.
 The display shows '07.00' in large characters, 'BUF' on the right, '14.31' on the left and '27.40C' on the right, and a battery icon in the top right corner.	Enter the pH value of your buffer solution for the proper temperature. While the "hourglass" icon is blinking, the sensor and temperature probe remain in the buffer solution.	The response time of the sensor and temperature probe is considerably reduced when the sensor is first moved about in the buffer solution and then held still.
 The display shows '7.00' in large characters, 'mV' on the left and '27.30C' on the right, and a battery icon in the top right corner.		





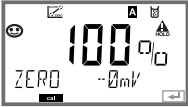

# Manual Calibration with Buffer Entry

Display	Action	Remark
	<p>At the end of the stability check, the value will be saved and the asymmetry potential will be displayed.</p> <p>Calibration with the first buffer is terminated.</p> <p>Remove the sensor and temp probe from the first buffer solution and rinse them thoroughly.</p> <p><b>Use the arrow keys to select:</b></p> <ul style="list-style-type: none"> <li>• END (1-point cal)</li> <li>• CAL2 (2-point cal)</li> <li>• REPEAT</li> </ul> <p>Press <b>enter</b> to proceed.</p>	<p>Please note: Stability check can be stopped after 10 sec (by pressing <b>enter</b>). However, this reduces calibration accuracy. Display for 1-point cal:</p>  <p>Sensoface is active. End with <b>enter</b></p>
	<p>2-point calibration: Immerse sensor and temperature probe in the second buffer solution.</p> <p>Enter pH value.</p> <p>Press <b>enter</b> to start.</p>	<p>The calibration process runs as for the first buffer.</p>
	<p>Rinse sensor and temperature probe and reinstall them.</p> <p>Press <b>enter</b> to proceed.</p>	<p>Display of slope and new asymmetry potential (based on 25 °C).</p>
	<p><b>Use the arrow keys to select:</b></p> <ul style="list-style-type: none"> <li>• MEAS (end)</li> <li>• REPEAT</li> </ul> <p>Press <b>enter</b> to proceed.</p> <p>End: HOLD is deactivated with delay.</p>	<p>When 2-point cal is ended:</p> 

## Data Entry of Premeasured Sensors

The DAT calibration mode must have been preset during configuration.

You can directly enter the values for slope and asymmetry potential of a sensor. The values must be known, e.g. determined beforehand in the laboratory.

Display	Action	Remark
 The display shows 'CAL' in large characters, with 'CAL_PH' below it. There are navigation arrows on the left and right sides, and a 'CAL' label at the bottom left.	Select Calibration. Press <b>enter</b> to proceed.	
 The display shows 'CAL' in large characters, with 'DATA INPUT' below it. There are navigation arrows on the left and right sides, and a 'CAL' label at the bottom left.	"Data Input" Ready for calibration. Hourglass blinks.	Display (3 sec) Now the device is in HOLD mode.
 The display shows '12 mV' in large characters, with 'INPUT ZERO' below it. There are navigation arrows on the left and right sides, and a 'CAL' label at the bottom left.	Enter asymmetry potential [mV]. Press <b>enter</b> to proceed.	
 The display shows '95' in large characters, with 'INPUT SLOPE' below it. There are navigation arrows on the left and right sides, and a 'CAL' label at the bottom left.	Enter slope [%].	
 The display shows '100' in large characters, with 'ZERO' and 'mV' below it. There are navigation arrows on the left and right sides, and a 'CAL' label at the bottom left.	The device displays the new slope and asymmetry potential (at 25 °C). Sensoface is active.	
 The display shows '7.23 PH' in large characters, with 'MEAS' below it. There are navigation arrows on the left and right sides, and a 'CAL' label at the bottom left.	<b>Use the arrow keys to select:</b> • MEAS (end) • REPEAT Press <b>enter</b> to proceed.	End: HOLD is deactivated with delay.

### Converting slope [%] to slope [mV/pH] at 25 °C

%	mV/pH
78	46,2
80	47,4
82	48,5
84	49,7
86	50,9
88	52,1
90	53,3
92	54,5
94	55,6
96	56,8
98	58,0
<b>100</b>	<b>59,2</b>
102	60,4

### Converting asymmetry potential to sensor zero point

$$\text{ZERO} = 7 - \frac{V_{AS} [\text{mV}]}{S [\text{mV} / \text{pH}]}$$

ZERO = Sensor zero

$V_{AS}$  = Asymmetry potential

S = Slope

# Product Calibration (pH)

Calibration by sampling (one-point calibration).

During product calibration the sensor remains in the process.




The measurement process is only interrupted briefly.

## Procedure:




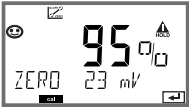
- 1) The sample is measured in the lab or directly on the site using a portable meter. To ensure an exact calibration, the sample temperature should correspond to the measured process temperature. During sampling the device saves the currently measured value and then returns to measuring mode. The "calibration"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

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 product calibration: P_CAL. Press <b>enter</b> to proceed.	
	Ready for calibration. Hourglass blinks.	Display (3 sec) Now the device is in HOLD mode.
	Take sample and save value. Press <b>enter</b> to proceed.	Now the sample can be measured.

## Product Calibration (pH)

Display	Action	Remark
	The device returns to measuring mode.	From the blinking CAL mode indicator you see that product calibration has not been terminated.
	Product calibration step 2	Display (3 sec) Now the device is in HOLD mode.
	The stored value is displayed (blinking) and can be overwritten with the measured sample value. Press <b>enter</b> to proceed.	
	Display of new asymmetry potential (based on 25°C). Sensoface is active. To end calibration: Select MEAS, then <b>enter</b>	To repeat calibration: Select REPEAT, then <b>enter</b>
End of calibration	After end of calibration, the outputs remain in HOLD mode for a short time.	

# ORP ( Redox) Calibration

The potential of a redox sensor is calibrated using a redox (ORP) buffer solution. In the course of that, the difference between the measured potential and the potential of the calibration solution is determined according to the following equation. During measurement this difference is added to the measured potential.

$$mV_{\text{ORP}} = mV_{\text{meas}} + \Delta mV$$

$mV_{\text{ORP}}$  = displayed ORP

$mV_{\text{meas}}$  = direct sensor potential





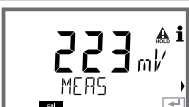
$\Delta mV$  = delta value, determined during calibration

The sensor potential can also be related to another reference system – e.g. the standard hydrogen electrode. In that case the temperature-corrected potential (see table) of the reference electrode used must be entered during calibration. During measurement, this value is then added to the ORP measured.






Please make sure that measurement and calibration temperature are the same since the temperature behavior of the reference electrode is not automatically taken into account.






