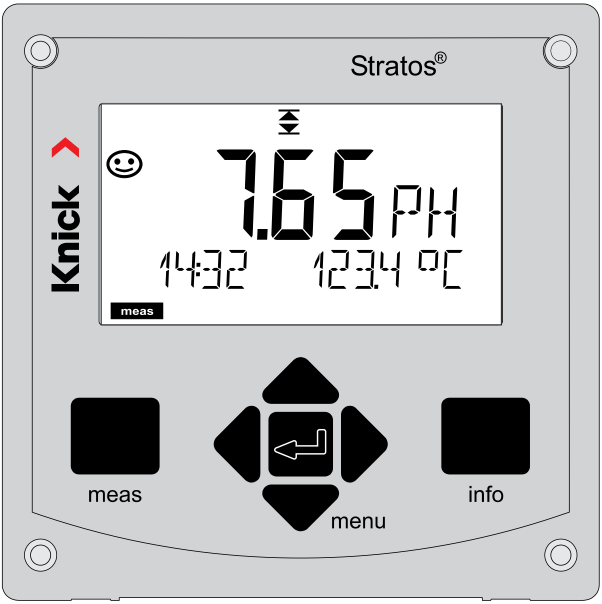
Knick

User Manual

PROFIBUS DP/PA
Stratos® Evo A451N
Stratos® Pro A221(N/X)



Read before installation.
Keep for future use.

www.knick.de

Read this document and retain it for future reference. Before assembling, installing, operating, or maintaining the product, ensure that you fully understand the instructions and risks. Observe all safety instructions. Failure to follow the instructions in this document may result in serious injury and/or property damage.
This document is subject to change without notice.
These supplemental directives explain how safety information is laid out in this document and what content it covers.

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

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

Warnings
This document uses the following warnings to indicate hazardous situations:

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

Related Documents
Stratos Safety Guide

Table of Contents

Safety Guide

In official EU languages and others

Test Report 2.2 According to EN 10204

Electronic Documentation on www.knick-international.com:

Manuals + software

Ex devices:

Control Drawings and Ex Certificates

EU Declarations of Conformity

Intended Use of Stratos Pro A221(N/X)

Stratos Pro A221(N/X) is a 2-wire analyzer with digital communication via PROFIBUS PA. The analyzer has an input for digital Memosens sensors. Interchangeable measuring modules enable operation with analog sensors. Power is supplied via the PROFIBUS.
The **Stratos Pro A221X** is suitable for use in hazardous locations. When installing the device in a hazardous location, observe the specifications given in the accompanying control drawings.

The defined rated operating conditions must be observed when using this product. They can be found in the Specifications chapter of this User Manual; see page 296.

The sturdy molded enclosure can be fixed into a control panel or mounted on a wall or at a post. The protective hood is optionally available to provide additional protection against direct weather exposure and mechanical damage.

You can select one of the following measuring functions:
- pH value
- ORP
- Conductivity, 2-/4-electrode sensors
- Conductivity, toroidal sensors
- Oxygen

Possible fields of application are:
- Biotechnology
- Chemical industry
- Pharmaceutical industry
- Environmental engineering
- Food technology
- Power station engineering
- Water/wastewater

Intended Use of Stratos Evo A451N

Stratos Evo A451N is a 4-wire analyzer with digital communication via PROFIBUS DP. The analyzer has an input for digital Memosens sensors. Interchangeable measuring modules enable operation with analog sensors. Current is provided through a universal power supply 80 … 230 V AC, 45 … 65 Hz / 24 … 60 V DC.
Two bus-controlled, floating relay contacts are available at the output for free configuration. The analyzer also provides power supply and allows signal processing for additional transmitters, e.g., for flow monitoring.

The defined rated operating conditions must be observed when using this product. They can be found in the Specifications chapter of this User Manual; see page 297.

The sturdy molded enclosure can be fixed into a control panel or mounted on a wall or at a post. The protective hood is optionally available to provide additional protection against direct weather exposure and mechanical damage.

You can select one of the following measuring functions:
- pH value
- ORP
- Conductivity, 2-/4-electrode sensors
- Conductivity, toroidal sensors
- Oxygen
- Oxygen, optical

Possible fields of application are:
- Biotechnology
- Chemical industry
- Pharmaceutical industry
- Environmental engineering
- Food technology
- Power station engineering
- Water/wastewater

Always Read and Observe the Safety Instructions!

The device is constructed in accordance with the latest technology and generally accepted safety rules and regulations.

Under certain circumstances, however, usage may pose risks to users or cause damage to the device.

Commissioning must be carried out by specialist personnel authorized by the operating company. If safe operation is not possible, the device must not be switched on or, if it is already on, must be switched off properly and secured against unintended operation.

Reasons to assume safe operation is not possible:

- the device shows visible damage
- failure to perform the intended function
- prolonged storage at temperature of below -30 °C/-22 °F or above 70 °C/158 °F
- severe transport stresses

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

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

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

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

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

Color-coded user interface
The colored display backlighting signals different operating states (eg, alarm: red).

Diagnostic functions
Diagnostic functions are provided by the "Sensocheck" automatic monitoring of glass and reference electrode and the "Sensoface" function for clear indication of the sensor condition.

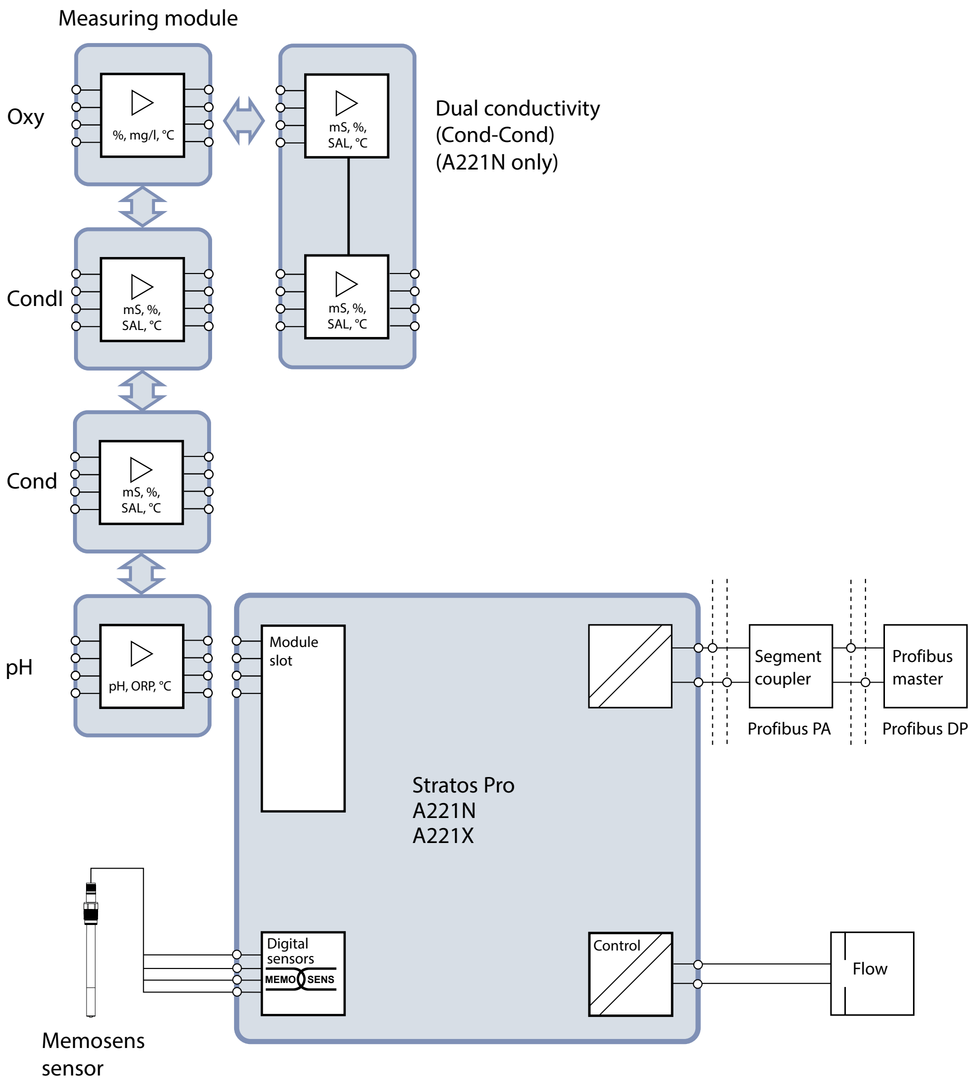
Data logger
The logbook (Audit Trail) can handle up to 100 entries.

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

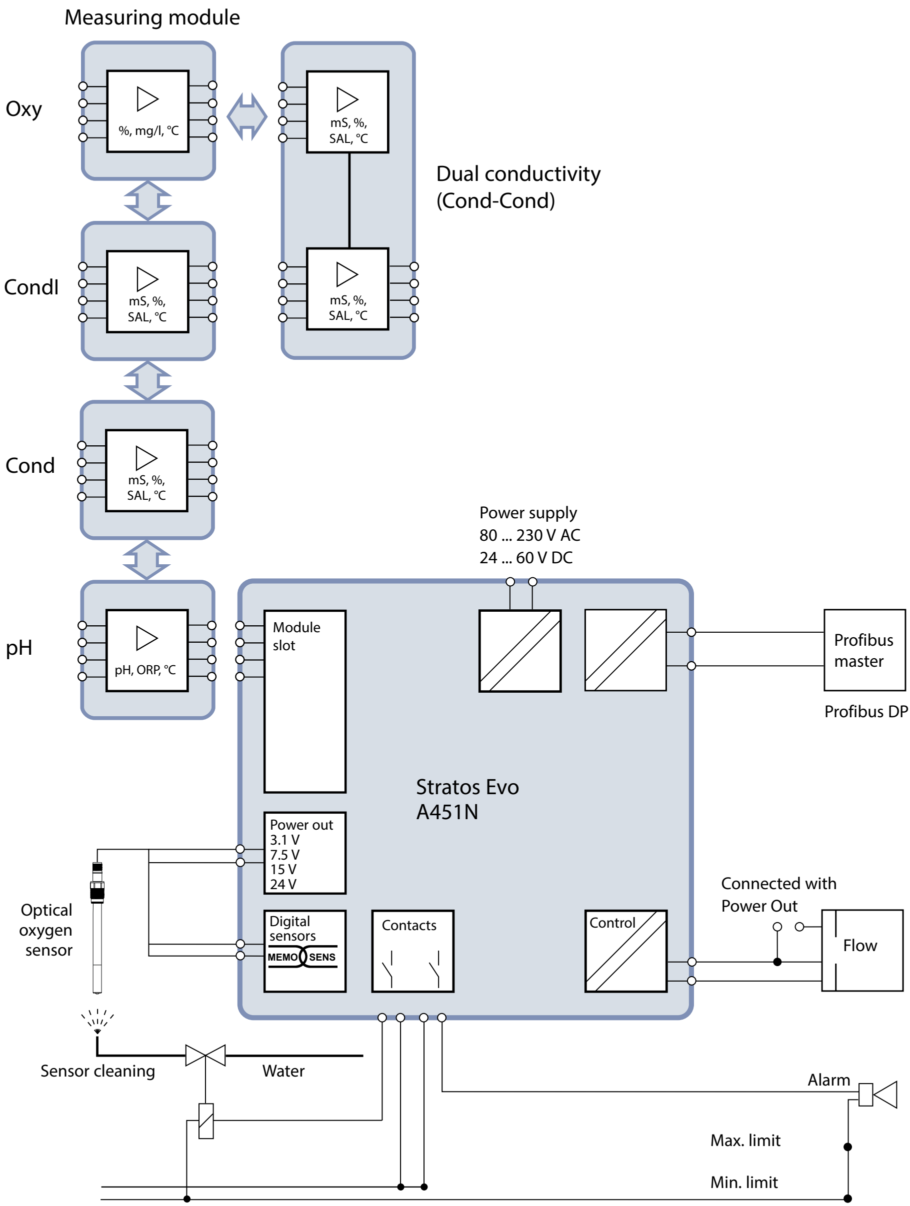
Automatic calibration with Calimatic
You can choose from the most commonly used pH buffer solutions.
In addition, you can enter an individual pH buffer set.

Door contact
When the enclosure is opened, a reed contacts opens, which automatically generates a logbook entry.

Control
Input for flow monitoring (floating, digital control input).



Measuring module
Oxy
%, mg/l, °C
Dual conductivity
(Cond-Cond)
(A221N only)
mS, %,
SAL, °C
mS, %,
SAL, °C
CondI
mS, %,
SAL, °C
Cond
mS, %,
SAL, °C
pH
pH, ORP, °C
Module
slot
Segment
coupler
Profibus
master
Profibus PA
Profibus DP
Stratos Pro
A221N
A221X
Digital
sensors
MEMO SENS
Control
Flow
Memosens
sensor



Measuring module
Oxy
%, mg/l, °C
mS, %, SAL, °C
Dual conductivity (Cond-Cond)
CondI
mS, %, SAL, °C
mS, %, SAL, °C
Cond
mS, %, SAL, °C
pH
pH, ORP, °C
Power supply
80 ... 230 V AC
24 ... 60 V DC
Module slot
Profibus master
Profibus DP
Stratos Evo A451N
Power out
3.1 V
7.5 V
15 V
24 V
Optical oxygen sensor
Digital sensors
MEMO SENS
Contacts
Control
Connected with Power Out
Flow
Sensor cleaning
Water
Alarm
Max. limit
Min. limit

Package Contents

Check the shipment for transport damage and completeness.

The package should contain:

Front unit, rear unit, bag containing small parts
Specific test report
Documentation

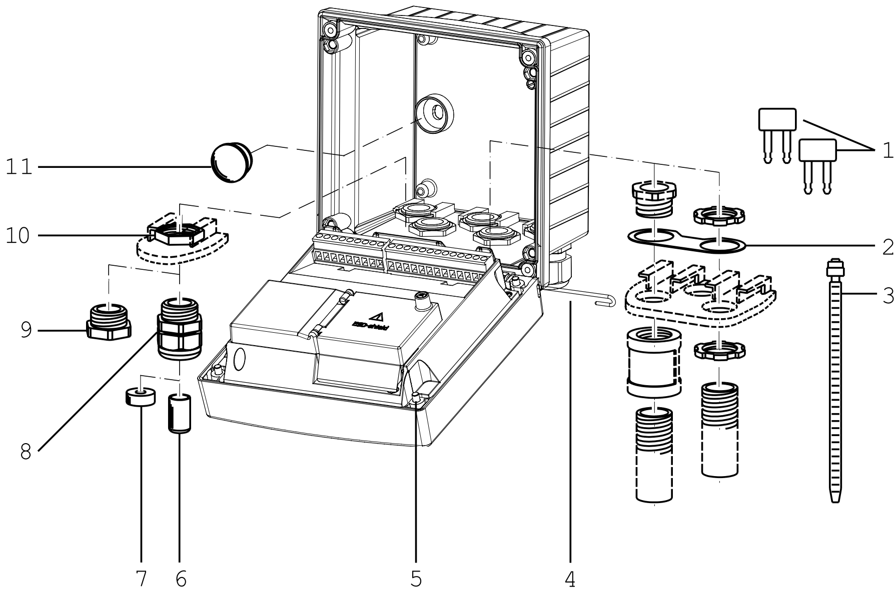
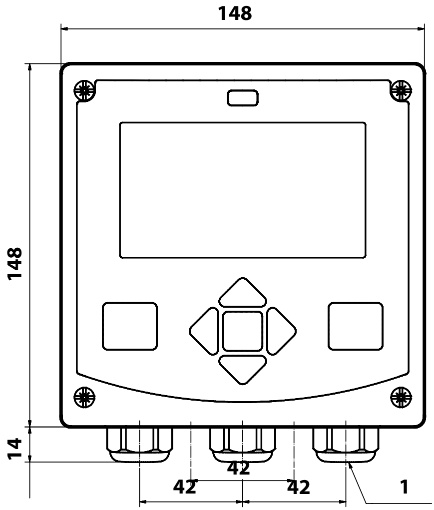
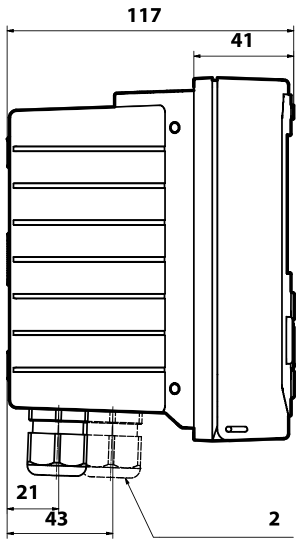