## Temperature Dependence of Commonly Used Reference Systems Measured Against SHE

Temperature [°C]	Ag/AgCl/KCl 1 mol/l [ΔmV]	Ag/AgCl/KCl 3 mol/l [ΔmV]	Thalamid [ΔmV]	Mercury sulfate [ΔmV]
0	249	224	-559	672
10	244	217	-564	664
20	240	211	-569	655
25	236	207	-571	651
30	233	203	-574	647
40	227	196	-580	639
50	221	188	-585	631
60	214	180	-592	623
70	207	172	-598	613
80	200	163	-605	603

Display	Action	Remark
	Select ORP calibration, proceed with <b>enter</b>	
	Remove the sensor and temperature probe, clean them, and immerse them in the redox buffer.	Display (3 sec) Now the device is in HOLD mode.
	Enter setpoint value for redox buffer. Press <b>enter</b> to proceed.	
	The ORP delta value is displayed (based on 25°C). Sensoface is active. Press <b>enter</b> to proceed.	
	To repeat calibration: Select REPEAT. To end calibration: Select MEAS, then press <b>enter</b>	After end of calibration, the outputs remain in HOLD mode for a short time.

## Temp Probe Adjustment

Display	Action	Remark
 The display shows 'CAL' in large characters at the top, with 'CAL RTD' below it. There are navigation arrows on the left and right sides.	Select temp adjustment. Press <b>enter</b> to proceed.	Wrong settings change the measurement properties!
 The display shows 'CAL' in large characters at the top, with 'TEMP ADJUST' below it. There is a warning triangle icon in the top right corner.	Measure the temperature of the process medium using an external thermometer.	Display (3 sec) Now the device is in HOLD mode.
 The display shows '25.0' in large characters, with 'OC' to its right. Below it, 'ADJUST' and '235' are visible. There is a warning triangle icon in the top right corner.	Enter the measured temperature value. Maximum difference: 10 K. Press <b>enter</b> to proceed.	Display of actual temperature (uncompensated) in the lower display.
 The display shows '25.0' in large characters, with 'OC' to its right. Below it, 'MEAS' is visible. There is a smiley face icon in the top left corner and a warning triangle icon in the top right corner.	The corrected temperature value is displayed. Sensoface is active. To end calibration: Select MEAS, then <b>enter</b> To repeat calibration: Select REPEAT, then <b>enter</b>	
 The display shows '7.23' in large characters, with 'PH' to its right. Below it, 'GOOD BYE' is visible. There is a smiley face icon in the top left corner and a warning triangle icon in the top right corner.	After calibration is ended, the device will switch to measuring mode.	After end of calibration, the outputs remain in HOLD mode for a short time.

Display	Remark
	<p>From the configuration or calibration menus, you can switch the device to measuring mode by pressing the <b>meas</b> key.</p> <p>In the measuring mode the main display shows the configured process variable (pH, ORP [mV], or temperature), the secondary display shows the time and the second configured process variable (pH, ORP [mV], or temperature). The [meas] mode indicator lights and the active parameter set (A/B) is indicated.</p>
<p>or AM/PM and °F:</p>	
	
<p>By pressing the <b>enter</b> key you can briefly display the output currents.</p>	
<p>By pressing the <b>meas</b> key you can step through the following displays. When no key has been pressed for 60 sec, the device returns to the standard display.</p>	
	<p>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). Confirm with <b>enter</b>.</p> <p>Further displays (each with <b>meas</b>).</p> <p>2) Display of tag number ("TAG")</p> <p>3) Display of time and date</p>
	
	

# Diagnostics

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








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






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





### Please note:

HOLD is not active during Diagnostics mode!







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

Display	Menu item
	<p><b>Display of calibration data</b></p> <p>Select CALDATA using ◀ ▶, confirm with <b>enter</b>. Use the ◀ ▶ keys to select the desired parameter from the bottom line of the display (LAST_CAL ISFET-ZERO ZERO SLOPE NEXT_CAL). The selected parameter is shown in the main display.</p>
	<p>Press <b>meas</b> to return to measurement.</p>
	
	
	
	
	<p>Display data using ◀ ▶ keys, return with <b>enter</b> or <b>meas</b>.</p>

Display	Menu item
	<b>Device self-test</b> (To abort, you can press <b>meas.</b> ) 1) <b>Display test:</b> Display of all segments with changing background colors white/green/red. Proceed with <b>enter</b>
	2) <b>RAM test:</b> Hourglass blinks, then display of --PASS-- or --FAIL-- Proceed with <b>enter</b>
	3) <b>EEPROM test:</b> Hourglass blinks, then display of --PASS-- or --FAIL-- Proceed with <b>enter</b>
	4) <b>FLASH test:</b> Hourglass blinks, then display of --PASS-- or --FAIL-- Proceed with <b>enter</b>
	5) <b>Module test:</b> Hourglass blinks, then display of --PASS-- or --FAIL-- Press <b>enter</b> or <b>meas</b> to return to measuring mode.

Display	Menu item
	<p><b>Display of logbook entries</b>            Select LOGBOOK using ◀ ▶, confirm with <b>enter</b>.</p> <p>With the ▲ ▼ keys, you can scroll backwards and forwards through the logbook (entries -00-...-99-), -00- being the last entry.</p>
	<p>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.</p>
	<p>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.</p> <p>Press <b>meas</b> to return to measurement.</p>
	<p><b>Extended logbook / Audit Trail (via TAN)</b>            With the ▲ ▼ keys, you can scroll backwards and forwards through the extended logbook (entries -000-...-199-), -000- being the last entry.</p> <p><b>Display: CFR</b>            Audit Trail also records function activations (CAL CONFIG SERVICE), some Sensoface messages (cal timer, wear), and opening of the enclosure.</p>

# Diagnostics



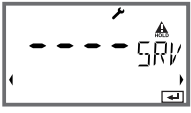
Display	Menu item
	<b>Display of currently measured values (sensor monitor)</b> Select MONITOR using ◀ ▶, confirm with <b>enter</b> . Use the ◀ ▶ keys to select the desired parameter from the bottom line of the display: mV_PH mV_ORP RTD R_GLASS R_REF I-INPUT (for digital sensors also: OPERATION TIME SENSOR WEAR LIFETIME CIP SIP AUTOCLAVE). The selected parameter is shown in the main display. Press <b>meas</b> to return to measurement.
<p>Display example:</p> 	Display mV_pH (for validation, sensor can be immersed in a calibration solution, for example, or the device is checked by using a simulator)
	Display of remaining dynamic lifetime (only for digital sensors, however not for MEMOSENS)
	Display of sensor operating time (for digital sensors only)
	Display of sensor wear (only for digital sensors of the InduCon type)
	<b>Version</b> Display of <b>device type, software/hardware version, and serial number</b> for all device components. Use the ▲ ▼ keys to switch between software and hardware version. Press <b>enter</b> to proceed to next device component.