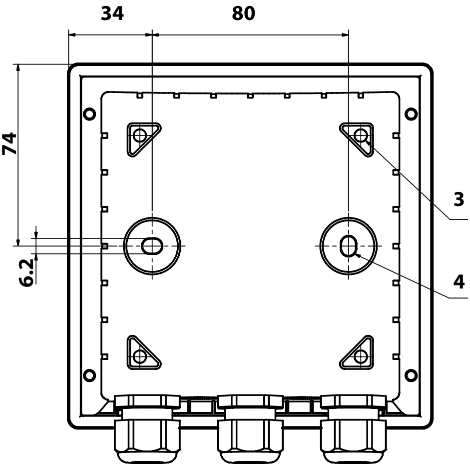
Fig.: Assembling the enclosure

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

Mounting Plan, Dimensions





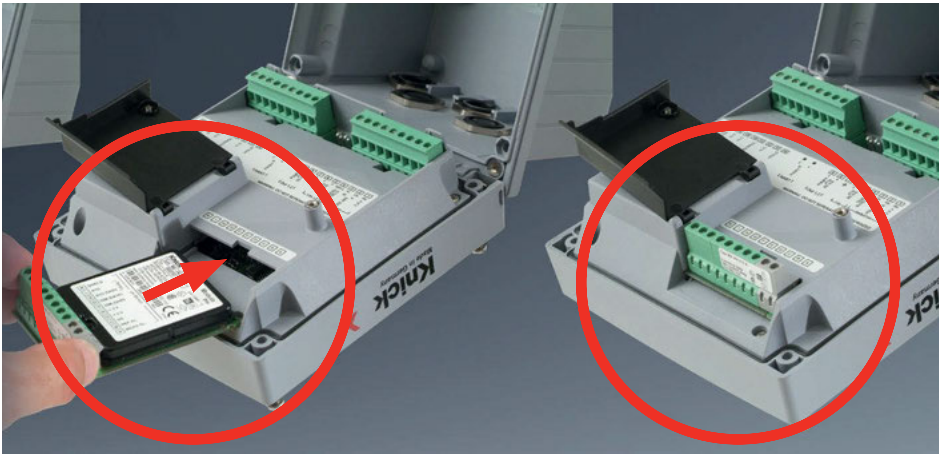


1) Cable gland (3 x)
2) Knockouts for cable gland or ½“ conduit, ø 21.5 mm (2 knockouts). Conduit couplings not included!
3) Knockout for pipe mounting (4 x)
4) Knockout for wall mounting (2 x)

All dimensions in mm

Mounting Accessories

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

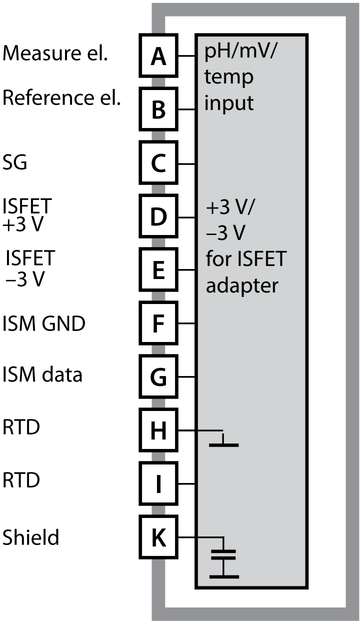


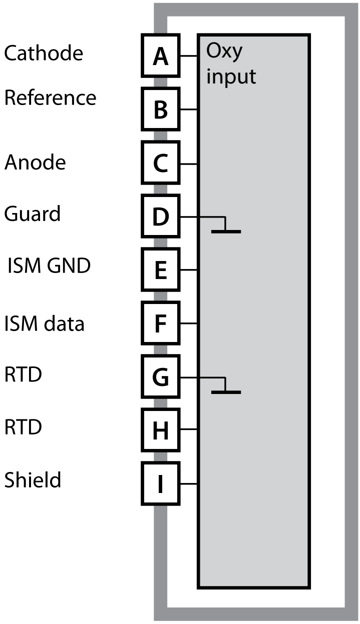
Measuring modules for connection of analog sensors:
pH, oxygen (Oxy), conductivity (Cond, CondI, Cond-Cond)

Measuring modules for the connection of analog sensors are simply inserted into the module slot.

Changing the Measuring Function

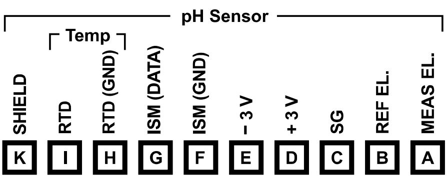
When you replace the measuring module, you must select the corresponding measuring function in the “Service” menu.

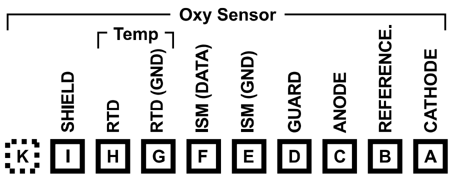




Module for pH measurement
Order code MK-PH015N / MK-PH015X
For wiring examples, see page 262.

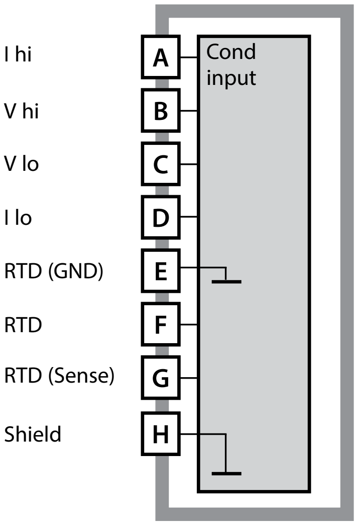
Module for oxygen measurement
Order code MK-OXY046N / MK-OXY045X
For wiring examples, see page 270.



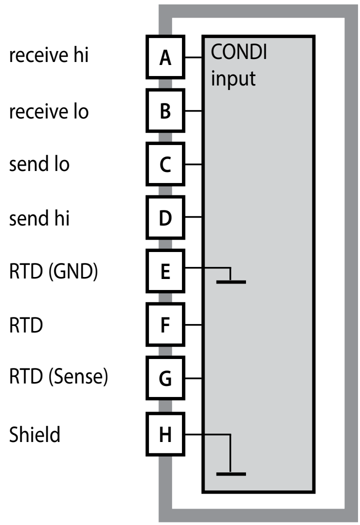


Terminal plate of pH module
The terminals are suitable for single or stranded wires up to 2.5 mm^2 (AWG 14).

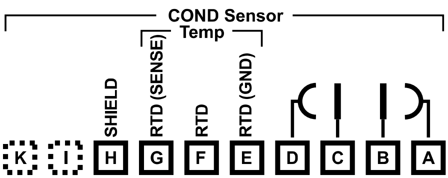
Terminal plate of oxygen module
The terminals are suitable for single or stranded wires up to 2.5 mm^2 (AWG 14).



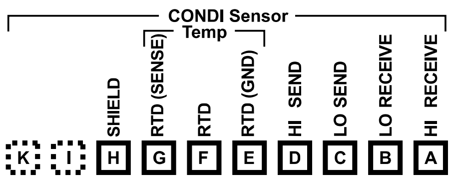
Module for contacting conductivity measurement (COND)
Order code MK-COND025N / MK-COND025X
For wiring examples, see page 275.



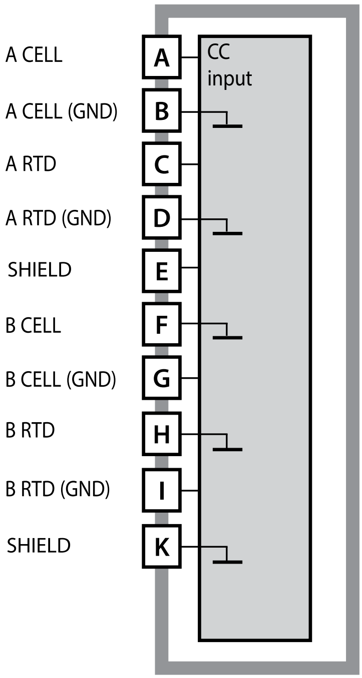
Module for inductive conductivity measurement (CONDI)
Order code MK-CONDI035N / MK-CONDI035X
For wiring examples, see page 283.



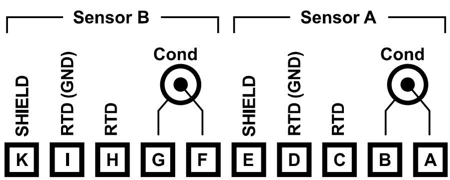
Terminal plate of COND module
The terminals are suitable for single or stranded wires up to 2.5 mm^2 (AWG 14).



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



Dual-conductivity module (COND-COND)
Order code MK-CC065N
For wiring examples, see page 289.



Terminal plate
Dual conductivity measurement
The terminals are suitable for single or stranded wires up to 2.5 mm² (AWG 14).

Changing the Measuring Function

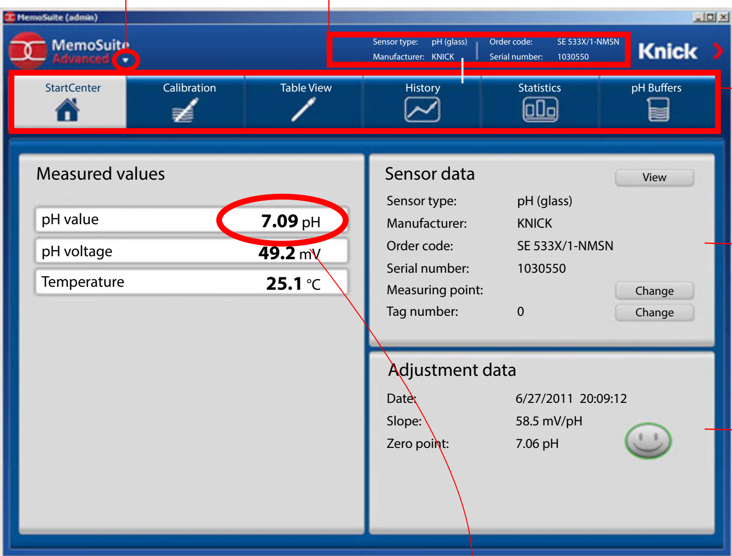
In the “Service” menu you can select another measuring function at any time.

Calibration and Maintenance in the Lab

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

Settings and Specifications

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



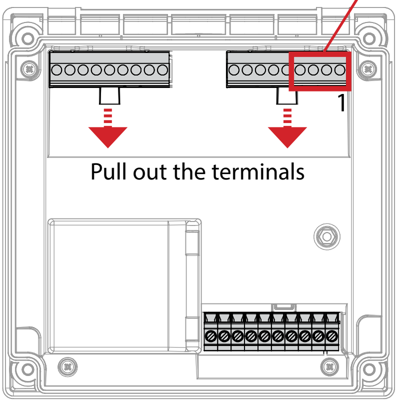
Function selection: The selected function is highlighted.

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

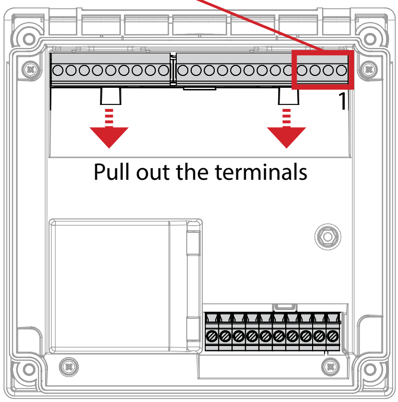
Last adjustment

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

Terminals for Memosens		
1	Brown	+3V
2	Green	RS 485 A
3	Yellow	RS 485 B
4	White	GND
	Transparent	Shield



Stratos Pro A221N / A221X

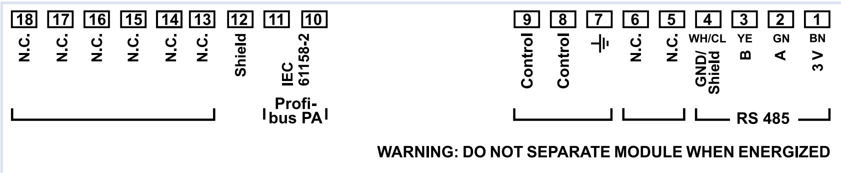


Stratos Evo A451N

NOTICE! Remove the measuring module!

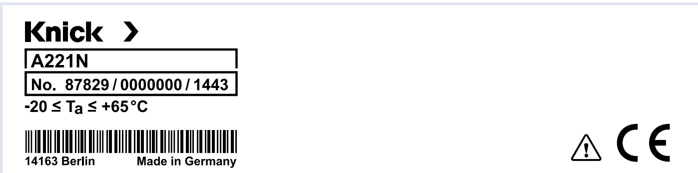
A221N Terminal Assignments

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



A221N Nameplate

(illustrative example)



Conductor Cross-Sections

With a tightening torque of 0.5 to 0.6 Nm, the following conductor cross-sections are permitted:

Connection	**Cross-section**
Conductor cross-section rigid/flexible	0.2 … 2.5 mm²
Conductor cross-section flexible with ferrule without plastic sleeve	0.25 … 2.5 mm²
Conductor cross-section flexible with ferrule with plastic sleeve	0.2 … 1.5 mm²

A451N Terminal Assignments

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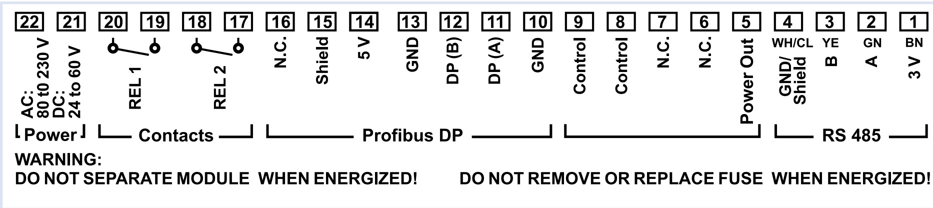
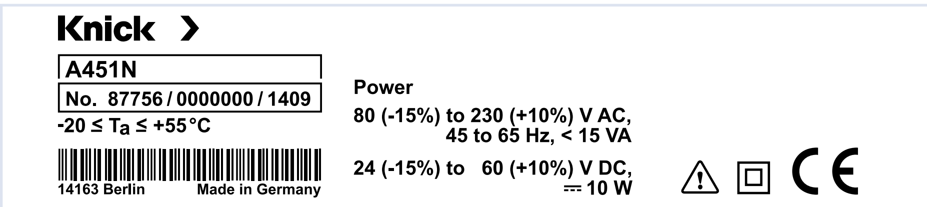


A451N Nameplate

(illustrative example)



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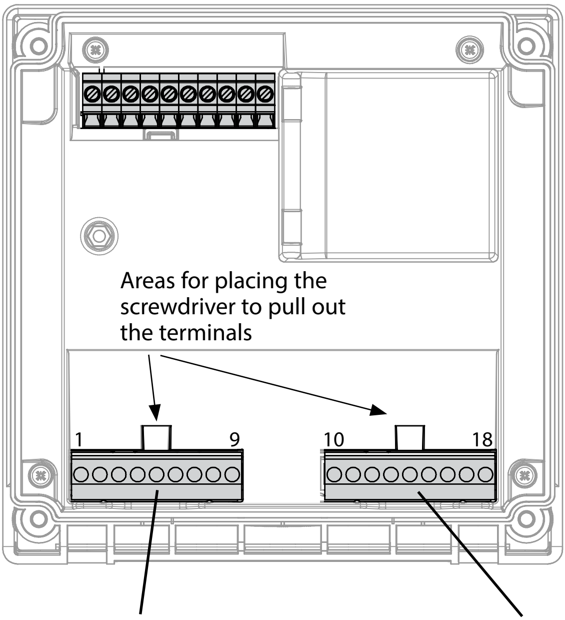


Figure:
Terminals, device opened,
back of front unit

Terminal row 1

1	+3V	Memosens
2	RS 485 A	Memosens
3	RS 485 B	Memosens
4	GND/Shield	Memosens
5	n. c.	
6	n. c.	
7	Equipot. bonding	
8	Control	
9	Control	

Terminal row 2

10	PA (IEC 61158-2)	PROFI-BUS PA
11	PA (IEC 61158-2)	PROFI-BUS PA
12	Shield	PROFI-BUS PA
13	n. c.	
14	n. c.	
15	n. c.	
16	n. c.	
17	n. c.	
18	n. c.	

Connecting the Memosens Sensor

Connect the Memosens sensor to the RS-485 interface of the device. Then select the measuring function. (When you change to another sensor type, you can change the measuring function in the “Service” menu.)
When you have selected the sensor type in the Configuration menu, the device will read the calibration data from the sensor and use them for calculating the measured value.

Power Supply

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

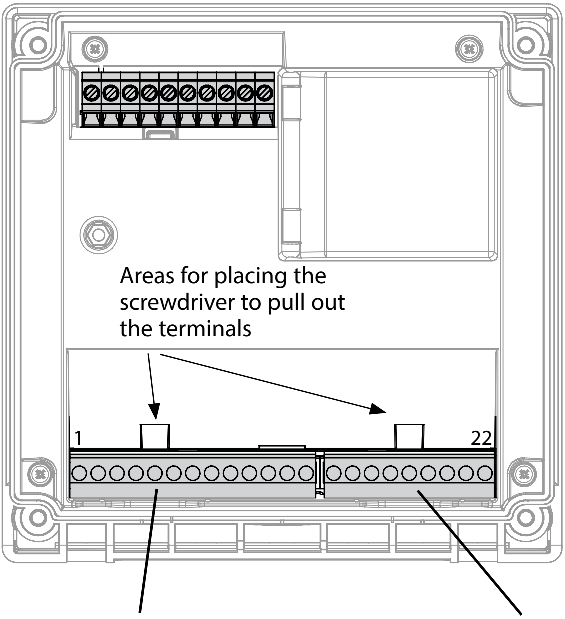


Figure:
Terminals, device opened, back of front unit

Terminal row 1

1	+3V	Memosens
2	RS 485 A	Memosens
3	RS 485 B	Memosens
4	GND/Shield	Memosens
5	Power Out	
6	n. c.	
7	n. c.	
8	Control	
9	Control	

Terminal row 2

10	GND	PROFIBUS DP
11	DP RS 485 A	PROFIBUS DP
12	DP RS 485 B	PROFIBUS DP
13	DP Shield	PROFIBUS DP
14	5 V BUS	PROFIBUS DP
15	shield	
16	n. c.	
17	Relay 2	
18	Relay 2	
19	Relay 1	
20	Relay 1	
21	Power	
22	Power	

Selecting the Measuring Function

Upon initial start-up, the analyzer automatically recognizes a connected module and adjusts the software correspondingly. When you replace the measuring module, you must select the corresponding measuring function in the “Service” menu.

Changing the Measuring Function

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

Measuring Mode

Prerequisite: A Memosens sensor is connected or a measuring module is installed with a corresponding conventional sensor connected.
After the operating voltage has been connected, the analyzer automatically goes to “Measuring“ mode. To call the measuring mode from another operating mode (e.g., Diagnostics, Service): Hold **meas** key depressed (> 2 s).

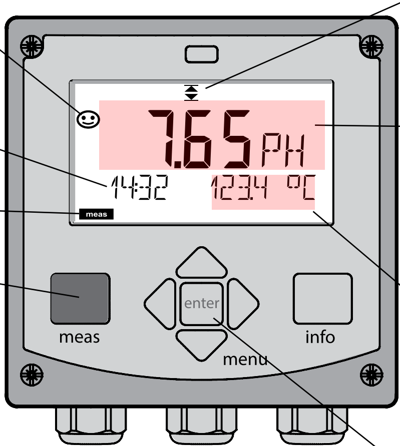
Sensoface indicator (sensor status)

BUS communication

Time

Operating mode (measuring)

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



Primary process value

Secondary process value

enter key

Depending on the configuration, one of the following displays can be set as standard display for the measuring mode:

- Measured value, time and temperature (default setting)
- Measured value
- Time and date

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

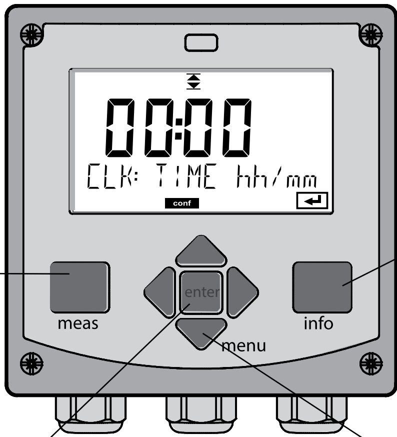
You must configure the analyzer for the respective measurement task.

Up / Down arrows

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

Left / Right arrows

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



meas

- Return to last menu level
- Directly to measuring mode (press > 2 s)
- Measuring mode: other display

info

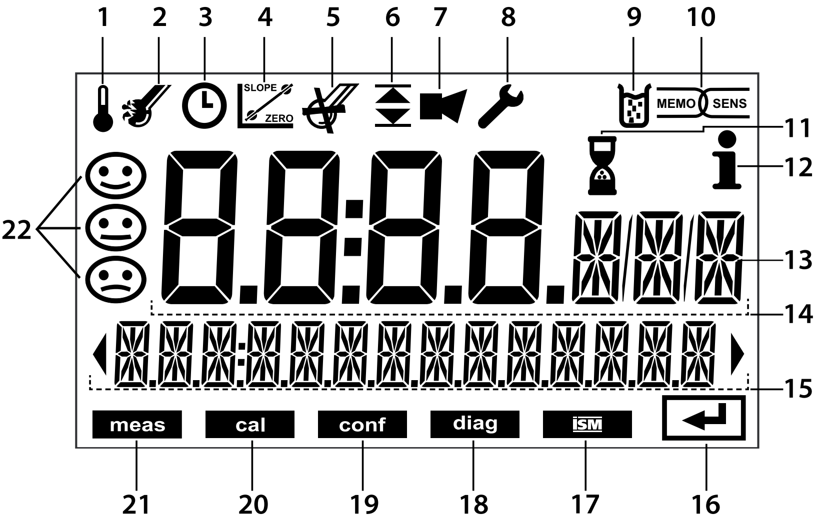
- Retrieve information
- Show error messages

enter

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

menu

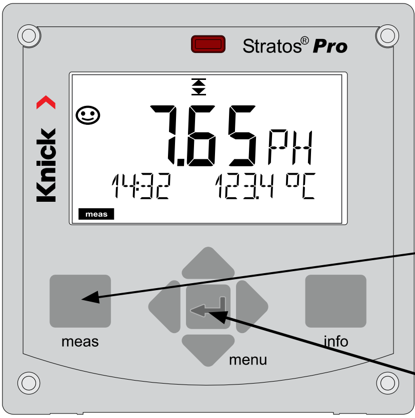
- Measuring mode: Call menu



1 Temperature
2 Sensocheck
3 Interval/response time
4 Sensor data
5 Sensocheck
6 BUS communication
7 Alarm
8 Service
9 Cal timer expired
10 Digital sensor
11 Waiting time running
12 Info available
13 Unit symbols
14 Primary process value
15 Secondary display
16 Proceed using enter
17 ISM sensor
18 Diagnostics
19 Configuration mode
20 Calibration mode
21 Measuring mode
22 Sensoface

Signal Colors (Display Backlighting)

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

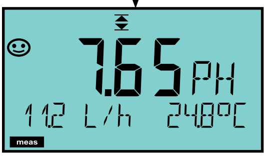


The MAIN DISPLAY is the display which is shown in measuring mode. To call the measuring mode from any other mode, hold the **meas** key depressed for at least 2 sec.

meas key

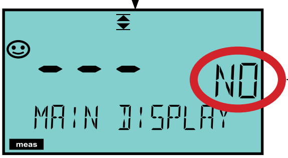
enter key

meas



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

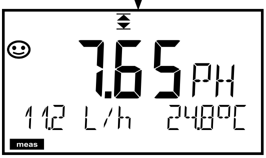
enter



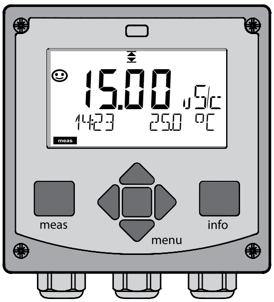
Press **enter** to select a display as MAIN DISPLAY.

The secondary display shows
“MAIN DISPLAY – NO”.
Use the **UP** / **DOWN** arrows to select
“MAIN DISPLAY – YES”
and confirm by pressing **enter**.
The display color changes to white.
This display is now shown in measuring mode.

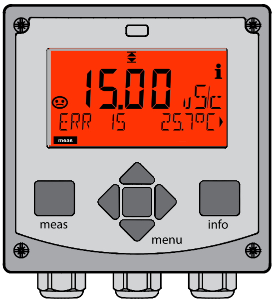
approx. 2 s



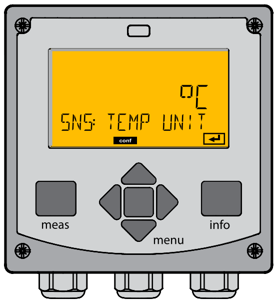
The color-coded user interface guarantees increased operating safety.
Operating modes are clearly signaled.
The normal measuring mode is white. Information text appears on a green screen and the diagnostic menu appears on turquoise. The yellow screen for configuration, calibration and service is quickly visible as is the magenta screen which indicates asset management messages for predictive diagnostics – such as maintenance request, pre-alarm and sensor wear.
The alarm status has a particularly noticeable red display color and is also signaled by flashing display values. Invalid inputs or false passcodes cause the entire display to blink red so that operating errors are significantly reduced.



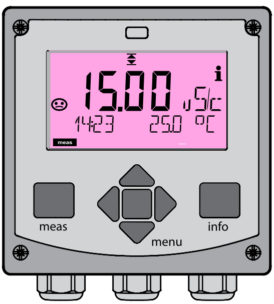
White:
Measuring mode



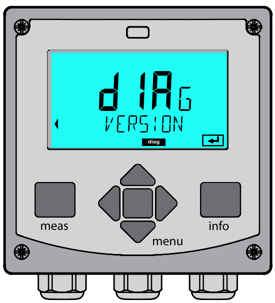
Red blinking:
Alarm, error



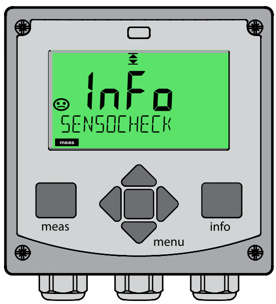
Yellow:
Configuration,
Calibration, Service



Magenta:
Maintenance request



Turquoise:
Diagnostics



Green:
Information texts

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

Calibration (CAL)
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.

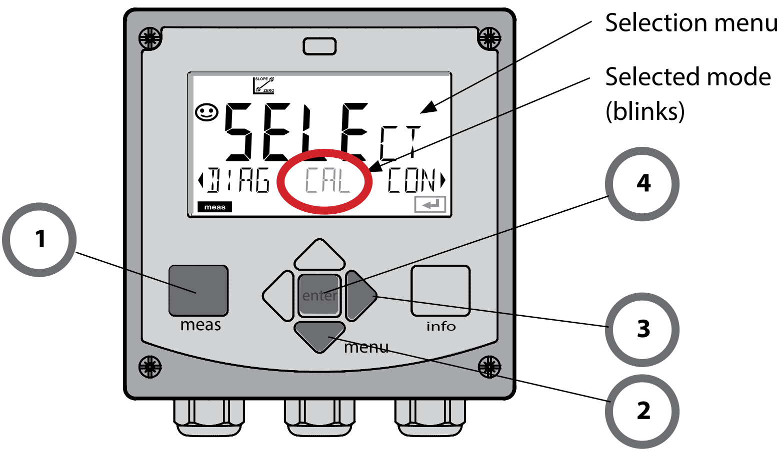
During calibration the device remains in the HOLD mode until it is stopped by the operator.

Configuration (CONF)
You must configure the analyzer for the respective measurement task. In the "Configuration" mode you select the adjusted measuring function, the connected sensor, the measuring range to be transmitted, and the conditions for warning and alarm messages.
Configuration mode is automatically exited 20 minutes after the last keystroke. The device returns to measuring mode.

Service (SERVICE)
Assigning passcodes, selecting the device type (pH/oxy/conductivity), resetting to factory settings.

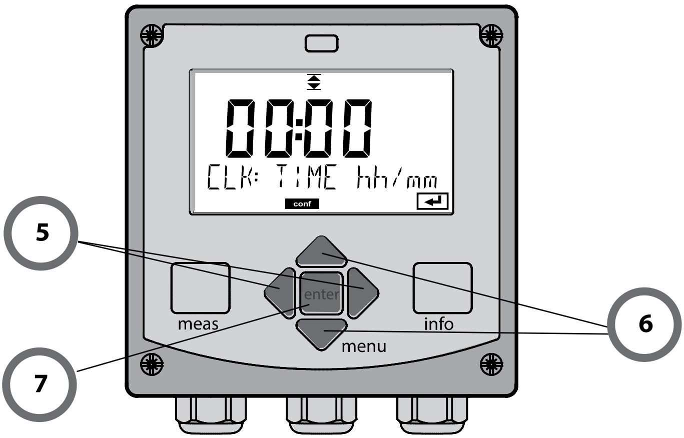
To select the operating mode:

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



To enter a value:

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



Alarm

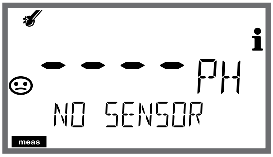
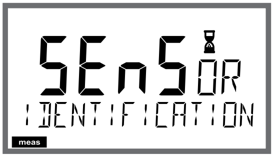
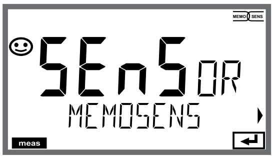
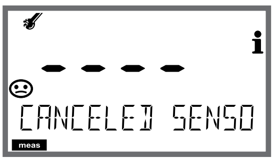
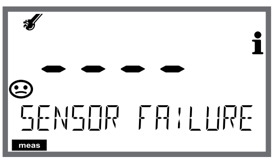
When an error has occurred, **Err** is displayed immediately.
Only after expiry of a user-defined delay time will the alarm be registered and entered in the logbook.
During an alarm the display blinks, the display backlighting turns **red**.
2 sec after the failure event is corrected, the alarm status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

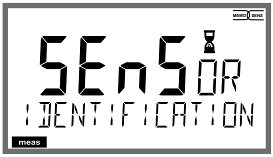
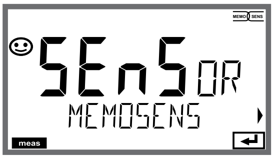
Meas. mode (main display selectable) —**meas**→ CLK display —**meas**→

CLK display —after 60 s→ Meas. mode

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

Menu group	Menu item	Description
DIAG	CALDATA	Display of calibration data
	SENSOR	Display of sensor data
	SELFTEST	Self test: RAM, ROM, EEPROM, module
	LOGBOOK	100 events with date and time (Audit Trail)
	MONITOR	Display of direct sensor values
	VERSION	Display of software version, model designation, serial no.
CAL	pH	pH adjustment / ORP adjustment / product calibration
	Oxy	Adjustment (WTR/AIR) / zero adjustment / product cal.
	Cond(I)	Adjustment with solution / cell factor input / product cal.
	CAL_RTD	Adjustment of temperature probe
CONF	pH	Configuring a pH/ORP sensor
	Cond	Configuring a Cond sensor
	CondI	Configuring a CondI sensor
	Oxy	Configuring an oxygen sensor
	Cond-Cond	Configuring a sensor for dual conductivity measurement
SERVICE Code “5555“ (editable)	SENSOR	Sensor (resetting diagnostics messages)
	DEVICE TYPE	Selecting the process variable
	NEW EXCHANGER	Resetting the consumption calculation of the ion exchanger
	MONITOR	Display of measured values for validation (simulators)
	POWER OUT	Selecting the output voltage (A451N only)
	CODES	Configuring the passcodes
	DEFAULT	Reset to factory setting

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

Step	Action/Display	Remark
Disconnect and remove old sensor.		
Install and connect new sensor.		Temporary messages which are activated during the replacement are indicated but not entered in the logbook.
Wait until the sensor data are displayed.		
Check sensor data.	 View sensor information using ◀ ▶ keys, confirm using **enter**.	You can view the sensor manufacturer and type, serial number and last calibration date.
Check measured values.		

pH

pH Configuration				Choices DEFAULT **in bold**
BUS:	**ADDRESS**			0000 … **0126**
SNS:				**STANDARD** | ISFET | MEMOSENS | PFAUDLER | ISM
	MEAS MODE			**pH** | mV | ORP
	RTD TYPE (STANDARD, ISFET, PFAUDLER)			100 PT | **1000 PT** | 30 NTC | 8.55 NTC | BALCO
	TEMP UNIT			**°C** | °F
	TEMP MEAS			**AUTO** | MAN |BUS
	MAN			-50 … 250 °C (**025.0 °C**) -58 … 482 °F **(077.0 °F)**
	TEMP CAL			**AUTO** | MAN |BUS
	MAN			-50 … 250 °C (**025.0 °C**) -58 … 482 °F **(077.0 °F)**
	NOM ZERO 1)			0.00 … 14.00 PH **(7.00 PH)**
	NOM SLOPE 1)			30.0 … 60.0 mV (**059.2 mV)**
	PH_ISO 1)			0.00 … 14.00 PH **(07.00 PH)**
	CALMODE			**AUTO** | MAN | DAT
	AUTO	**BUFFER SET**		-01- MT **-02- KNC** -03- CIB -04- NST -05- STD -06- HCH -07- WTW -08- HMT -09- RGC -10- DIN -U1- USR
	CAL TIMER 2)			**OFF** | FIX | AdAPT
	FIX	AdAPT	**CAL-CYCLE** 2)	**xxxx h (0168 h)**
	ACT 3)			**OFF** | AUTO | MAN
	MAN		**ACT CYCLE** 3)	0 … 2000 DAY **(0007 DAY)**
	TTM 3)			**OFF** | AUTO | MAN**)**
	MAN		**TTM CYCLE** 3)	0 … 2000 DAY **(0030 DAY)**

pH Configuration			Choices DEFAULT **in bold**
SNS:	**CIP COUNT**		ON | **OFF**
	ON	**CIP CYCLES** [3]	0 … 9999 CYC (**0000 CYC**)
	SIP COUNT		ON | **OFF**
	ON	**SIP CYCLES** [3]	0 … 9999 CYC (**0000 CYC**)
	AUTOCLAVE [3]		ON | **OFF**
	ON	**AC CYCLES** [3]	xxxx CYC (**0000 CYC**)
COR:	**TC SELECT**		**OFF** | LIN | PURE WTR | USER TAB
	LIN	**TC LIQUID**	-19.99 … +19.99 %/K **(00.00 %/K)**
	USER TAB	**EDIT TABLE**	**NO** | YES
		YES	0 … 100 °C in 5 °C steps
IN:	**FLOW ADJUST**		0 … 20 000 l/L **(12 000 l/L)**
ALA:	**ALARM DELAY**		0 … 600 SEC **(010 SEC)**
	SENSOCHECK		ON | **OFF**
	HOLD		OFF | **LAST**
CLK:	**CLK FORMAT**		**24h** | 12h
	CLK TIME		hh:mm | hh.mm (A/M) **(00.00)**
	CLK DAY/MONTH		dd.mm **(01.01.)**
	CLK YEAR		yyyy **(2014)**