The Service mode allows

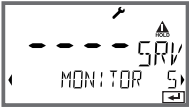


- displaying the currently measured values with the sensor monitor
- performing a device self-test
- testing the two current outputs
- activating and communicating via the IrDA interface
- assigning and editing passcodes
- resetting the device to factory settings
- enabling options via TAN.






**Please note:**

HOLD is active during Service mode!

Action	Key/Display	Remark
Activate Service		Press any arrow key to call the selection menu. (Display color changes to green) Select SERVICE using ◀ ▶ keys, confirm with <b>enter</b>
Passcode		Enter passcode "5555" for service mode using the ▲ ▼ ◀ ▶ keys. Confirm with <b>enter</b> .
Display		In service mode the following icons are displayed: <ul style="list-style-type: none"> <li>• [diag] mode indicator</li> <li>• HOLD triangle</li> <li>• Service (wrench)</li> </ul>
End	<b>meas</b>	End with <b>meas</b> .

















## Service

Menu item	Remark
 <p>Display example:</p> 	<p><b>Display of currently measured values (sensor monitor) with HOLD mode activated:</b> Select MONITOR using ◀ ▶, confirm with <b>enter</b>. Select variable in the bottom text line using ◀ ▶.</p> <p>The selected parameter is shown in the main display. As the device is in HOLD mode, you can perform validations using simulators without influencing the signal outputs.</p> <p>Press <b>meas</b> to return to the service menu. Return to measurement: Press <b>meas</b> once more.</p>
	<p><b>Specify current at outputs 1 and 2:</b> Select OUT1 or OUT2 using the ◀ ▶ keys, confirm with <b>enter</b>. Enter a valid current value for the respective output using ▲ ▼ ◀ ▶ keys. Confirm with <b>enter</b>. For checking purposes, the actual output current is shown in the bottom right corner of the display. End with <b>enter</b> or <b>meas</b>.</p>

Menu item	Remark
	<p><b>IrDA communication:</b> Select IRDA using ◀ ▶, confirm with <b>enter</b>.</p>
	<p>When IrDA communication is active, the device remains in the HOLD mode for reasons of safety. Further operation is performed via IrDA.</p> <p>End communication with <b>meas</b>.</p> <p><b>Exception: Firmware update (must not be interrupted!)</b></p>
	<p><b>Assigning passcodes:</b> In the "SERVICE - CODES" menu you can assign passcodes to DIAG, HOLD, CAL, CONF, and SERVICE modes (Service preset to 5555).</p> <p><b>When you have lost the Service passcode</b>, 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.</p>
	<p><b>Reset to factory settings:</b> In the "SERVICE - DEFAULT" menu you can reset the device to factory settings. Not affected: calibration data</p>
	<p><b>Release of options:</b> Options come with a "transaction number" (TAN). This TAN must be entered and confirmed with <b>enter</b> to release the option.</p>

# Operating States

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Operating status	OUT 1	OUT 2	Time out
Measuring			-
DIAG			60 s
CAL			No
CONF			20 min
SERVICE			20 min
SERVICE OUT 1			20 min
SERVICE OUT 2			20 min
HOLD			No

Explanation:



as configured (Last/Fix or Last/Off)



active



manual

# Product Line and Accessories

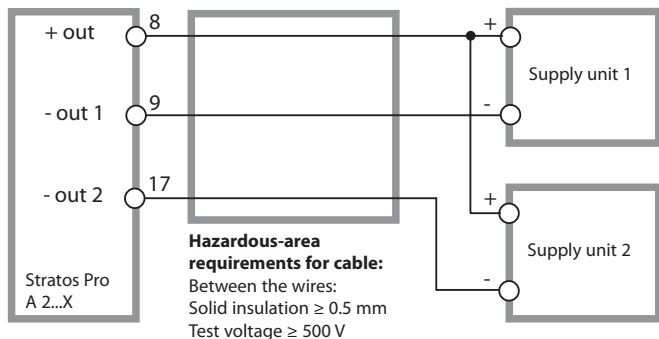
## Order Code Stratos Pro A 2...

		A	2	1	1	X	-	PH	-	1	TAN
<b>Example</b>		A	2	1	1	X	-	PH	-	1	
2-wire / 4-20 mA		A	2								B,C,E
<b>Communication</b>											
Without (HART retrofittable via TAN)				0							A
HART				1							
PROFIBUS PA				2							
Foundation Fieldbus FF				3							
<b>Version number</b>											
Version				1							
<b>Approvals</b>											
General Safety						N					
ATEX / IECEX Zone 2						B					
ATEX / IECEX / FM / CSA Zone 1 / CI 1 Div 1						X					
Other approvals						Z					
<b>Measuring channel</b>											
Memosens pH / Redox	digital							MSPH			
Memosens Cond	digital							MSCOND			
Memosens Oxy	digital							MSOXY			
Dual COND (2x2-electrode sensors, analog)					N			CC			
pH / ORP value (ISM digital per TAN)	Measuring module							PH			F
Cond, 2-/4-electrode	Measuring module							COND			
Conductivity, electrodeless	Measuring module							CONDI			
Oxygen (ISM digital and traces per TAN)	Measuring module							OXY			D, F
Carbon dioxide (ISM digital per TAN)	Measuring module							CO2			
<b>Options</b>											
Without 2nd current output										0	
With 2nd current output										1	
<b>TAN options</b>											
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)
<b>Mounting accessories</b>											
Pipe-mount kit								ZU 0274			
Protective hood								ZU 0737			
Panel-mount kit								ZU 0738			

# A201/A211X: Supply Units and Connection

Recommended Power Supply Units:	Order No.:
Repeater power supply, IS, 24 V AC/DC, output 0/4...20 mA	WG 20 A2
Repeater power supply, IS, 90...253 V AC, output 4...20 mA	WG 21 A7
Repeater power supply, IS, 90...253 V AC, HART, output 4...20 mA	WG 21 A7 Opt. 470
Repeater power supply, IS, 24 V AC/DC, output 4...20 mA	WG 21 A7 Opt. 336
Repeater power supply, IS, 24 V AC/DC, HART, output 4...20 mA	WG 21 A7 Opt. 336, 470
Repeater power supply, non-IS, 24 V DC, output 4...20 mA	IsoAmp PWR B 10116
Repeater power supply, non-IS, 24 V DC, HART, output 0/4...20 mA / 0...10 V	IsoAmp PWR A 20100