1) with PFAUDLER sensors only

2) omitted for ISM sensors

3) with ISM sensors only

pH

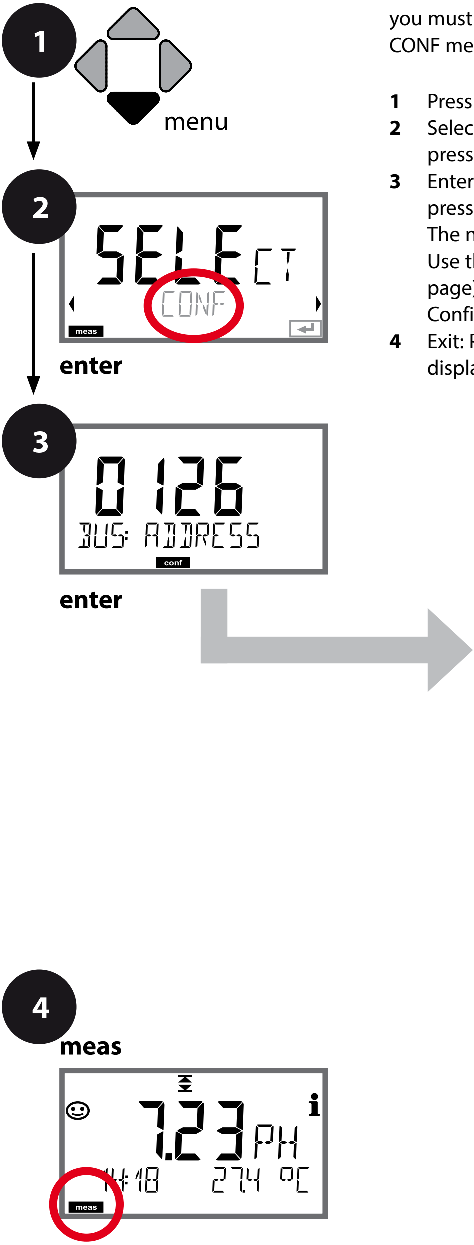
Parameter		Default	User setting
BUS:	Address	126	
SNS:	Sensor type	STANDARD	
	Measuring mode	pH	
	Type of temp probe	1000 PT	
	Temperature unit	°C	
	Measurement temp	AUTO	
	Measurement temp, manual	25.0 °C (77.0 °F)	
	Calibration temp	AUTO	
	Calibration temp, manual	25.0 °C (77.0 °F)	
	Zero point[1)]	7.00 pH	
	Slope[1)]	59.2 mV	
	PH ISO[1)]	7.00 pH	
	Calibration mode	AUTO	
	Buffer set	-02- KNC (Knick)	
	Calibration timer[2)]	OFF	
	Calibration cycle	168 h	
	Adaptive cal timer (ACT)[3)]	OFF	
	Calibration cycle (ACT)[3)]	30 DAY	
	Adaptive maintenance timer (TTM)[3)]	OFF	
	Maintenance cycle (TTM)[3)]	365 DAY	
	CIP counter	OFF	
	CIP cycles	0000 CYC	
	SIP counter	OFF	
	SIP cycles	0000 CYC	
	Autoclaving counter[3)]	OFF	
	Autoclaving cycles[3)]	0000 CYC	

Parameter		Default	User setting
COR:	Temperature compensation	OFF	
	Temperature compensation, LINEAR	00.00%/K	
	Temperature compensation, USER	NO	
IN:	Flow meter (pulses/liter)	12 000 l/L	
	Flow meter (pulse recording interval)	1 s	
ALA:	Delay	10 s	
	Sensocheck	OFF	
	HOLD mode	LAST	
CLK:	Time format	24h	
	Time hh/mm	00.00	
	Day/Month	01.01.	
	Year	2014	

1) with PFAUDLER sensors only
2) omitted for ISM sensors
3) with ISM sensors only

Device Type: pH

Connected modules are automatically recognized. In the SERVICE menu you can change the device type. Afterwards, you must select the corresponding calibration mode in the CONF menu.

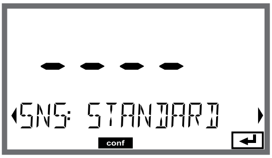
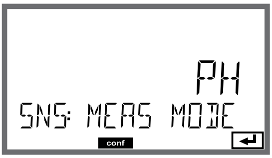
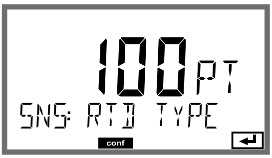
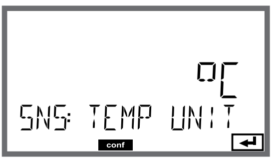


1 Press **menu** key.
2 Select **CONF** using ◀ ▶,
press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶,
press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** until the [meas] mode indicator is displayed.

3

PROFIBUS address
Sensor type
Measuring mode
Type of temp probe
Temperature unit
Temp detection during measurement
Temp detection during calibration
Calibration mode
Calibration timer
Adaptive calibration timer
Adaptive maintenance timer
Cleaning cycles CIP
Sterilization cycles SIP
Autoclaving counter
Temperature compensation

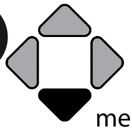
3

Menu item	Action	Choices
PROFIBUS address 	Adjust value using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm. **Note:** When communication is active, the PROFIBUS address cannot be changed.	0000 … **0126**
Sensor type 	Select sensor type using ▲ ▼ keys. Press **enter** to confirm.	**STANDARD** ISFET MEMOSENS PFAUDLER ISM
Measuring mode 	Select measuring mode using ▲ ▼ keys. Press **enter** to confirm.	**pH** mV ORP
Type of temp probe 	(not for digital sensors) Select type of temperature probe using ▲ ▼ keys. Press **enter** to confirm.	100 PT **1000 PT** 30 NTC 8.55 NTC BALCO
Temperature unit 	Select °C or °F using ▲ ▼ keys. Press **enter** to confirm.	**°C** °F

pH

Sensor, Temp Detection during Calibration, Calibration Mode

1



menu

2

enter

3

enter

4

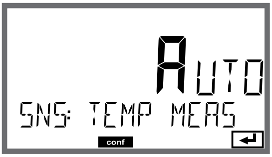
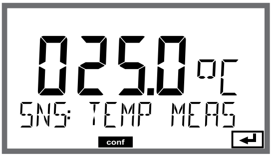
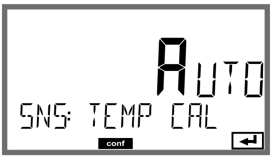
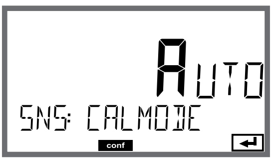
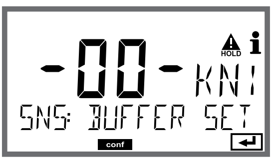
meas

1 Press **menu** key.
2 Select **CONF** using ◀ ▶,
press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶,
press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

3

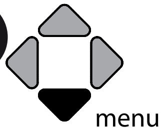
PROFIBUS address
Sensor type
Measuring mode
Type of temp probe
Temperature unit
Temp detection during measurement
Temp detection during calibration
Calibration mode
Calibration timer
Adaptive calibration timer
Adaptive maintenance timer
Cleaning cycles CIP
Sterilization cycles SIP
Autoclaving counter
Temperature compensation

3

Menu item	Action	Choices
Temperature detection during measurement 	Select mode using ▲ ▼ keys: AUTO: Measured by sensor MAN: direct input of temperature, no measurement (see next step) BUS: Value from AO block Press **enter** to confirm.	**AUTO** MAN BUS
(Manual temperature) 	Adjust value using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm.	–50 …250 °C **(25.0 °C)** (–58 …482 °F) **(77.0 °F)**
Temp detection during calibration 	AUTO: Measured by sensor MAN: direct input of temperature, no measurement (see next step) BUS: Value from AO block Press **enter** to confirm.	**AUTO** MAN BUS
(Manual temperature)	See above	
Calibration mode 	Select CALMODE using ▲ ▼ keys: AUTO: Calibration with Calimatic buffer set recognition MAN: Manual entry of buffer solutions DAT: Input of adjustment data of premeasured sensors Press **enter** to confirm.	**AUTO** MAN DAT
(AUTO: Buffer set) 	Select buffer set using ▲ ▼ keys (see buffer tables for nominal values) Press **enter** to confirm.	-00-...-10-, -U1- (see Appendix) Pressing the **info** key displays the manufacturer and nominal values in the lower line.

Sensor, Calibration Timer, Calibration Cycle

1



2

enter

3

enter

4

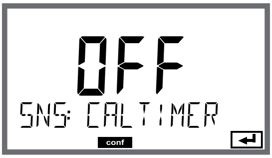
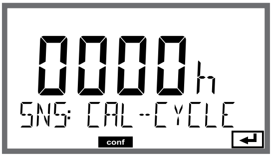
meas

1 Press **menu** key.
2 Select **CONF** using ◀ ▶,
press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶,
press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

3

PROFIBUS address
Sensor type
Measuring mode
Type of temp probe
Temperature unit
Temp detection during measurement
Temp detection during calibration
Calibration mode
Calibration timer
Adaptive calibration timer
Adaptive maintenance timer
Cleaning cycles CIP
Sterilization cycles SIP
Autoclaving counter
Temperature compensation

3

Menu item	Action	Choices
Calibration Timer 	Adjust CALTIMER using ▲ ▼: OFF: No timer FIX: Fixed cal cycle (adjust in the next step) AdAPT: Maximum cal cycle (adjust in the next step) Press **enter** to confirm.	**OFF** FIX AdAPT With ADAPT, the calibration 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: Adjust value using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm.	0 … 9999

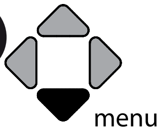
Note for the calibration timer:
When Sensocheck has been activated, the Sensoface indicator reminds you when the calibration interval is about to expire:

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

The time remaining until the next due calibration can be seen in the diagnostics menu (see Diagnostics chapter, from page 156 onwards).

pH

ISM Sensor, Adaptive Cal Timer (ACT)

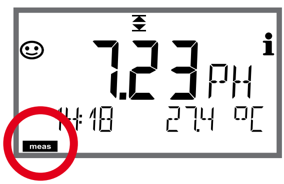
1


2


enter

3


enter

4
meas


1 Press **menu** key.
2 Select **CONF** using ◀ ▶, press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶, press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

3

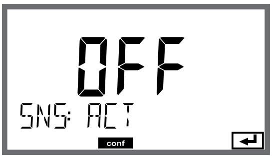
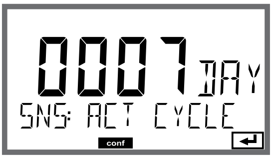
PROFIBUS address
Sensor type
Measuring mode
Type of temp probe
Temperature unit
Temp detection during measurement
Temp detection during calibration
Calibration mode
Calibration timer
Adaptive calibration timer
Adaptive maintenance timer
Cleaning cycles CIP
Sterilization cycles SIP
Autoclaving counter
Temperature compensation

Adaptive Cal Timer (ACT)

By issuing a Sensoface message, the adaptive calibration timer reminds you to calibrate the sensor. After expiration of the interval, Sensoface is getting "sad". Pressing the **info** key shows the text "OUT OF CAL TIME CALIBRATE SENSOR" which reminds you that a calibration is due. The ACT interval is either read automatically from the sensor settings or can be specified manually (max. 9999 days). Stressing influences (temperature, measurement in extreme ranges) shorten the timer interval.

The adaptive cal timer is reset after each calibration.

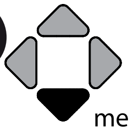
3

Menu item	Action	Choices
Adaptive cal timer (ACT)  	Select using ▲ ▼: OFF: No timer AUTO: The interval stored in the ISM sensor is used. MAN: The interval is specified manually (0 ... 9999 days). Default ACT CYCLE = 7 days Confirm by pressing **enter**	**OFF** AUTO MAN

pH

ISM Sensor, Adaptive Maintenance Timer (TTM)

1



menu

2

enter

3

enter

4

meas

1 Press **menu**.

2 Select **CONF** using ◀ ▶, press **enter**.

3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶, press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.

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

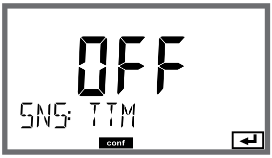
3

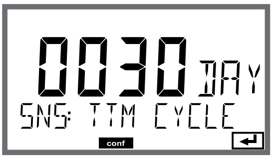
PROFIBUS address
Sensor type
Measuring mode
Type of temp probe
Temperature unit
Temp detection during measurement
Temp detection during calibration
Calibration mode
Calibration timer
Adaptive calibration timer
Adaptive maintenance timer
Cleaning cycles CIP
Sterilization cycles SIP
Autoclaving counter
Temperature compensation

Adaptive Maintenance Timer (TTM, Time to Maintenance)

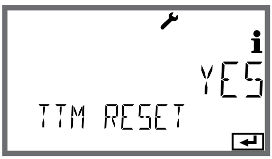
By issuing a Sensoface message, the adaptive maintenance timer reminds you to service the sensor. After expiration of the interval, Sensoface is getting "sad". Pressing the **info** key shows the text "OUT OF MAINTENANCE CLEAN SENSOR" which reminds you that a sensor maintenance is due. The TTM interval is either read automatically from the sensor settings or can be specified manually (max. 2000 days).
Stressing influences (temperature, measurement in extreme ranges) shorten the timer interval.

3

<table>
<tr><th>Menu item</th><th>Action</th><th>Choices</th></tr>
<tr><td>Adaptive maintenance timer (TTM)



</td><td>Select using ▲ ▼ keys:
OFF: No timer
AUTO: The interval stored in the ISM sensor is used.

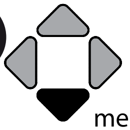
MAN: The interval is specified manually (0 ... 2000 days).
Default TTM CYCLE = 30 days

Confirm by pressing enter</td><td>OFF
AUTO
MAN</td></tr>
<tr><td colspan="3">The adaptive maintenance timer can be reset in the SERVICE / SENSOR / TTM menu. Here, the interval is reset to its initial value.</td></tr>
<tr><td>
</td><td>To do so, select "TTM RESET = YES" and confirm by pressing enter.</td><td>NO
YES</td></tr>
</table>

pH

Sensor, CIP / SIP Cycles

1



menu

2

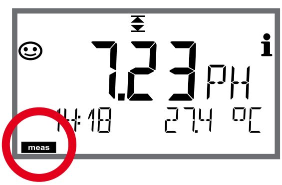
enter

3

enter

4

meas

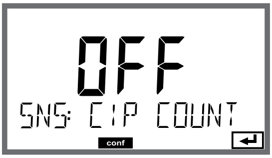
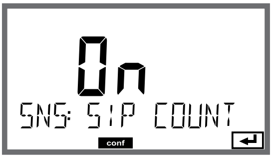


1 Press **menu**.
2 Select **CONF** using ◄ ►, press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◄ ►, press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

3

PROFIBUS address
Sensor type
Measuring mode
Type of temp probe
Temperature unit
Temp detection during measurement
Temp detection during calibration
Calibration mode
Calibration timer
Adaptive calibration timer
Adaptive maintenance timer
Cleaning cycles CIP
Sterilization cycles SIP
Autoclaving counter
Temperature compensation

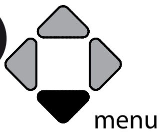
3

Menu item	Action	Choices
Cleaning cycles CIP 	Select ON or OFF using ▲ ▼ keys. When switched on, the cycles will be entered in the extended logbook but not counted. Press **enter** to confirm.	ON **OFF**
Sterilization cycles SIP 	Select ON or OFF using ▲ ▼ keys. When switched on, the cycles will be entered in the extended logbook but not counted. Press **enter** to confirm.	ON **OFF**

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

pH

ISM Sensor, Autoclaving Counter

1


2


enter

3


enter

4
meas


1 Press **menu**.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▴ ▾ ◂ ▸,
press **enter**.
The next menu item appears.
Use the arrow keys ▴ ▾ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

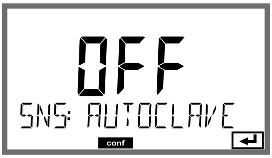
3

PROFIBUS address
Sensor type
Measuring mode
Type of temp probe
Temperature unit
Temp detection during measurement
Temp detection during calibration
Calibration mode
Calibration timer
Adaptive calibration timer
Adaptive maintenance timer
Cleaning cycles CIP
Sterilization cycles SIP
Autoclaving counter
Temperature compensation

Autoclaving Counter

After reaching a specified limit value the autoclaving counter generates a Sensoface message. As soon as the counter has reached the specified value, Sensoface is getting “sad”. Pressing the **info** key shows the text “AUTOCLAVE CYCLES OVERRUN” which reminds you that the maximum number of autoclaving cycles has been reached. After each autoclaving process, you must manually increment the autoclaving counter in the SENSOR service menu. The transmitter displays “INCREMENT AUTOCLAVE CYCLE” as confirmation.