## Connection to Supply Units



# Specifications

<b>pH/mV input</b>	Input for pH or ORP sensors or ISFET		
	Input	Glass electrode or ISFET	
	Input	Reference electrode	
	Input	ORP electrode (e.g. platinum) or auxiliary electrode for impedance measurement	
Measuring range (MR)	-1500 ... +1500 mV		
Display range	pH value	-2.00 ... 16.00	
	ORP	-1999 ... +1999 mV	
Glass electrode input <sup>4)</sup>	Input resistance	$> 1 \times 10^{12} \Omega$	
	Input current	$< 1 \times 10^{-12} \text{ A}^{2)}$	
	Impedance range	0.5 ... 1000 M $\Omega$ ( $\pm 20\%$ )	
Reference electrode input <sup>4)</sup>	Input resistance	$> 1 \times 10^{10} \Omega$	
	Input current	$< 1 \times 10^{-10} \text{ A}^{2)}$	
	Impedance range	0.5 ... 200 k $\Omega$ ( $\pm 20\%$ )	
Meas. error <sup>1,2,3)</sup> (Display)	pH value	$< 0.02$	TC: 0.002 pH/K
	mV value	$< 1 \text{ mV}$	TC: 0.1 mV/K
<b>pH sensor standardization *</b>	pH calibration		
Operating modes	BUF	Calibration with Calimatic automatic buffer recognition	
	MAN	Manual calibration with input of individual buffer values	
	DAT	Data entry of pre-measured electrodes	
	Product calibration		
Calimatic buffer sets *	-00- Knick	2.00/4.01/7.00/9.21	
	-01- Mettler-Toledo	2.00/4.01/7.00/9.21	
	-02- Merck/Riedel	2.00/4.00/7.00/9.00/12.00	
	-03- Ciba (94)	2.06/4.00/7.00/10.00	
	-04- NIST technical	1.68/4.00/7.00/10.01/12.46	
	-05- NIST standard	1.679/4.006/6.865/9.180	
	-06- HACH	4.00/7.00/10.01	
	-07- WTW techn. buffers	2.00/4.01/7.00/10.00	
	-08- Hamilton	4.01/7.00/10.01	
	-09- Reagecon	2.00/4.00/7.00/9.00/12.00	
-U1-	Specifiable buffer set		

# Specifications

Zero adjustment	$\pm 200$ mV (for ISFET)
Max. calibration range	Asymmetry potential $\pm 60$ mV Slope 80 ... 103 % (47.5 ... 61 mV/pH) (possibly restricting notes from Sensoface)
<b>ORP sensor standardization*</b>	ORP calibration (zero adjustment)
Max. calibration range	-700 ... +700 $\Delta$ mV
<b>Adaptive cal timer*</b> (German patent DE 101 41 408)	Interval 0000 ... 9999 h
<b>Sensocheck</b>	Automatic monitoring of glass and reference electrode, can be disabled
Delay	Approx. 30 s
<b>Sensoface</b>	Provides information on the sensor condition, evaluation of zero/slope, response time, calibration interval, wear, Sensocheck, can be switched off
<b>Temperature input</b>	Pt100 / Pt1000 / NTC 30 k $\Omega$ * 2-wire connection, adjustable
Measuring range	Pt 100/Pt 1000 -20.0 ... +200.0 °C / -4 ... +392 °F NTC 30 k $\Omega$ -20.0 ... +150.0 °C / -4 ... +302 °F
Adjustment range	10 K
Resolution	0.1 °C / 1 °F
Meas. error <sup>1,2,3)</sup>	< 0.5 K (< 1K for Pt100; < 1K for NTC > 100 °C)
<b>Temperature compensation of process medium</b>	Linear -19.99 ... +19.99 %/K Reference temp 25 °C
<b>ISM input</b>	"One wire" interface for operation with ISM (digital sensors) (6 V / Ri= approx. 1.2 k $\Omega$ )
<b>I input</b>	Current input 0/4 ... 20 mA / 50 $\Omega$ for external temperature signal
Start/end of scale	Configurable within the measurement range for °C (°F)
Characteristic	Linear
Measurement error <sup>1,3)</sup>	< 1% current value + 0.1 mA

<b>HOLD input</b>	Galvanically separated (OPTO coupler)
Function	Switches device to HOLD mode
Switching voltage	0 ... 2 V (AC/DC)      Inactive
	10 ... 30 V (AC/DC)      HOLD active
<b>CONTROL input</b>	Galvanically separated (OPTO coupler)
Function	Selecting parameter set A/B
Switching voltage	0 ... 2 V (AC/DC)      Parameter set A
	10 ... 30 V (AC/DC)      Parameter set B
<b>Output 1</b>	Current loop 4 ... 20 mA, floating, protected against inverse polarity HART communication
Supply voltage	14 ... 30 V
Process variable*	pH, ORP, or temperature
Characteristic	Linear
Overrange*	22 mA in the case of error messages
Output filter*	PT, filter, time constant 0 ... 120 s
Measurement error <sup>1)</sup>	< 0.25 % current value + 0.025 mA
Start/end of scale*	Configurable within the measurement ranges for pH, mV, °C, °F
Min. span	pH 2.00 / 200 mV / 20 K / 36 °F
<b>Output 2</b>	Current loop 4 ... 20 mA, floating, protected against inverse polarity
Supply voltage	14 ... 30 V
Process variable*	pH, ORP, or temperature
Characteristic	Linear
Overrange*	22 mA in the case of error messages
Output filter*	PT, filter, time constant 0 ... 120 s
Measurement error <sup>1)</sup>	< 0.25 % current value + 0.05 mA
Start/end of scale*	Configurable within the measurement ranges for pH, mV, °C, °F
Min. span	pH 2.00 / 200 mV / 20 K / 36 °F

# Specifications

<b>Power output</b>	for operating an ISFET adapter +3 V / 0,5 mA -3 V / 0.5 mA
<b>Real-time clock</b>	Different time and date formats selectable
<b>Power reserve</b>	> 5 days
<b>Display</b>	LC display, 7-segment with icons
<b>Main display</b>	Character height approx. 22 mm, unit symbols approx. 14 mm
<b>Secondary display</b>	Character height approx. 10 mm
<b>Text line</b>	14 characters, 14 segments
<b>Sensoface</b>	3 status indicators (friendly, neutral, sad face)
<b>Mode indicators</b>	meas, cal, conf, diag Further icons for configuration and messages
<b>Alarm indication</b>	Red backlighting in case of alarm
<b>Keypad</b>	Keys: meas, info, 4 cursor keys, enter
<b>HART communication</b>	HART Version 6 Digital communication by FSK modulation of output current 1 Device identification, measured values, status and messages, parameter setting, calibration, records
<b>IrDA interface</b>	Infrared interface for transmission of records and logbook, parameter setting, calibration, firmware update
<b>FDA 21 CFR Part 11</b>	Access control by editable passcodes Logbook entry and flag via HART in the case of configuration changes Message and logbook entry when enclosure is opened
<b>Diagnostics Functions</b>	
<b>Calibration data</b>	Calibration date, zero, slope, response time
<b>Device self-test</b>	Displaytest, automatic memory test (RAM, FLASH, EEPROM), module test
<b>Logbook</b>	100 events with date and time
<b>Extended logbook (TAN)</b>	AuditTrail: 200 events with date and time