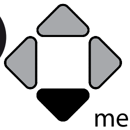
3

Menu item	Action	Choices
Autoclaving counter  	Select using ▲ ▼: OFF: No timer ON: The cycles are specified manually (0 … 9999). Press **enter** to confirm.	**OFF** ON
With the autoclaving counter switched on, you must increment the count after each autoclaving process in the SERVICE/SENSOR/AUTOCLAVE menu:		
Incrementing the autoclaving counter (SERVICE menu) 	After having completed an autoclaving process, open the SERVICE menu SENSOR / AUTOCLAVE to increment the autoclaving count. To do so, select “**YES**” and confirm by pressing **enter**.	**NO** / YES

pH

Temperature Compensation of Process Medium (pH)

1



menu

2

enter

3

enter

4

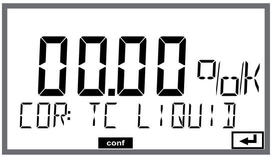
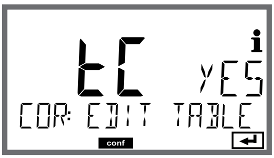
meas

1 Press **menu**.
2 Select **CONF** using ◄ ►, press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◄ ►, press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

3

PROFIBUS address
Sensor type
Measuring mode
Type of temp probe
Temperature unit
Temp detection during measurement
Temp detection during calibration
Calibration mode
Calibration timer
Adaptive calibration timer
Adaptive maintenance timer
Cleaning cycles CIP
Sterilization cycles SIP
Autoclaving counter
Temperature compensation

3

Menu item	Action	Choices
Temperature compensa-tion of process medium 	For pH measurement only: Select temperature compensa-tion of the process medium. OFF: No compensation LIN: Linear compensation PURE WTR: Ultrapure water USER TAB: User-defined table Select using ◀ ▶, press **enter** to confirm.	**OFF** LIN PURE WTR USER TAB
Temperature compensa-tion, linear 	Only with LIN: Enter the linear temperature compensation of the process medium. Enter value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	−19.99...+19.99 %/K
Temperature compensation 	Only with USER TAB: 0 … 100 °C in 5 °C steps	**NO** YES

Support of Pfaudler Sensors

or pH sensors with a zero point other than pH 7 and/or deviating slope, e.g., pH sensors with a zero point at pH 4.6

You select a Pfaudler sensor in the pH configuration menu (see page 44).
For Pfaudler standard pH sensors, you can specify a nominal zero point and a nominal slope.
In addition, you can enter a pHiso value.
The additional entries appear in the CONFIGURATION / SENSOR menu:

SNS: NOM ZERO (0.00 … 14.00 pH, default: 07.00 pH)
SNS: NOM SLOPE (30.0 … 60.0 mV, default: 59.2 mV)
SNS: PH_ISO (0.00 … 14.00 pH, default: 07.00 pH)

Prior to measurement, you must enter the values for nominal zero and slope and the isothermal intersection point pHiso as provided by the manufacturer and perform a calibration using suitable buffer solutions.
When you use a Memosens Pfaudler sensor, the data will be read from the sensor or will be set to standard values. Here, you do not have to make entries. The respective menu items will be suppressed.
The nominal ZERO/SLOPE values are required for the proper functioning of the sensor monitoring and calibration functions (Sensoface, Calimatic), they do not replace an adjustment (calibration)!

Typical values				
Probe	Pfaudler enamel probes (Pfaudler specifications)	Probes with absolute pH measurement and Ag/AgCl reference system	Probes with absolute pH measurement and Ag/A (silver acetate) reference system	Differential pH probe
Nom. slope	55 mV/pH	55 mV/pH	55 mV/pH	55 mV/pH
Nom. zero	pH 8.65	pH 8.65	pH 1.35	pH 7 ... 12
pHiso	pH 1.35	pH 1.35	pH 1.35	pH 3.00

Note:
Please refer to the operating instructions of the respective sensor for more information on functioning, installation, calibration and configuration.

Cond

Cond Configuration			Choices DEFAULT **in bold**
BUS:	**ADDRESS**		0000 … **0126**
SNS:			**2-ELECTRODE** | 4-ELECTRODE | MEMOSENS
	CELLFACTOR [1)]		00.0050 – 19.9999 c **(01.0000c)**
	MEAS MODE		**Cond** | Conc % | SAL ‰ | USP µS/cm | TDS
	Cond	**DISPLAY UNIT**	0.000 µS/cm 00.00 µS/cm 000.0 µS/cm 0000 µS/cm 0.000 mS/cm 00.00 mS/cm **000.0 mS/cm** 0.000 S/cm 00.00 S/cm 00.00 MΩ
	Conc %	**SOLUTION**	**-01- (NaCl),** -02- (HCl), -03- (NaOH), -04- (H2SO4), -05- (HNO3), -06- (H2SO4), -07- (HCl), -08- (HNO3), -09- (H2SO4), -10- (NaOH), -U1-
	TEMP UNIT		**°C** | °F
	TEMPERATURE		**AUTO** | MAN | BUS
	AUTO	**RTD TYPE** [1)]	100 PT **1000 PT** 100 NI 8.55 NTC 30 NTC
	MAN	**TEMPERATURE**	-50 … 250 °C **(025.0 °C)** -58 … 482 °F (**077.0 °F**)
	CIP COUNT		ON | **OFF**
	SIP COUNT		ON | **OFF**
COR:	**TC SELECT**		**OFF** | LIN | nLF | nACL | HCL | nH3 | nAOH
	LIN	**TC LIQUID**	0 … +19.99 %/K **(00.00 %/K)**
	LIN	**REF TEMP**	-20 … 200 °C **(25.0 °C)** 4 … 392 °F (**077.0 °F**)
	TDS FACTOR [2)]		0.01 … 99.99 **(1.00)**
	USP FACTOR [3)]		010.0 … 100.0 % (**100.0 %**)
IN:	**FLOW ADJUST**		0 … 20 000 l/L **(12 000 l/L)**

Cond Configuration		Choices DEFAULT **in bold**
ALA:	**ALARM DELAY**	0 … 600 SEC **(010 SEC)**
	SENSOCHECK	ON | **OFF**
	HOLD	OFF | **LAST**
CLK:	**CLK FORMAT**	**24h** | 12h
	CLK TIME	hh:mm | hh.mm (A/M) **(00.00)**
	CLK DAY/MONTH	dd.mm **(01.01.)**
	CLK YEAR	yyyy **(2014)**

1) omitted for Memosens sensors

2) only for MEAS MODE = TDS

3) only for MEAS MODE = USP

Cond

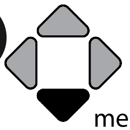
Parameter		Default	User setting
BUS:	Address	126	
SNS:	Sensor type	2-ELECTRODE	
	Cell factor[1)]	01.0000 c	
	Measuring mode	Cond	
	Cond range	000.0 mS/cm	
	Concentration determination	-01- (NaCL)	
	Temperature unit	°C	
	Measurement temp	AUTO	
	Type of temp probe[1)]	1000 PT	
	Measurement temp, manual	25.0 °C (77.0 °F)	
	Calibration temp	AUTO	
	Calibration temp, manual	25.0 °C (77.0 °F)	
	CIP counter	OFF	
	SIP counter	OFF	
COR:	Temperature compensation	OFF	
	Temperature compensation, LINEAR	00.00%/K	
	Reference temperature, LINEAR	25.0 °C (77.0 °F)	
	TDS factor[2)]	1.0	
	USP factor[3)]	100.0 %	
IN:	Flow meter (pulses/liter)	12 000 l/L	
	Flow meter (pulse recording interval)	1 s	
ALA:	Delay	10 s	
	Sensocheck	OFF	
	HOLD mode	LAST	
CLK:	Time format	24h	
	Time hh/mm	00.00	
	Day/Month	01.01.	
	Year	2014	

[1)] omitted for Memosens sensors [2)] for MEAS MODE = TDS
[3)] for MEAS MODE = USP

Cond

Device Type: Cond

1



menu

2

enter

3

enter

meas

4

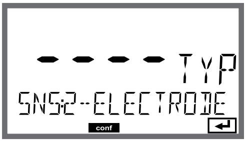
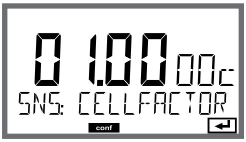
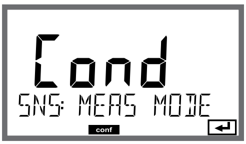
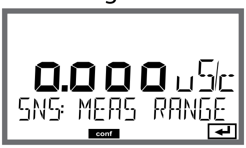
Connected modules are automatically recognized. In the SERVICE menu you can change the device type. Afterwards, you must select the corresponding calibration mode in the CONF menu.

1 Press **menu**.
2 Select **CONF** using ◀ ▶, press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶, press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

3

PROFIBUS address
Sensor type
Enter cell factor
Measuring mode
Cond measuring range
Concentration determination Conc
Temperature unit
Temperature detection
Type of temp probe
Cleaning cycles CIP
Sterilization cycles SIP
Temperature compensation

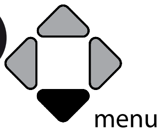
3

Menu item	Action	Choices
PROFIBUS address 	Adjust value using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm. **Note:** When communication is active, the PROFIBUS address cannot be changed.	0000 … **0126**
Sensor type 	Select sensor type using ▲ ▼ keys. Press **enter** to confirm.	**2-ELECTRODE** 4-ELECTRODE MEMOSENS
Cell factor 	Adjust value using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm.	00.0050 … 19.9999 c **(01.0000 c)**
Measuring mode 	Select desired mode using ▲ ▼ keys. Press **enter** to confirm.	**Cond** Conc % Sal ‰ USP µS/cm TDS
Cond range 	**For cond measurement only** Select desired measuring range using ▲ ▼ keys. Press **enter** to confirm.	x.xxx µS/cm, xx.xx µS/cm xxx.x µS/cm, xxxx µS/cm x.xxx mS/cm, xx.xx mS/cm **xxx.x mS/cm**, x.xxx S/m xx.xx S/m, xx.xx MΩ

Cond

Sensor, Concentration Determination

1



2

enter

3

enter

1 Press **menu**.
2 Select **CONF** using ◀ ▶,
press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶,
press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

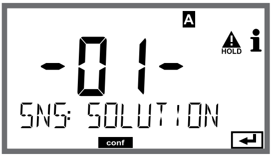
3

PROFIBUS address
Sensor type
Enter cell factor
Measuring mode
Measuring range
Concentration determination Conc
Temperature unit
Temperature detection
Type of temp probe
Cleaning cycles CIP
Sterilization cycles SIP
Temperature compensation

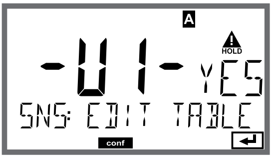
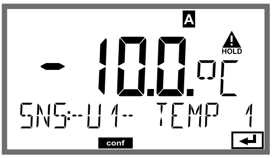
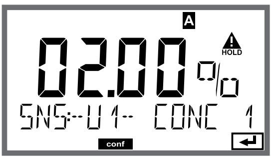
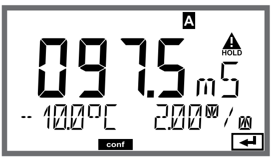
meas

4

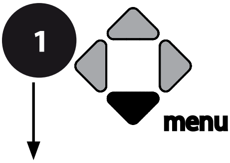
3

Menu item	Action	Choices
Concentration determination 	**For concntration measurement only** Use the arrow keys ▲ ▼ to select the desired concentration solution. Confirm with **enter**	**-01- (NaCl),** -02- (HCl), -03- (NaOH), -04- (H_2SO_4), -05- (HNO_3), -06- (H_2SO_4), -07- (HCl), -08- (HNO_3), -09- (H_2SO_4), -10- (NaOH), -U1-

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

	Press **enter** to confirm	
	Use the arrow keys ▲ ▼ ◀ ▶ to enter temperature values 1 ... 5. Confirm with **enter**	Input range: –50...250 °C / –58...482 °F
	Use the arrow keys ▲ ▼ ◀ ▶ to enter concentration value 1. Confirm with **enter**	
	For concentration value 1: Use the arrow keys ▲ ▼ ◀ ▶ to enter conductivity values for temperatures 1 ... 5. Confirm with **enter**	

Sensor, Temperature Unit, Temp Detection, Temperature Probe



enter

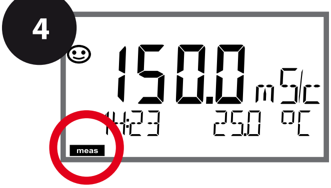
enter

1 Press **menu**.
2 Select **CONF** using ◀ ▶,
press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶,
press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

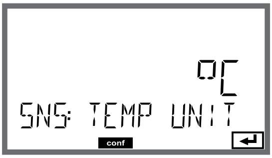
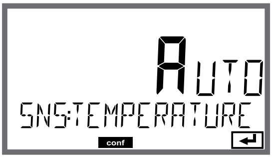
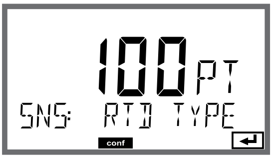
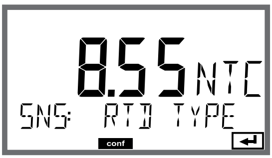
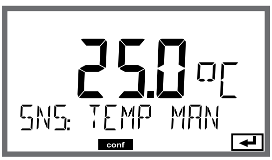
3

PROFIBUS address
Sensor type
Enter cell factor
Measuring mode
Measuring range
Concentration determination
Temperature unit
Temperature detection
Type of temp probe
Cleaning cycles CIP
Sterilization cycles SIP
Temperature compensation

meas

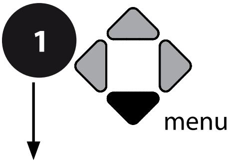


3

Menu item	Action	Choices
Temperature unit 	Select °C or °F using ▲ ▼ keys. Press **enter** to confirm.	**°C** / °F
Temp detection 	Select mode using ▲ ▼ keys: AUTO: Measured by sensor MAN: Direct input of tempera-ture, no measurement (see next step) BUS: Value from AO block Press **enter** to confirm.	**AUTO** MAN BUS
Type of temp probe  	(not for Memosens) Select type of temperature probe using ▲ ▼ keys. Press **enter** to confirm.	100 PT **1000 PT** 100 Ni 8.55 NTC 30 NTC
(Manual temperature) 	Modify value using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm.	–50…250 °C **(25.0 °C)** (–58…482 °F) **(77.0 °F)**

Cond

Sensor, CIP / SIP Cycles



enter

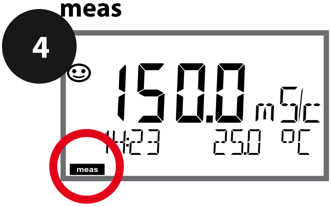
enter

1 Press **menu**.
2 Select **CONF** using ◀ ▶, press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶, press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

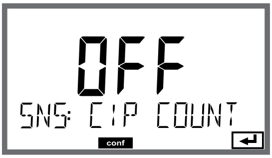
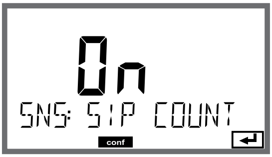
3

PROFIBUS address
Sensor type
Enter cell factor
Measuring mode
Measuring range
Concentration determination
Temperature unit
Temperature detection
Type of temp probe
Cleaning cycles CIP
Sterilization cycles SIP
Temperature compensation

meas



3

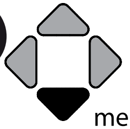
Menu item	Action	Choices
CIP Cleaning cycles on/off 	Select ON or OFF using ▲ ▼ keys. Activates/deactivates logging in logbook Press **enter** to confirm.	ON/**OFF**
SIP Sterilization cycles on/off 	Select ON or OFF using ▲ ▼ keys. Activates/deactivates logging in logbook Press **enter** to confirm.	ON/**OFF**

The cleaning and sterilization cycles are logged 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).

Note:
A CIP or SIP cycle is only entered into the logbook 2 hours after the start to ensure that the cycle is complete.

Cond

Temperature Compensation (Cond)

1

menu

2


enter

3


enter

meas

4


1 Press **menu**.

2 Select **CONF** using ◀ ▶,
press **enter**.

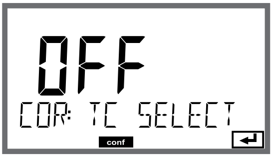
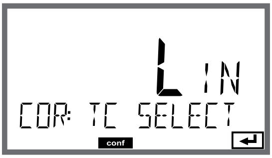
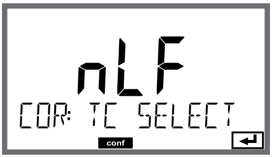
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶,
press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.