<b>Service functions</b>	
Sensor monitor	Display of direct sensor signals (mV/temperature/resistance ...)
Current source	Current specifiable for output 1 and 2 (00.00 ... 22.00 mA)
IrDA	Activating the IrDA function
Passcodes	Assigning passcodes for menu access
Factory setting	Resetting all parameters to factory setting Exception: Calibration data
TAN	Enabling optionally available additional functions
<b>Data retention</b>	Parameters, calibration data, logbook > 10 years (EEPROM)
<b>EMC</b>	EN 61326-1 (General Requirements)
Emitted interference	Class B (residential area)
Immunity to interference	Industry EN 61326-2-3 (Particular Requirements for Transmitters)
<b>Explosion protection</b> Stratos Pro A201X/A211X PH (coming soon)	Europe: ATEX Zone 0,1,2 USA: FM Cl I Div 1,2 / Zone 0,1,2 Canada: CSA Cl I Div 1,2 / Zone 0,1,2 International: IECEx
<b>Nominal operating conditions</b>	
Ambient temperature	-20 ... +65 °C
Transport/Storage temperature	-20 ... +70 °C
Relative humidity	10 ... 95% not condensing
Supply voltage	14 ... 30 V
<b>Enclosure</b>	Molded enclosure made of PBT/PC, glass reinforced
Fastening	Wall, pipe/post, or panel mounting
Color	Gray, RAL 7001
Ingress protection	IP 67
Flammability	UL 94 V-0

# Specifications

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Dimensions	148 mm x 148 mm
Control panel cutout	138 mm x 138 mm to DIN 43 700
Weight	1.2 kg (1.6 kg incl. accessories and packaging)
Cable glands	3 knockouts for M20 x 1.5 cable glands 2 knockouts for NPT ½" or rigid metallic conduit
Connections	Terminals, conductor cross section max. 2.5 mm <sup>2</sup>

\* User-defined

- 1) Acc. to EN 60746-1, at nominal operating conditions
- 2)  $\pm 1$  count
- 3) Plus sensor error
- 4) At room temperature

- 00- Knick technical buffers (correspond to
- 01- Mettler-Toledo technical buffers)

°C	pH			
0	2.03	4.01	7.12	9.52
5	2.02	4.01	7.09	9.45
10	2.01	4.00	7.06	9.38
15	2.00	4.00	7.04	9.32
20	2.00	4.00	7.02	9.26
<b>25</b>	<b>2.00</b>	<b>4.01</b>	<b>7.00</b>	<b>9.21</b>
30	1.99	4.01	6.99	9.16
35	1.99	4.02	6.98	9.11
40	1.98	4.03	6.97	9.06
45	1.98	4.04	6.97	9.03
50	1.98	4.06	6.97	8.99
55	1.98	4.08	6.98	8.96
60	1.98	4.10	6.98	8.93
65	1.99	4.13	6.99	8.90
70	1.99	4.16	7.00	8.88
75	2.00	4.19	7.02	8.85
80	2.00	4.22	7.04	8.83
85	2.00	4.26	7.06	8.81
90	2.00	4.30	7.09	8.79
95	2.00	4.35	7.12	8.77

## -02- Merck Titrisols, Riedel-de-Haen Fixanals

°C	pH				
0	2.01	4.05	7.13	9.24	12.58
5	2.01	4.04	7.07	9.16	12.41
10	2.01	4.02	7.05	9.11	12.26
15	2.00	4.01	7.02	9.05	12.10
<b>20</b>	<b>2.00</b>	<b>4.00</b>	<b>7.00</b>	<b>9.00</b>	<b>12.00</b>
25	2.00	4.01	6.98	8.95	11.88
30	2.00	4.01	6.98	8.91	11.72
35	2.00	4.01	6.96	8.88	11.67
40	2.00	4.01	6.95	8.85	11.54
45	2.00	4.01	6.95	8.82	11.44
50	2.00	4.00	6.95	8.79	11.33
55	2.00	4.00	6.95	8.76	11.19
60	2.00	4.00	6.96	8.73	11.04
65	2.00	4.00	6.96	8.72	10.97
70	2.01	4.00	6.96	8.70	10.90
75	2.01	4.00	6.96	8.68	10.80
80	2.01	4.00	6.97	8.66	10.70
85	2.01	4.00	6.98	8.65	10.59
90	2.01	4.00	7.00	8.64	10.48
95	2.01	4.00	7.02	8.64	10.37

**-03-** Ciba (94) buffers

Nominal values: 2.06 4.00 7.00 10.00

°C	pH			
0	2.04	4.00	7.10	10.30
5	2.09	4.02	7.08	10.21
10	2.07	4.00	7.05	10.14
15	2.08	4.00	7.02	10.06
20	2.09	4.01	6.98	9.99
25	2.08	4.02	6.98	9.95
30	2.06	4.00	6.96	9.89
35	2.06	4.01	6.95	9.85
40	2.07	4.02	6.94	9.81
45	2.06	4.03	6.93	9.77
50	2.06	4.04	6.93	9.73
55	2.05	4.05	6.91	9.68
60	2.08	4.10	6.93	9.66
65	2.07*	4.10*	6.92*	9.61*
70	2.07	4.11	6.92	9.57
75	2.04*	4.13*	6.92*	9.54*
80	2.02	4.15	6.93	9.52
85	2.03*	4.17*	6.95*	9.47*
90	2.04	4.20	6.97	9.43
95	2.05*	4.22*	6.99*	9.38*

\* extrapolated

## Buffer Tables

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### -04- NIST technical buffers

°C	pH				
0	1.67	4.00	7.115	10.32	13.42
5	1.67	4.00	7.085	10.25	13.21
10	1.67	4.00	7.06	10.18	13.01
15	1.67	4.00	7.04	10.12	12.80
20	1.675	4.00	7.015	10.06	12.64
<b>25</b>	<b>1.68</b>	<b>4.005</b>	<b>7.00</b>	<b>10.01</b>	<b>12.46</b>
30	1.68	4.015	6.985	9.97	12.30
35	1.69	4.025	6.98	9.93	12.13
40	1.69	4.03	6.975	9.89	11.99
45	1.70	4.045	6.975	9.86	11.84
50	1.705	4.06	6.97	9.83	11.71
55	1.715	4.075	6.97	9.83*	11.57
60	1.72	4.085	6.97	9.83*	11.45
65	1.73	4.10	6.98	9.83*	11.45*
70	1.74	4.13	6.99	9.83*	11.45*
75	1.75	4.14	7.01	9.83*	11.45*
80	1.765	4.16	7.03	9.83*	11.45*
85	1.78	4.18	7.05	9.83*	11.45*
90	1.79	4.21	7.08	9.83*	11.45*
95	1.805	4.23	7.11	9.83*	11.45*

\* Values complemented

-05- NIST standard buffers  
NIST Standard (DIN 19266 : 2000-01)

°C	pH			
0				
5	1.668	4.004	6.950	9.392
10	1.670	4.001	6.922	9.331
15	1.672	4.001	6.900	9.277
20	1.676	4.003	6.880	9.228
<b>25</b>	<b>1.680</b>	<b>4.008</b>	<b>6.865</b>	<b>9.184</b>
30	1.685	4.015	6.853	9.144
37	1.694	4.028	6.841	9.095
40	1.697	4.036	6.837	9.076
45	1.704	4.049	6.834	9.046
50	1.712	4.064	6.833	9.018
55	1.715	4.075	6.834	9.985
60	1.723	4.091	6.836	8.962
70	1.743	4.126	6.845	8.921
80	1.766	4.164	6.859	8.885
90	1.792	4.205	6.877	8.850
95	1.806	4.227	6.886	8.833

**Please note:**

The actual pH values of the individual batches of the reference materials are documented in a certificate of an accredited laboratory. This certificate is supplied with the respective buffers. Only these pH(S) values shall be used as standard values for the secondary reference buffer materials. Correspondingly, this standard does not include a table with standard pH values for practical use. The table above only provides examples of pH(PS) values for orientation.

## Buffer Tables

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### -06- HACH buffers

Nominal values: 4.01 7.000 10.01 ( $\pm 0.02$  at 25 °C)

°C	pH		
0	4.00	7.118	10.30
5	4.00	7.087	10.23
10	4.00	7.059	10.17
15	4.00	7.036	10.11
20	4.00	7.016	10.05
25	4.01	7.000	10.01
30	4.01	6.987	9.96
35	4.02	6.977	9.92
40	4.03	6.970	9.88
45	4.05	6.965	9.85
50	4.06	6.964	9.82
55	4.07	6.965	9.79
60	4.09	6.968	9.76
65	4.10*	6.98*	9.71*
70	4.12*	7.00*	9.66*
75	4.14*	7.02*	9.63*
80	4.16*	7.04*	9.59*
85	4.18*	7.06*	9.56*
90	4.21*	7.09*	9.52*
95	4.24*	7.12*	9.48*

\* Values complemented

## -07- WTW technical buffers

°C	pH			
0	2.03	4.01	7.12	10.65
5	2.02	4.01	7.09	10.52
10	2.01	4.00	7.06	10.39
15	2.00	4.00	7.04	10.26
20	2.00	4.00	7.02	10.13
<b>25</b>	<b>2.00</b>	<b>4.01</b>	<b>7.00</b>	<b>10.00</b>
30	1.99	4.01	6.99	9.87
35	1.99	4.02	6.98	9.74
40	1.98	4.03	6.97	9.61
45	1.98	4.04	6.97	9.48
50	1.98	4.06	6.97	9.35
55	1.98	4.08	6.98	
60	1.98	4.10	6.98	
65	1.99	4.13	6.99	
70	2.00	4.16	7.00	
75	2.00	4.19	7.02	
80	2.00	4.22	7.04	
85	2.00	4.26	7.06	
90	2.00	4.30	7.09	
95	2.00	4.35	7.12	

## Buffer Tables

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### -08- Hamilton Duracal buffers

°C	pH		
0	4.01	7.12	10.23
5	4.01	7.09	10.19
10	4.00	7.06	10.15
15	4.00	7.04	10.11
20	4.00	7.02	10.06
<b>25</b>	<b>4.01</b>	<b>7.00</b>	<b>10.01</b>
30	4.01	6.99	9.97
35	4.02	6.98	9.92
40	4.03	6.97	9.86
45	4.04	6.97	9.83
50	4.05	6.97	9.79
55	4.06	6.98	9.75
60	4.08	6.98	9.72
65	4.10*	6.99*	9.69*
70	4.12*	7.00*	9.66*
75	4.14*	7.02*	9.59*
80	4.16*	7.04*	9.59*
85	4.18*	7.06*	9.56*
90	4.21*	7.09*	9.52*
95	4.24*	7.12*	9.48*

\* Values complemented

## -09- Reagecon buffers

°C	pH				
0°C	*2.01	*4.01	*7.07	*9.18	*12.54
5°C	*2.01	*4.01	*7.07	*9.18	*12.54
10°C	2.01	4.00	7.07	9.18	12.54
15°C	2.01	4.00	7.04	9.12	12.36
20°C	2.01	4.00	7.02	9.06	12.17
<b>25°C</b>	<b>2.00</b>	<b>4.00</b>	<b>7.00</b>	<b>9.00</b>	<b>12.00</b>
30°C	1.99	4.01	6.99	8.95	11.81
35°C	2.00	4.02	6.98	8.90	11.63
40°C	2.01	4.03	6.97	8.86	11.47
45°C	2.01	4.04	6.97	8.83	11.39
50°C	2.00	4.05	6.96	8.79	11.30
55°C	2.00	4.07	6.96	8.77	11.13
60°C	2.00	4.08	6.96	8.74	10.95
65°C	*2.00	*4.10	*6.99	*8.70	*10.95
70°C	*2.00	*4.12	*7.00	*8.67	*10.95
75°C	*2.00	*4.14	*7.02	*8.64	*10.95
80°C	*2.00	*4.16	*7.04	*8.62	*10.95
85°C	*2.00	*4.18	*7.06	*8.60	*10.95
90°C	*2.00	*4.21	*7.09	*8.58	*10.95
95°C	*2.00	*4.24	*7.12	*8.56	*10.95

\* Values complemented

## **-U1- Specifiable Buffer Set**

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You can specify a buffer set with 2 buffer solutions in the temperature range of 0 ... 95 °C, step width: 5 °C.

To do so, select buffer set -U1- in the configuration menu.

As delivered, the Ingold technical buffer solutions pH 4.01 / 7.00 are stored as buffer set and can be edited.






### **Conditions for the specifiable buffer set:**

- All values must lie in the range pH 0 ... 14
- Maximum difference between two adjacent pH values (5 °C step width) of the same buffer solution: pH 0.25
- The values of buffer solution 1 must be lower than those of buffer solution 2:  
The difference between values for identical temperatures must be greater than 2 pH units.