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

3

PROFIBUS address
Sensor type
Enter cell factor
Measuring mode
Measuring range
Concentration determination
Temperature unit
Temperature detection
Type of temp probe
Cleaning cycles CIP
Sterilization cycles SIP
Temperature compensation

3

Menu item	Action	Choices
Temp compensation 	Select desired compensation using ▲ ▼ keys: **OFF:** Temperature compensation switched off	**OFF** LIN NLF nACL HCL nH3 nAOH
	**LIN**: Linear temperature compensation Select desired temperature coefficient and reference temperature using ▲ ▼ keys.	TC LIQUID **00.00** … +19.99 %/K REF TEMP -20 … 200 °C **(25.0 °C)** 4 … 392 °F **(077.0 °F)**
	**NLF:** Temperature compensation for natural waters to EN 27888	
	**nACl:** Temperature compensation for ultrapure water with NaCl traces	
	**HCL:** Temperature compensation for ultrapure water with HCl traces	
	**nH3:** Temperature compensation for ultrapure water with NH_3 traces Confirm by pressing **enter**	
	NaOH (without figure)	

CondI

CondI Configuration			Choices DEFAULT **in bold**
BUS:	**ADDRESS**		0000 … **0126**
SNS:			**SE 655** | SE 656 | SE 660 | SE 670| SE 680 | MEMOSENS | OTHER
	OTHER	**RTD TYPE**	100 PT **1000 PT** 30 NTC
	OTHER	**CELLFACTOR**	XX.XXx **(01.980)**
	OTHER	**TRANS RATIO**	XXX.Xx **(120.00)**
	MEAS MODE		**Cond** | Conc % | SAL ‰ | TDS
	Cond	**DISPLAY UNIT**	0.000 mS/c *) 00.00 mS/c **000.0 mS/c** 0000 mS/c 0.000 S/m 00.00 S/m
	Conc	**SOLUTION**	**-01- (NaCl)** -02- (HCl) -03- (NaOH) -04- (H2SO4) -05- (HNO3) -06- (H2SO4) -07- (HCl) -08- (HNO3) -09- (H2SO4) -10- (NaOH) -U1-
	TEMP UNIT		**°C** | °F
	TEMPERATURE		**AUTO** | MAN |BUS
	MAN	**TEMPERATURE**	-50 … 250 °C **(025.0 °C)** -50 … 482 °F **(077.0 °C)**
	CIP COUNT		ON | **OFF**
	SIP COUNT		ON | **OFF**
COR:	**TC SELECT**		**OFF** | LIN | nLF | nACL | HCL | nH3 | nAOH
	LIN	**TC LIQUID**	0 … +19.99 %/K **(00,00 %/K)**
	LIN	**REF TEMP**	-20 … 200 °C **(25.0 °C)** 4 … 392 °F **(077.0 °F)**
	TDS FACTOR 1)		0.01 … 99.99 **(1.00)**
IN:	**FLOW ADJUST**		0 … 20 000 l/L **(12 000 l/L)**

CondI Configuration		Choices DEFAULT **in bold**
ALA:	**ALARM DELAY**	0 … 600 SEC **(010 SEC)**
	SENSOCHECK	ON | **OFF**
	HOLD	OFF | **LAST**
CLK:	**CLK FORMAT**	**24h** | 12h
	CLK TIME	hh:mm | hh.mm (A/M) **(00.00)**
	CLK DAY/MONTH	dd.mm **(01.01.)**
	CLK YEAR	yyyy **(2014)**

* 0.000 mS/cm range blocked for SE 660

1) for MEAS MODE = TDS

CondI Configuration (Template for Copy)

CondI

Parameter		Default	User setting
BUS:	Address	126	
SNS:	Sensor type	SE 655	
	Type of temp probe	1000 PT	
	Cell factor	01.980 c	
	Transfer ratio	120.00	
	Measuring mode	Cond	
	Cond range	000.0 mS/cm	
	Concentration determination	-01- (NaCL)	
	Temperature unit	°C	
	Temperature	AUTO	
	Manual temp	25.0 °C (77.0 °F)	
	CIP counter	OFF	
	SIP counter	OFF	
COR:	Temperature compensation	OFF	
	Temperature compensation, LINEAR	00.00%/K	
	Reference temperature, LINEAR	25.0 °C (77.0 °F)	
	TDS factor[1)]	1.0	
IN:	Flow meter (pulses/liter)	12 000 l/L	
	Flow meter (pulse recording interval)	1 s	
ALA:	Delay	10 s	
	Sensocheck	OFF	
	HOLD mode	LAST	
CLK:	Time format	24h	
	Time hh/mm	00.00	
	Day/Month	01.01.	
	Year	2014	

[1)] for MEAS MODE = TDS

Device Type: Condl

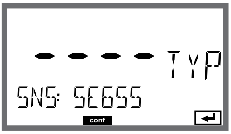
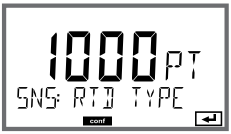
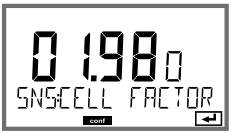
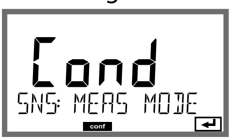
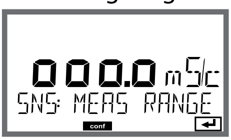
Connected modules are automatically recognized.
In the SERVICE menu you can change the device type.
Afterwards, you must select the corresponding calibration mode in the CONF menu.

1 Press **menu**.
2 Select **CONF** using ◀ ▶,
press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶,
press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

3

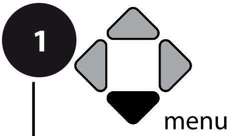
PROFIBUS address
Sensor type
Temperature probe
Cell factor
Transfer ratio
Measuring mode
Cond measuring range
Concentration determination
Temperature unit
Temperature detection
Cleaning cycles CIP
Sterilization cycles SIP
Temperature compensation

3

Menu item	Action	Choices
PROFIBUS address 	Adjust value using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm. **Note:** When communication is active, the PROFIBUS address cannot be changed.	0000 … **0126**
Sensor type 	Select sensor type using ▲ ▼ keys. Press **enter** to confirm.	**SE 655** SE 656 SE 660 SE 670 SE 680 MEMOSENS OTHER
Temperature probe 	**Only with OTHER** Select type of temperature probe using ▲ ▼ keys. Press **enter** to confirm.	**1000 PT** 100 PT 30 NTC
Cell factor 	**Only with OTHER** Enter cell factor using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	**01.980** XX.XXx
Transfer ratio 	**Only with OTHER** Enter transfer ratio using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	**120.00** XXX.Xx
Measuring mode 	Select desired mode using ▲ ▼ keys. Press **enter** to confirm.	**Cond** Conc % Sal ‰ TDS
Measuring range 	**For cond measurement only** Select desired measuring range using ▲ ▼ keys. Press **enter** to confirm.	x.xxx mS/cm, xx.xx mS/cm **xxx.x mS/cm**, xxxx mS/m, x.xxx S/m, xx.xx S/m

Sensor, Concentration Determination

1 Press **menu**.
2 Select **CONF** using ◀ ▶,
press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶,
press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.



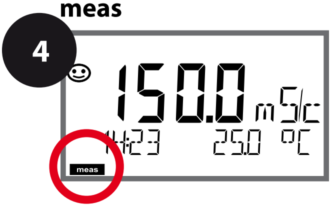
enter

enter

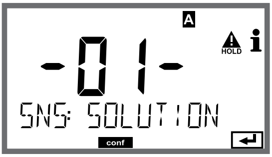
3

PROFIBUS address
Sensor type
Temperature probe
Cell factor
Transfer ratio
Measuring mode
Measuring range
Concentration determination Conc
Temperature unit
Temperature detection
Cleaning cycles CIP
Sterilization cycles SIP
Temperature compensation

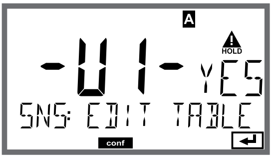
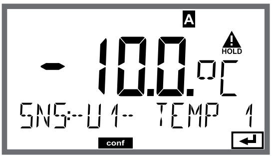
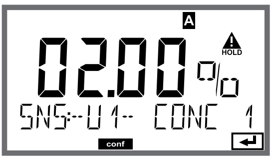
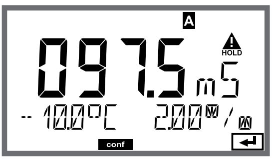
meas



3

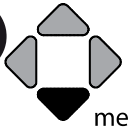
Menu item	Action	Choices
Concentration determination 	**For concentration measurement only** Use the arrow keys ▲ ▼ to select the desired concentration solution. Confirm with **enter**	**-01- (NaCl),** -02- (HCl), -03- (NaOH), -04- (H_2SO_4), -05- (HNO_3), -06- (H_2SO_4), -07- (HCl), -08- (HNO_3), -09- (H_2SO_4), -10- (NaOH), -U1-

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

	Press **enter** to confirm	
	Use the arrow keys ▲ ▼ ◀ ▶ to enter temperature values 1 ... 5. Confirm with **enter**	Input range: –50…250 °C / –58…482 °F
	Use the arrow keys ▲ ▼ ◀ ▶ to enter concentration value 1. Confirm with **enter**	
	For concentration value 1: Use the arrow keys ▲ ▼ ◀ ▶ to enter conductivity values for temperatures 1 … 5. Confirm with **enter**	

Sensor, Temperature Unit

1



menu

2

enter

3

enter

meas

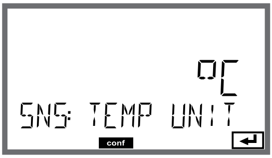
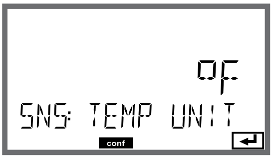
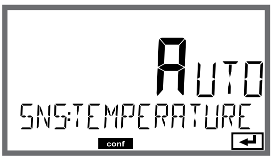
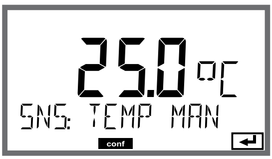
4

1 Press **menu**.
2 Select **CONF** using ◀ ▶, press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶, press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

3

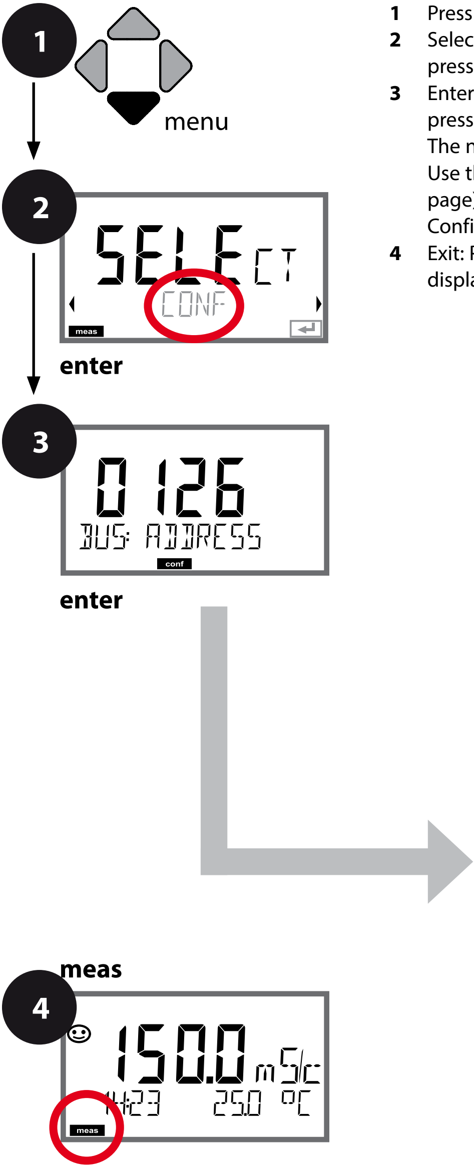
PROFIBUS address
Sensor type
Temperature probe
Cell factor
Transfer ratio
Measuring mode
Measuring range
Concentration determination
Temperature unit
Temperature detection
Cleaning cycles CIP
Sterilization cycles SIP
Temperature compensation

3

Menu item	Action	Choices
Temperature unit  	Select °C or °F using ▲ ▼ keys. Press **enter** to confirm.	**°C** / °F
Temp detection 	Select mode using ▲ ▼ keys: AUTO: Measured by sensor MAN: Direct input of temperature, no measurement (see next step) BUS: Value from AO block Press **enter** to confirm.	**AUTO** MAN BUS
(Manual temperature) 	Modify value using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm.	–50…250 °C **(25.0 °C)** (–58…482 °F) **(77.0 °F)**

Condl

Sensor, Cleaning Cycles, Sterilization Cycles

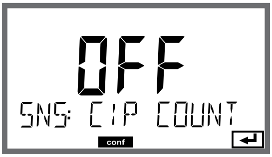
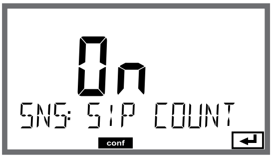


1. Press **menu**.
2. Select **CONF** using ◀ ▶, press **enter**.
3. Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶, press **enter**.
   The next menu item appears.
   Use the arrow keys ▲ ▼ for selection (see right-hand page).
   Confirm (and proceed) by pressing **enter**.
4. Exit: Press **meas** key until the [meas] mode indicator is displayed.

3

PROFIBUS address
Sensor type
Temperature probe
Cell factor
Transfer ratio
Measuring mode
Measuring range
Concentration determination
Temperature unit
Temperature detection
Cleaning cycles CIP
Sterilization cycles SIP
Temperature compensation

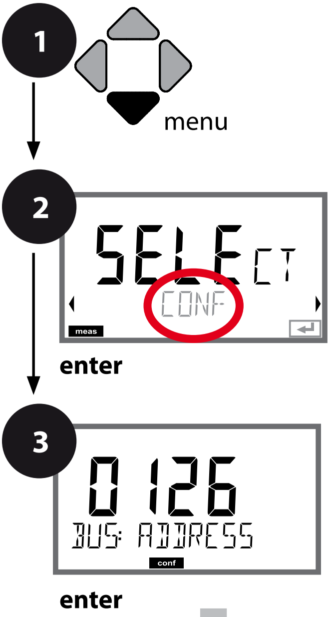
3

Menu item	Action	Choices
CIP Cleaning cycles on/off  	Select ON or OFF using ▲ ▼ keys. Activates/deactivates logging in logbook Press **enter** to confirm.	ON/**OFF**
SIP Sterilization cycles on/off  	Select ON or OFF using ▲ ▼ keys. Activates/deactivates logging in logbook Press **enter** to confirm.	ON/**OFF**

The cleaning and sterilization cycles are logged 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).

Note:
A CIP or SIP cycle is only entered into the logbook 2 hours after the start to ensure that the cycle is complete.

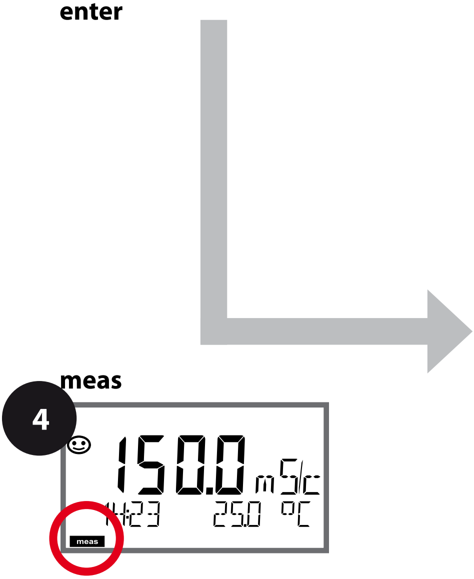
Temperature Compensation (Condl)



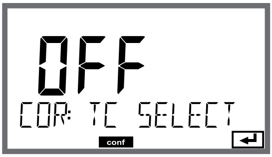
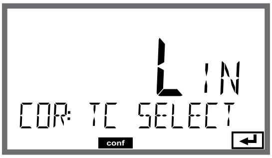
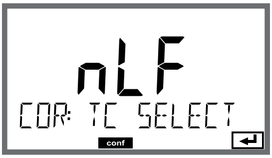
1 Press **menu**.
2 Select **CONF** using ◀ ▶,
press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶,
press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

3

PROFIBUS address
Sensor type
Temperature probe
Cell factor
Transfer ratio
Measuring mode
Measuring range
Concentration determination
Temperature unit
Temperature detection
Cleaning cycles CIP
Sterilization cycles SIP
Temperature compensation



3

Menu item	Action	Choices
Temp compensation 	Select desired compensation using ▲ ▼ keys: **OFF:** Temperature compensation switched off	**OFF** LIN NLF nACL HCL nH3 nAOH
	**LIN**: Linear temperature compensation Select desired temperature coefficient and reference temperature using ▲ ▼ keys.	TC LIQUID **00.00** … +19.99 %/K REF TEMP -20 … 200 °C **(25.0 °C)** 4 … 392 °F **(077.0 °F)**
	**NLF:** Temperature compensation for natural waters to EN 27888	
	**nACl:** Temperature compensation for ultrapure water with NaCl traces	
	**HCL:** Temperature compensation for ultrapure water with HCl traces	
	**nH3:** Temperature compensation for ultrapure water with NH_3 traces Confirm by pressing **enter**	
	NaOH (without figure)	