Faulty entries are indicated in measuring mode by the "FAIL BUFFERSET -U1-" message.

The 25 °C value is always used for buffer display during calibration.

## -U1- Specifiable Buffer Set

Step	Action/Display	Remark
Select buffer set -U1- (CONFIG / SNS menu)		
Select buffer solution 1 for editing	 <p data-bbox="397 518 643 579">Select "YES" using up/down key.</p>	You are prompted for confirmation to prevent accidental changes of the settings.
Editing the values of buffer solution 1	 <p data-bbox="397 757 681 873">Edit using arrow keys, press <b>enter</b> to confirm and proceed to next temperature value.</p> 	Enter the values for the first buffer solution in 5°C steps. The difference to the next value must not exceed 0.25 pH unit.
Select buffer solution 2 for editing		The difference between buffer solutions for identical temperatures must be greater than 2 pH units.

## -U1- Specifiable Buffer Set


---

### Buffer Set U1:

Fill in your configuration data or use the table as original for copy.

Temperature (°C)	Buffer 1	Buffer 2
5		
10		
15		
20		
25		
30		
35		
40		
45		
50		
55		
60		
65		
70		
75		
80		
85		
90		
95		

## Alarm condition:

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

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

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

## Parameter errors:

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

If they are out of range,

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

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

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

## Calibration errors:

If errors occur during calibration, e.g. by using a wrong calibration solution,

- an error message will be displayed
- calibration will be restarted

## Sensoface:

If the Sensoface becomes sad,

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

# Error Messages

<b>Error</b>	<b>Info text</b> (is displayed in case of fault when the Info key is pressed)	<b>Problem</b> <b>Possible causes</b>
<b>ERR 99</b>	DEVICE FAILURE	<b>Error in factory settings</b> 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.
<b>ERR 98</b>	CONFIGURATION ERROR	<b>Error in configuration or calibration data</b> Configuration or calibration data defective Reset device to factory settings (SERVICE/DEFAULT), then calibrate
<b>ERR 97</b>	NO MODULE INSTALLED	<b>No module</b> (Not for digital devices) Please have the module installed in the factory.
<b>ERR 96</b>	WRONG MODULE	<b>Wrong module</b> Please have the module replaced in the factory.
<b>ERR 95</b>	SYSTEM ERROR	<b>System error</b> Restart required. If error still persists, send in the device for repair.
<b>ERR 01</b>	NO SENSOR	<b>pH sensor *</b> Sensor defective Sensor not connected Break in sensor cable
<b>ERR 02</b>	WRONG SENSOR	<b>Wrong sensor *</b>
<b>ERR 03</b>	CANCELED SENSOR	<b>Sensor devaluated *</b>

Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
<b>ERR 04</b>	SENSOR FAILURE	<b>Failure in sensor *</b>
<b>ERR 05</b>	CAL DATA	<b>Error in cal data *</b>
<b>ERR 10</b>	ORP RANGE	<b>ORP display range violation</b> < -1999 mV or > 1999 mV
<b>ERR 11</b>	PH RANGE	<b>pH display range violation</b> < -2 or > 16
<b>ERR 12</b>	MV RANGE	<b>mV range</b>
<b>ERR 13</b>	TEMPERATURE RANGE	<b>Temperature range violation</b>
<b>ERR 15</b>	SENSOCHECK GLASS-EL	<b>Sensocheck glass</b>
<b>ERR 16</b>	SENSOCHECK REF-EL	<b>Sensocheck ref.</b>
<b>ERR 60</b>	OUTPUT LOAD	<b>Load error</b>
<b>ERR 61</b>	OUTPUT 1 TOO LOW	<b>Output current 1</b> < 3.8 mA
<b>ERR 62</b>	OUTPUT 1 TOO HIGH	<b>Output current 1</b> > 20.5 mA
<b>ERR 63</b>	OUTPUT 2 TOO LOW	<b>Output current 2</b> < 3.8 mA
<b>ERR 64</b>	OUTPUT 2 TOO HIGH	<b>Output current 2</b> > 20.5 mA
<b>ERR 69</b>	TEMP. OUTSIDE TABLE	<b>Temperature</b> value outside table
<b>ERR 100</b>	INVALID SPAN OUT1	<b>Configuration error</b> Output range 1
<b>ERR 101</b>	INVALID SPAN OUT2	<b>Configuration error</b> Output range 2

## Error Messages

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<b>Error</b>	<b>Info text</b> (is displayed in case of fault when the Info key is pressed)	<b>Problem</b> <b>Possible causes</b>
<b>ERR 102</b>	FAILURE BUFFERSET -U1-	<b>Configuration error</b> Specifiable buffer set U1
<b>ERR 104</b>	INVALID PARAMETER CONTROLLER	<b>Configuration error</b> Controller
<b>ERR 105</b>	INVALID SPAN I-INPUT	<b>Configuration error</b> Current input
<b>ERR 106</b> <b>...255</b>	VOID PARAMETER	<b>Invalid parameter</b>

\*) Digital sensors (ISM, InduCon, Memosens)

(Sensochek must have been activated during configuration.)

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

## **Sensochek**

Continuously monitors the sensor and its wiring.

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



The Sensochek message is also output as error message Err 15 (glass electrode) or Err 16 (reference electrode – for digital transmitters, however only with InduCon sensors with SG). The alarm contact is active, the display backlighting turns red, output current 1 is set to 22 mA (when configured correspondingly).












Sensochek can be switched off during configuration (then Sensoface is also disabled).




### **Exception:**

After a calibration a smiley is always displayed for confirmation.



### **Please note:**


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

Display	Problem	Status
	Asymmetry potential and slope	 Asymmetry potential (zero) and slope of the sensor are still okay. The sensor should be replaced soon.
		 Asymmetry potential and slope of the sensor have reached values which no longer ensure proper calibration. Replace sensor.
	Calibration timer	 Over 80% of the calibration interval has already past.
		 The calibration interval has been exceeded.
	Sensor defect	 Check the sensor and its connections (see also Error Messages Err 15 and Err 16).
	Response time	 Sensor response time has increased. The sensor should be replaced soon. To achieve an improvement, clean the sensor and soak it in buffer.
		 Sensor response time significantly increased (> 72 s, calibration aborted after 120 s) Replace sensor.