Oxy

Oxy Configuration				Choices DEFAULT **in bold**
BUS:	**ADDRESS**			0000 … **0126**
SNS:				**STANDARD** | TRACES | SUBTRACES | MEMOSENS | ISM | LDO SE 740*)
	MEAS MODE			**dO %** | dO mg/l | dO ppm | GAS %
	U-POL MEAS 1)			0000 … -1000 mV **(-675 mV)**
	U-POL CAL1)			0000 … -1000 mV **(-675 mV)**
	MEMBR.COMP 1) 3)			00.50 … 03.00 **(01.00)**
	RTD TYPE 1) 3)			**22 NTC** | 30 NTC
	TEMP UNIT			**°C** | °F
	CALMODE 2)			**CAL AIR** | CAL WTR
	CAL TIMER 3)			ON | **OFF**
	ON	**CAL CYCLE**		0 … 9999 h **(0168 h)**
	ACT 4)			**OFF** | AUTO | MAN
	MAN	**ACT CYCLE** 4)		0 … 9999 DAY (**0030 DAY**)
	TTM4)			**OFF** | AUTO | MAN**)**
	MAN	**TTM CYCLE** 4)		0 … 2000 DAY (**0365 DAY**)
	CIP COUNT			ON | **OFF**
	ON	**CIP CYCLES** 5)		0 … 9999 CYC (**0000 CYC**)
	SIP COUNT			ON | **OFF**
	ON	**SIP CYCLES** 5)		0 … 9999 CYC **(0000 CYC)**
	AUTOCLAVE 5)			ON **| OFF**
	ON		**AC CYCLES** 5)	0 … 9999 CYC **(0000 CYC)**
COR:	**SALINITY**			00.00 … 45.00 ppt **(00.00 ppt)**
	PRESSURE UNIT			**BAR** | KPA | PSI
	PRESSURE			**MAN** | BUS
	MAN	BAR	**PRESSURE**	0.000 … 9.999 BAR **(1.013 BAR)**
	MAN	KPA	**PRESSURE**	000.0 … 999.9 KPA **(100 KPA)**
	MAN	PSI	**PRESSURE**	000.0 … 145.0 PSI **(14.5 PSI)**
IN:	**FLOW ADJUST**			0 … 20 000 l/L **(12 000 l/L)**
ALA:	**ALARM DELAY**			0 … 600 SEC **(010 SEC)**
	SENSOCHECK			ON | **OFF**
	HOLD			OFF | **LAST**

Oxy Configuration		Choices DEFAULT **in bold**
CLK:	**CLK FORMAT**	**24h** | 12h
	CLK TIME	hh:mm | hh.mm (A/M) **(00.00)**
	CLK DAY/MONTH	dd.mm **(01.01.)**
	CLK YEAR	yyyy **(2014)**

* Stratos Pro A451N only
1) omitted for Memosens and LDO SE 740
2) omitted for MEAS MODE = GAS %
3) omitted for ISM
4) only for ISM
5) only for ISM and LDO SE 740

Oxy Configuration (Template for Copy)

Parameter		**Default**	**User setting**
BUS:	Address	126	
SNS:	Sensor type	STANDARD	
	Measuring mode	dO %	
	Polarization voltage, measurement [1]	-675 mV	
	Polarization voltage, calibration [1]	-675 mV	
	Membrane compensation [1] [3]	01.00	
	Type of temp probe [1] [3]	22 NTC	
	Temperature unit	°C	
	Calibration mode [2]	CAL AIR	
	Calibration timer [3]	OFF	
	Calibration cycle	7 DAY	
	Adaptive cal timer (ACT) [4]	OFF	
	Calibration cycle (ACT) [4]	30 DAY	
	Adaptive maintenance timer (TTM) [4]	OFF	
	Maintenance cycle (TTM) [4]	365 DAY	
	CIP counter	OFF	
	CIP cycles [5]	0000 CYC	
	SIP counter	OFF	
	SIP cycles [5]	0000 CYC	
	Autoclaving counter [5]	OFF	
	Autoclaving cycles [5]	0000 CYC	
COR:	Salinity	00.00 ppt	
	Pressure unit	BAR	
	Pressure measurement	MAN	
	Manual pressure, BAR	1.013 bar	
	Manual pressure, KPA	100 KPA	
	Manual pressure, PSI	14.5 PSI	

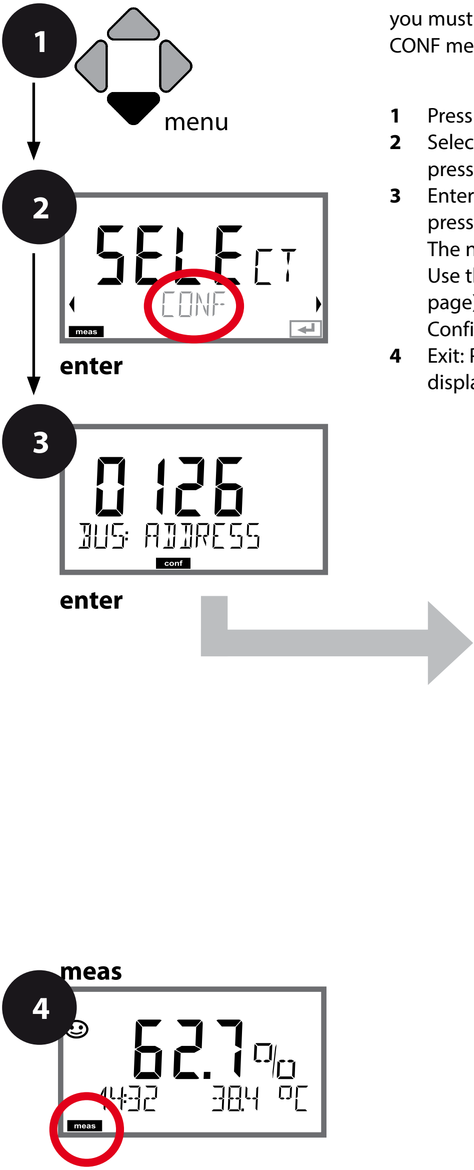
Parameter		Default	User setting
IN:	Flow meter (pulses/liter)	12 000 l/L	
	Flow meter (pulse recording interval)	1 s	
ALA:	Delay	10 s	
	Sensocheck	OFF	
	HOLD mode	LAST	
CLK:	Time format	24h	
	Time hh/mm	00.00	
	Day/Month	01.01.	
	Year	2014	

[1] omitted for Memosens and LDO SE 740
[2] omitted for MEAS MODE = GAS %
[3] omitted for ISM
[4] only for ISM
[5] only for ISM ad LDO SE 740

Oxy

Device Type: Oxy

Connected modules are automatically recognized. In the SERVICE menu you can change the device type. Afterwards, you must select the corresponding calibration mode in the CONF menu.

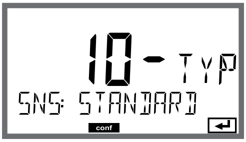
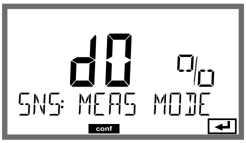
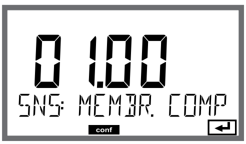
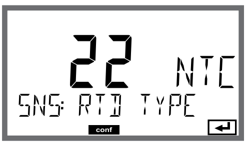


1 Press **menu**.
2 Select **CONF** using ◀ ▶, press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶, press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

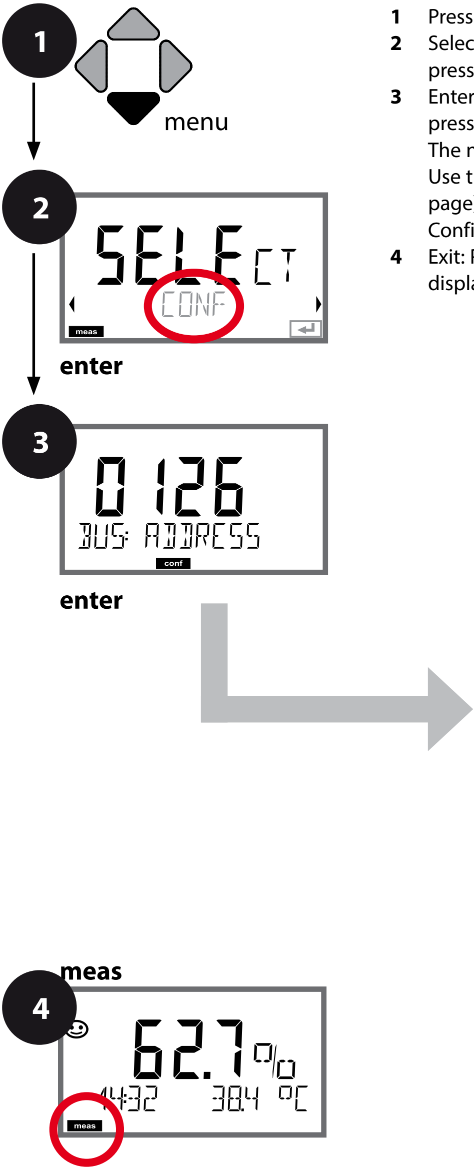
3

PROFIBUS address
Sensor type
Measuring mode
Polarization voltage during meas/cal
Membrane compensation
Type of temp probe
Temperature unit
Calibration mode water/air
Calibration timer
Adaptive calibration timer
Adaptive maintenance timer
Cleaning cycles CIP
Sterilization cycles SIP
Autoclaving counter
Salinity
Pressure unit
Pressure correction

3

Menu item	Action	Choices
PROFIBUS address 	Adjust value using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm. **Note:** When communication is active, the PROFIBUS address cannot be changed.	0000 … **0126**
Sensor type 	Select sensor type using ▲ ▼ keys. Press **enter** to confirm.	**STANDARD** TRACES SUBTRACES MEMOSENS ISM LDO SE 740 (A451N only)
Measuring mode 	Select measuring mode using ▲ ▼ keys. dO: Measurement in liquids GAS: Measurement in gases Press **enter** to confirm.	**dO %,** dO mg/l dO ppm GAS %
Polarization voltage 	To be entered separately for measurement and calibration. When measuring low oxygen concentrations (traces) U-POL MEAS = –500 mV Enter V_{pol} using arrow keys. Press **enter** to confirm.	**–675 mV** 0000 … -1000 mV ***not for Memosens, ISM and LDO SE 740***
Membrane compensation 	Enter membrane compensation using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	**01.00** 00.50 … 03.00 ***not for Memosens, ISM and LDO SE 740***
Type of temp probe 	Select type of temperature probe using ▲ ▼ keys. Press **enter** to confirm.	**22 NTC** 30 NTC ***not for Memosens, ISM and LDO SE 740***

Sensor, Temperature Unit, Medium: Water/Air, Calibration Timer

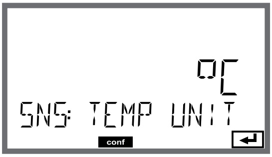
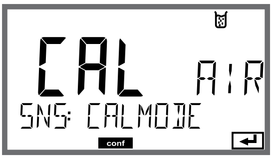
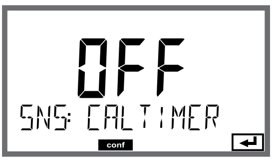
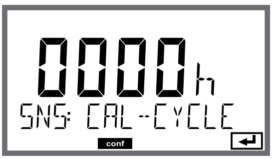


1. Press **menu**.
2. Select **CONF** using ◀ ▶,
   press **enter**.
3. Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶,
   press **enter**.
   The next menu item appears.
   Use the arrow keys ▲ ▼ for selection (see right-hand page).
   Confirm (and proceed) by pressing **enter**.
4. Exit: Press **meas** key until the [meas] mode indicator is displayed.

3

PROFIBUS address
Sensor type
Measuring mode
Polarization voltage during meas/cal
Membrane compensation
Type of temp probe
Temperature unit
Calibration mode air/water
Calibration timer
Adaptive calibration timer
Adaptive maintenance timer
Cleaning cycles CIP
Sterilization cycles SIP
Autoclaving counter
Salinity
Pressure unit
Pressure correction

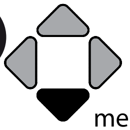
3

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

Note for the calibration timer:
When Sensocheck has been activated, the Sensoface indicator reminds you when the calibration interval is about to expire (beaker icon and smiley). The time remaining until the next due calibration can be seen in the diagnostics menu (see Diagnostics chapter, from page 156 onwards).

ISM Sensor, Adaptive Cal Timer (ACT)

1



menu

2

enter

3

enter

meas

4

1 Press **menu**.
2 Select **CONF** using ◀ ▶,
press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶,
press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

3

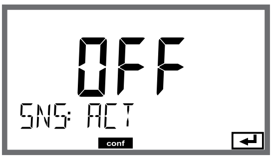
PROFIBUS address
Sensor type
Measuring mode
Polarization voltage during meas/cal
Membrane compensation
Type of temp probe
Temperature unit
Calibration mode air/water
Calibration timer
Adaptive calibration timer
Adaptive maintenance timer
Cleaning cycles CIP
Sterilization cycles SIP
Autoclaving counter
Salinity
Pressure unit
Pressure correction

Adaptive Cal Timer (ACT)

By issuing a Sensoface message, the adaptive calibration timer reminds you to calibrate the sensor. After expiration of the interval, Sensoface is getting “sad”. Pressing the **info** key shows the text “OUT OF CAL TIME CALIBRATE SENSOR” which reminds you that a calibration is due. The ACT interval is either read automatically from the sensor settings or can be specified manually (max. 2000 days). Stressing influences (temperature, measurement in extreme ranges) shorten the timer interval.

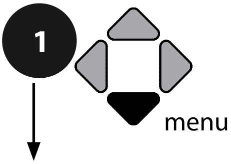
The adaptive cal timer is reset after each calibration.

3

Menu item	Action	Choices
Adaptive cal timer (ACT)   	Select using ▲ ▼ : OFF: No timer AUTO: The interval stored in the ISM sensor is used. MAN: The interval is specified manually (0 ... 2000 days). Default ACT CYCLE: 30 days Press **enter** to confirm.	**OFF** AUTO MAN

Oxy

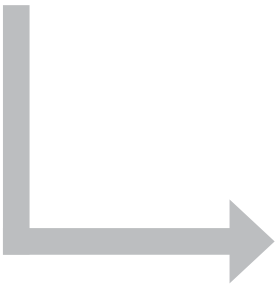
ISM Sensor, Adaptive Maintenance Timer (TTM)



enter

enter

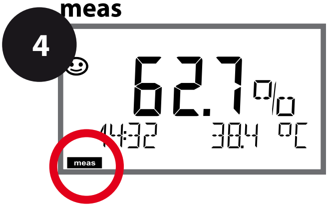
1 Press **menu**.
2 Select **CONF** using ◀ ▶, press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶, press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.



3

PROFIBUS address
Sensor type
Measuring mode
Polarization voltage during meas/cal
Membrane compensation
Type of temp probe
Temperature unit
Calibration mode air/water
Calibration timer
Adaptive calibration timer
Adaptive maintenance timer
Cleaning cycles CIP
Sterilization cycles SIP
Autoclaving counter
Salinity
Pressure unit
Pressure correction

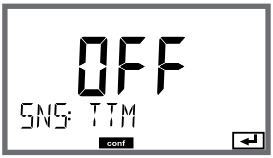
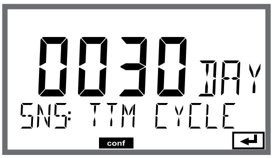
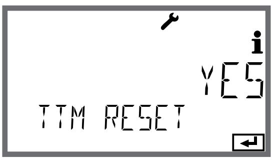
meas



Adaptive Maintenance Timer (TTM, Time to Maintenance)

By issuing a Sensoface message, the adaptive maintenance timer reminds you to service the sensor. After expiration of the interval, Sensoface is getting “sad”. Pressing the **info** key shows the text “OUT OF MAINTENANCE CHECK ELECTROLYTE AND MEMBRANE” which reminds you that a sensor maintenance is due. The TTM interval is either read automatically from the sensor settings or can be specified manually (max. 2000 days). Stressing influences (temperature, measurement in extreme ranges) shorten the timer interval.

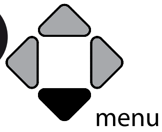
3

Menu item	Action	Choices
Adaptive maintenance timer (TTM)  	Select using arrow keys: AUTO: The interval stored in the ISM sensor is used. MAN: The interval is specified manually (0 ... 2000 days). Default TTM CYCLE: 365 days Press **enter** to confirm.	**OFF** AUTO MAN
The adaptive maintenance timer can be reset in the SERVICE / SENSOR / TTM menu. Here, the interval is reset to its initial value.		
	To do so, select **“TTM RESET = YES”** and confirm by pressing **enter**.	**NO** / YES

Oxy

Sensor, CIP Cleaning Cycles, SIP Sterilization Cycles

1



2

enter

3

enter

meas

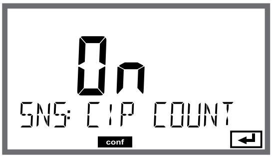
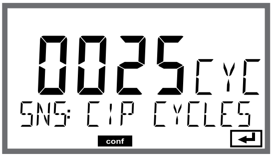
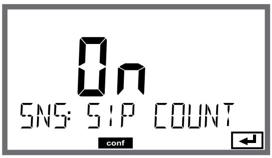
4

1 Press **menu**.
2 Select **CONF** using ◄ ►,
press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◄ ►,
press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

3

PROFIBUS address
Sensor type
Measuring mode
Polarization voltage during meas/cal
Membrane compensation
Type of temp probe
Temperature unit
Calibration mode air/water
Calibration timer
Adaptive calibration timer
Adaptive maintenance timer
Cleaning cycles CIP
Sterilization cycles SIP
Autoclaving counter
Salinity
Pressure unit
Pressure correction

3

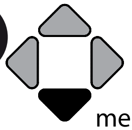
Menu item	Action	Choices
CIP counter 	Adjust CIP counter using ▲ ▼: OFF: No counter ON: Fixed cleaning cycle (adjust in the next step) Press **enter** to confirm.	ON **OFF**
CIP cycles 	Only with CIP COUNT ON: Enter max. number of cleaning cycles using ▲ ▼ ◀ ▶ keys Press **enter** to confirm.	**0000** … 9999 CYC
SIP counter 	Adjust SIP counter using ▲ ▼: OFF: No counter ON: Max. sterilization cycles (adjust as for CIP counter) Press **enter** to confirm.	ON **OFF**

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).