Display	Problem	Status
	Sensor wear (for digital sensors only)	<p data-bbox="456 171 948 336">  High temperatures and pH values have caused a wear of over 80%. The sensor should be replaced soon.           </p> <p data-bbox="456 380 948 438">  Wear is at 100%. Replace sensor.           </p>

# EC Declaration of Conformity

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<b>EG-Konformitätserklärung EC Declaration of Conformity Déclaration de Conformité CE</b>		
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	 ppa. Wolfgang Feucht (Vice President Engineering, R&D)	 ppa. Bernhard Kusig (Vice President Marketing/Sales)

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Niederspannungs-Richtlinie / Low-voltage directive / Directive basse tension	<b>2006/95/EG</b>	Jahr der Anbringung der CE-Kennzeichnung / 2008 Year in which the CE marking was affixed / L'année d'apposition du marquage CE
Harmonisierte Normen / Harmonised Standards / Normes harmonisées	<b>DIN EN 61010-1 / VDE 0411 Teil 1: 2002-08</b>	
EMV-Richtlinie / EMC directive / Directive CEM	<b>2004/108/EG</b>	
Norm / Standard / Norme	<b>DIN EN 61326-1 / VDE 0843 Teil 20-1: 2006-10</b> <b>DIN EN 61326-2-3 / VDE 0843 Teil 20-2-3: 2007-05</b>	
*) Die Sicherheitsanweise der mitgelieferten Produktdokumentation sind zu beachten. Bei einer mit dem Hersteller nicht abgestimmten Änderung des Gerätes und/oder bei Nichtbeachtung der Sicherheitsanweise verliert diese Erklärung ihre Gültigkeit. The safety instructions contained in the documentation accompanying the product have to be observed. If the apparatus is modified without having obtained manufacturer's prior consent and/or the safety instructions are not followed, this declaration becomes void. Il est impératif de respecter les instructions de sécurité dans la documentation fournie avec le produit. En cas de modification de l'appareil sans l'accord du fabricant et/ou en cas de non-respect des instructions de sécurité, cette déclaration perd sa vigueur.		
Ausstellungsort, -datum / Place and date of issue / Lieu et date d'émission	<b>Berlin, 24.07.2008</b>	
	<b>Knick Elektronische Messgeräte GmbH &amp; Co. KG</b>	
	 ppa. Wolfgang Feucht (Vice President Engineering, R&D)	 ppa. Bernhard Kusig (Vice President Marketing/Sales)









# FDA 21 CFR Part 11

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## **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 US 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 the M420 Series meet the demands of FDA 21 CFR Part 11:

### **Electronic Signature – Passcodes**

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

### **Audit Trail**

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

### **Extended logbook**

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

<b>Asymmetry potential</b>	The voltage which a pH sensor provides at a pH of 7. The asymmetry potential is different for each sensor and changes with age and wear.
<b>Buffer set</b>	Contains selected buffer solutions which can be used for automatic calibration (Calimatic). The buffer set must be selected prior to the first calibration.
<b>Buffer solution</b>	Solution with an exactly defined pH value for calibrating a pH meter.
<b>Calibration</b>	Adjustment of the pH meter to the current sensor characteristics. The asymmetry potential and slope are adjusted. Either a one- or two-point calibration can be carried out. With one-point calibration only the asymmetry potential (zero point) is adjusted.
<b>Calimatic</b>	Automatic buffer recognition. Before the first calibration, the buffer set used must be activated once. The patented Calimatic then automatically recognizes the buffer solutions used during calibration.

## Glossary

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<b>CIP</b>	Cleaning In Place – CIP cycles are used for cleaning the process-wetted parts in the process. They are performed for biotech applications, for example. Depending on the application, one or more chemicals are used at temperatures above 70 °C. This extremely stresses the sensors. Digital sensors can release a message after preset number of CIP cycles. This allows replacing the sensor in time.
<b>Combination electrode</b>	Combination of glass and reference electrode in one body.
<b>GainCheck</b>	Device self-test which runs automatically in the background at fixed intervals. The memory and measured-value transfer are checked. You can also start GainCheck manually in the diagnostics menu. In that case, also a display test will be performed.
<b>ISFET adapter</b>	Adapter between ISFET sensor and transmitter. Here, the signal of the pH-sensitive FET is converted to voltage corresponding to the signal of a glass electrode. This voltage is led to the pH input of the device and is processed further as usual. The adapter is directly supplied from the device.

<b>ISM®</b>	Intelligent Sensor Management – ISM® sensors have an “electronic datasheet” which allows the storage of additional operating parameters such as calibration date and settings directly in the sensor.
<b>One-point calibration</b>	Calibration with which only the asymmetry potential (zero point) is taken into account. The previous slope value is maintained. Only one buffer solution is required for a one-point calibration.
<b>Passcode</b>	User-defined four-digit number to select certain operating modes.
<b>pH sensor</b>	A pH sensor consists of a glass and a reference electrode. If they are combined in one body, they are referred to as combination electrode. When the sensor has an additional platinum electrode, the oxidation-reduction potential (ORP) can be measured simultaneously with the pH.
<b>Response time</b>	Time from the start of a calibration step to the stabilization of the sensor potential.
<b>Sensocheck</b>	Sensocheck continuously monitors the glass and reference electrodes. The resulting information is indicated by the Sensoface smileys. Sensocheck can be switched off.

<b>Sensoface</b>	Provides information on the sensor condition. The zero point, slope, and response time are evaluated. In addition, the Sensocheck information is indicated.
<b>SIP</b>	Sterilization In Place – CIP cycles are used for sterilizing the process-wetted parts in the process. They are performed for biotech applications, for example. Depending on the application, one or more chemicals are used at temperatures above 115 °C. This extremely stresses the sensors. Digital sensors can release a message after preset number of SIP cycles. This allows replacing the sensor in time.
<b>Slope</b>	Is indicated in % of the theoretical slope (59.2 mV/pH at 25 °C). The sensor slope is different for each sensor and changes with age and wear.
<b>TAN</b>	Transaction number for releasing an additional function.
<b>Two-point calibration</b>	Calibration with which the asymmetry potential (zero point) and slope are determined. Two buffer solutions are required for two-point calibration.
<b>Zero adjustment</b>	Basic adjustment of the ISFET sensor to ensure reliable Sensoface information.
<b>Zero point</b>	See asymmetry potential

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## Trademarks

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The following names are registered trademarks. For practical reasons they are shown without trademark symbol in this manual.

Stratos®

Sensocheck®

Sensoface®

Calimatic®

GainCheck®

InPro® is a registered trademark of Mettler-Toledo.

Memosens® is a registered trademark of Endress+Hauser Conducta GmbH and Knick Elektronische Meßgeräte GmbH & Co. KG.

HART® is a registered trademark of the HART Communication Foundation.

# Passcodes

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

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

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## Knick Elektronische Messgeräte GmbH & Co. KG

P.O. Box 37 04 15  
D-14134 Berlin

Tel: +49 (0)30 - 801 91 - 0  
Fax: +49 (0)30 - 801 91 - 200  
Internet: <http://www.knick.de>  
[knick@knick.de](mailto:knick@knick.de)