Oxy

ISM Sensor, Autoclaving Counter

1



menu

2

enter

3

enter

meas

4

1 Press **menu**.
2 Select **CONF** using ◄ ►,
press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◄ ►,
press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

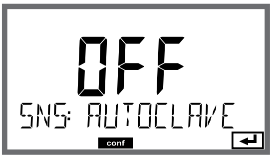
3

PROFIBUS address
Sensor type
Measuring mode
Polarization voltage during meas/cal
Membrane compensation
Type of temp probe
Temperature unit
Calibration mode air/water
Calibration timer
Adaptive calibration timer
Adaptive maintenance timer
Cleaning cycles CIP
Sterilization cycles SIP
Autoclaving counter
Salinity
Pressure unit
Pressure correction

Autoclaving Counter

After reaching a specified limit value the autoclaving counter generates a Sensoface message. As soon as the counter has reached the specified value, Sensoface is getting "sad". Pressing the **info** key shows the text "AUTOCLAVE CYCLES OVERRUN" which reminds you that the maximum number of autoclaving cycles has been reached. After each autoclaving process, you must manually increment the autoclaving counter in the SENSOR service menu. The transmitter displays "INCREMENT AUTOCLAVE CYCLE" as confirmation.

3

Menu item	Action	Choices
Autoclaving counter   	Select using arrow keys: OFF: No counter ON: The cycles are specified manually (**0000** … 9999). Press **enter** to confirm.	ON **OFF** ***For ISM only***
With the autoclaving counter switched on, you must increment the count after each autoclaving process:		
Incrementing the autoclaving counter (SERVICE menu)  	After having completed an autoclaving process, open the SERVICE menu SENSOR / AUTOCLAVE to increment the autoclaving count. To do so, select "**YES**" and confirm by pressing **enter**.	**NO** YES

Oxy

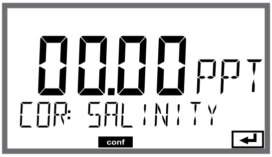
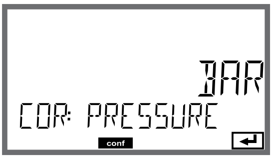
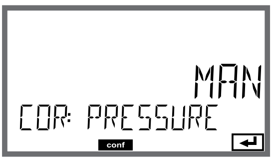
Correction (Oxy), Salinity Correction, Pressure Correction

1 Press **menu**.
2 Select **CONF** using ◀ ▶,
press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶,
press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

3

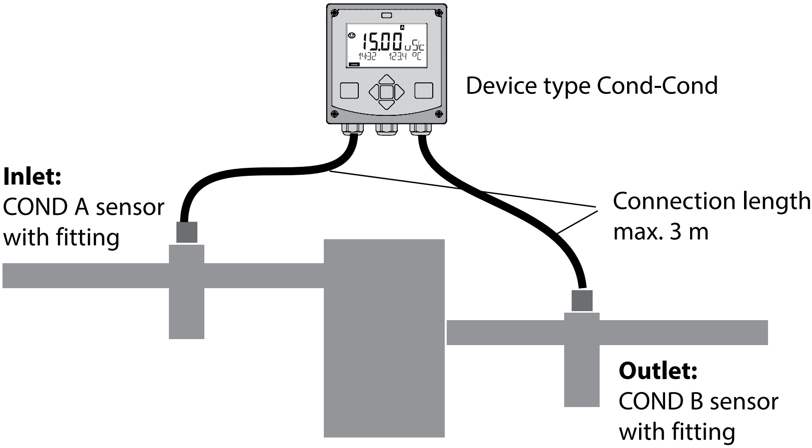
PROFIBUS address
Sensor type
Measuring mode
Polarization voltage during meas/cal
Membrane compensation
Type of temp probe
Temperature unit
Calibration mode air/water
Calibration timer
Adaptive calibration timer
Adaptive maintenance timer
Cleaning cycles CIP
Sterilization cycles SIP
Autoclaving counter
Salinity
Pressure unit
Pressure correction

3

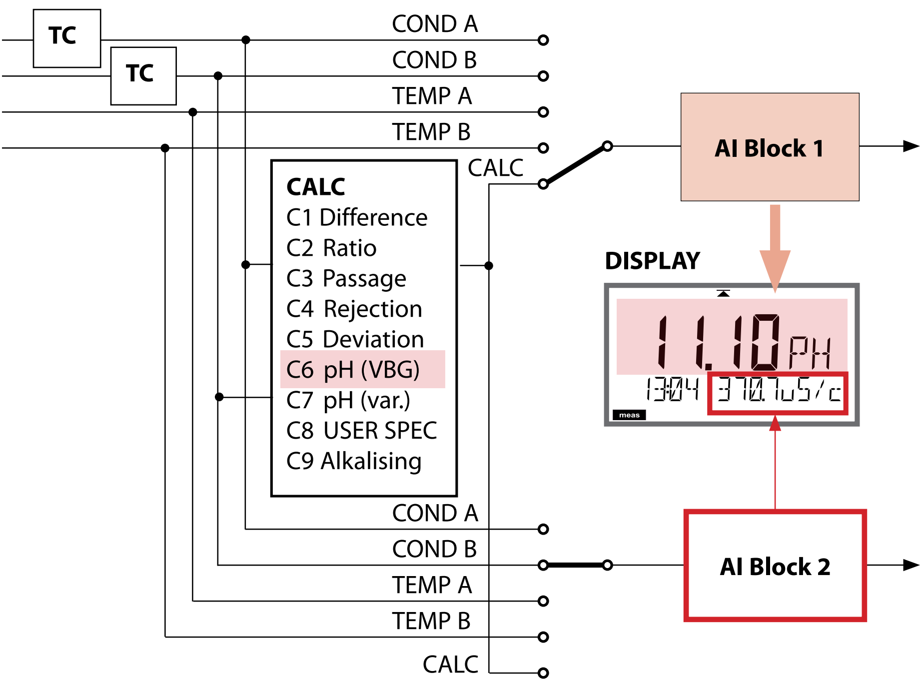
Menu item	Action	Choices
Salinity 	Adjust salinity correction using ▲ ▼. Press **enter** to confirm.	**00.00 ppt** xx.xx ppt
Pressure unit 	Select pressure unit using ▲ ▼. Press **enter** to confirm.	**BAR** KPA PSI
Pressure correction 	Select using ▲ ▼ keys: MAN: Manual input BUS: Value from AO block Press **enter** to confirm.	MAN BUS
Manual pressure input 	Enter value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	Input range: 0.000 … 9.999 BAR 000.0 … 999.9 KPA 000.0 … 145.0 PSI **1.013 BAR** **100 KPA** **14.5 PSI**

CC

Sensors A and B – Arrangement



Channel Selection and Display Assignment



Calculations (CALC)

CONF	Calculation	Formula
-C1-	Difference	COND A – COND B
-C2-	Ratio	COND A / COND B
-C3-	Passage	COND B / COND A · 100
-C4-	Rejection	(COND A – COND B) / COND A · 100
-C5-	Deviation	(COND B – COND A) / COND A · 100
-C6- [2)]	pH value acc. to VBG S-006	Additional specifications possible for calculating the consumption of the ion exchanger (size, capacity, efficiency)
	Alkalizing agent NaOH	11+log((COND A – COND B /3)/243)
	Alkalizing agent LiOH	11+log((COND A – COND B /3)/228)
	Alkalizing agent NH3	11+log((COND A – COND B /3)/273)
	EXCHER CAP	ON / **OFF** **Displaying the remaining capacity:** Diagnostics / Monitor menu After replacement of the ion exchanger an entry must be made in the SERVICE menu, see p. 163.
	EXCHER SIZE	Input of ion exchanger size
	CAPACITY	Input of ion exchanger capacity
	EFFICIENCY	Input of ion exchanger efficiency
-C7-	Variable pH value, factors specifiable	C+log((Cond A -Cond B / F1) / F2) / F3
	COEFFICIENT	Coefficient C
	FACTOR 1	Factor F1
	FACTOR 2	Factor F2
	FACTOR 3	Factor F3

CC

-C8-	USER SPEC[1] (DAC) PARAMETER W, A, B specifiable	
-C9-[2]	ALKALISING	Concentration of the alkalizing agent selecting NaOH, NH_3, LiOH
	nAOH	Concentration calculation
	nH3	Concentration calculation
	LiOH	Concentration calculation

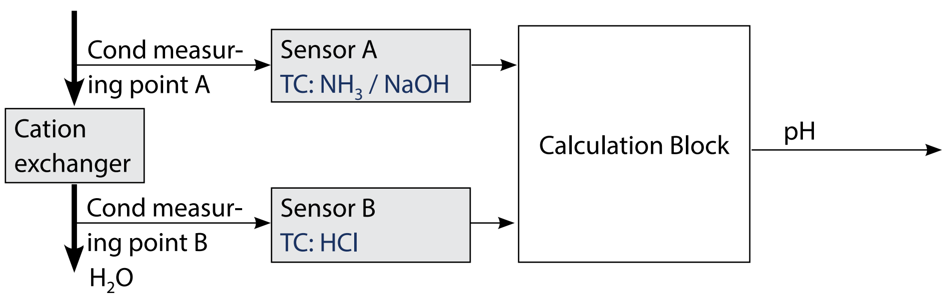
1) Input of user-specific parameters possible

2) With C6 and C9, the concentration of the alkalizing agent can be shown in the measurement display and in the sensor monitor and it can be switched to the current outputs.

Calculating the pH Value by Means of Dual Conductivity Measurement

When monitoring boiler feedwater in power plants, dual conductivity measurement can be used to calculate the pH value. For that purpose, the boiler feedwater conductance is measured before and after the cation exchanger. This commonly used method of indirect pH value measurement does not require much maintenance and has the following advantage:
Normal pH measurement in ultrapure water is very critical. Boiler feedwater does not contain many ions. This requires the use of a special electrode, which must be calibrated constantly and the service life of which is generally rather short.

Function
Two sensors are used to measure the conductivity before and after the cation exchanger. The pH value is inferred from these two conductivity values.



Calculated pH Value

To obtain a correct pH measurement, a great number of conditions must be observed. In practice, the pH value of the power plant feedwater is therefore calculated from the specific conductivity and the cation conductivity using the method described below.

When only one single alkalizing agent is used, such as ammonia, sodium hydroxide or lithium hydroxide, the pH in the range of 7.5 to 10.5 can be calculated as follows:

$$pH_{NH_3} = \log\left(\frac{x_v - {}^1/_3\, x_h}{273}\right) + 11$$

$$pH_{NaOH} = \log\left(\frac{x_v - {}^1/_3\, x_h}{243}\right) + 11$$

$$pH_{LiOH} = \log\left(\frac{x_v - {}^1/_3\, x_h}{228}\right) + 11$$

x_v = Conductivity

x_h = Cation conductivity

The conductivity values used for calculating the pH must be temperature compensated.

This calculation method is basically applicable. With increasing cation conductivity values, however, a decreasing accuracy must be tolerated.

(Translation of extract from VGB-S-006-00-2012-09-DE, pages 62, 63)

Configuration			**Choices** DEFAULT **in bold**
BUS:	**ADDRESS**		0000 … **0126**
SENSOR A			
S_A:	**CELLFACTOR (A)**[1)]		0.0050 … 1.9999 **(0.0290)**
	TC SELECT (A)		**OFF** | LIN | nLF | nACL | HCL | nH3 | nAOH
	LIN	**TC LIQUID (A)**	00.00 … +19.99 %/K **(00.00 %/K)**
	LIN	**REF TEMP (A)**	-20 … 200 °C **(25.0 °C)** 4 … 392 °F **(077.0 °F)**
SENSOR B			
S_B:	**CELLFACTOR (B)**[1)]		0.0050 … 1.9999 **(0.0290)**
	TC SELECT (B)		**OFF** | LIN | nLF | nACL | HCL | nH3 | nAOH
	LIN	**TC LIQUID (B)**	00.00 … +19.99 %/K **(00.00 %/K)**
	LIN	**REF TEMP (B)**	-20 … 200 °C **(25.0 °C)** 4 … 392 °F **(077.0 °F)**
MEAS MODE			
MES:	**MEAS RANGE**[2)] Setting applies to both channels, A and B		0.000 µS/cm **00.00 µS/cm** 000.0 µS/cm 0000 µS/cm 00.00 MΩ
	TEMP UNIT		**°C** | °F
	CALCULATION		ON | **OFF**
	ON		**-C1- DIFFERENCE** -C2- RATIO -C3- PASSAGE -C4- REJECTION -C5- DEVIATION -C6- PH VGB -C7- PH VARIABLE -C8- USER SPEC -C9- ALKALISING
	-C6-	**PH VGB**	**nAOH** | LiOH | nH3
		Entries for Calculating the Consumption of the Ion Exchanger	
		EXCHER CAP [3)]	ON | **OFF**
		EXCHER SIZE [3)]	**00.50** … 5.00 LTR
		CAPACITY [3)]	**1.000** … 5.000 VAL
		EFFICIENCY [3)]	50.00 … **100.0** %

Configuration			Choices DEFAULT **in bold**
MES:	-C7-	**COEFFICIENT**	00.00 … 99.99 **(11.00)**
		FACTOR 1	0.0001 ... 9.9999 **(3.0000)**
		FACTOR 2	0001 ... 9999 **(0243)**
		FACTOR 3	0.0001 ... 9.9999 **(1.0000)**
	-C8-	**PARAMETER W**	xxxx E-3 **(1000 E-3)**
		PARAMETER A	xxx.x E-3 **(000.0 E-3)**
		PARAMETER B	xxx.x E-3 **(000.0 E-3)**
	-C9-	**ALKALISING**	**NaOH**, NH3, LiOH

1) The cell constant can be modified by an entry in the configuration menu or by calibration (one storage position). This means, a cell constant determined by calibration is taken over by pressing **enter** during configuration. It remains unchanged until a new value is entered.
2) For conductivity (µS/cm), the range selection determines the max. resolution. If the selected range is exceeded, the device automatically switches to the next higher range until the max. measurement limit is reached (9999 µS/cm). This applies to display values and current outputs. The current outputs are adjusted using a floating-point editor which allows settings over several decades. The initial range of the editor is the selected range:

Selected resolution	Displayed range (or floating-point editor)			
	x.xxx µS/cm	xx.xx µS/cm	xxx.x µS/cm	xxxx µS/cm
x.xxx µS/cm				
xx.xx µS/cm				
xxx.x µS/cm				
xxxx µS/cm				

3) Entries for calculating the consumption of the ion exchanger: Activate with EXCHER CAP = ON. Messages in the Diagnostics / Monitor menu.

You can enter more parameters for calculating the consumption of the ion exchanger (size, capacity, efficiency). The remaining capacity can be viewed in the DIAGNOSTICS / MONITOR menu or directly from within measuring mode by repeatedly pressing the **meas** key; see p. 155.
After replacement of the ion exchanger an entry must be made in the SERVICE menu.

Configuration		Choices DEFAULT **in bold**
IN:	**ADJUST FLOW**	0 … 20 000 l/L **(12 000 l/L)**
ALA:	**ALARM DELAY**	0 … 600 SEC **(010 SEC)**
	SENSOCHECK	ON | **OFF**
	HOLD	OFF | **LAST**
CLK:	**CLK FORMAT**	**24h** | 12h
	CLK TIME	hh:mm | hh.mm (A/M) **(00.00)**
	CLK DAY/MONTH	dd.mm **(01.01.)**
	CLK YEAR	yyyy **(2014)**

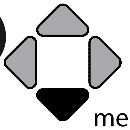
CC Configuration (Template for Copy)

CC

Parameter		**Default**	**User settings**
BUS:	Address	126	
S_A:	Cell factor A	0.0290	
	Temperature compensation A	OFF	
	Temperature compensation, LINEAR	00.00%/K	
	Reference temperature, LINEAR	25.0 °C (77.0 °F)	
S_B:	Cell factor B	0.0290	
	Temperature compensation B	OFF	
	Temperature compensation, LINEAR	00.00%/K	
	Reference temperature, LINEAR	25.0 °C (77.0 °F)	
MES:	Measuring range	00.00 µS/cm	
	Temperature unit	°C	
	Calculation	OFF	
	CALCULATION ON	-C1- DIFFERENCE	
	-C6- PH VGB	nAOH	
	-C6- EXCHER CAP	OFF	
	-C6- EXCHER SIZE	00.50 LTR	
	-C6- CAPACITY	1.000 VAL	
	-C6- EFFICIENCY	100.0 %	
	-C7- COEFFICIENT	11.00	
	-C7- FACTOR 1	3.0000	
	-C7- FACTOR 2	0243	
	-C7- FACTOR 3	1.0000	
	-C8- PARAMETER W	1000 E-3	
	-C8- PARAMETER A	000.0 E-3	
	-C8- PARAMETER B	000.0 E-3	
	-C9- ALKALISING	NaOH	
IN:	Flow meter (pulses/liter)	12 000 l/L	
	Flow meter (pulse recording interval)	1 s	

Parameter		Default	User settings
ALA:	Delay	10 s	
	Sensocheck	OFF	
	HOLD mode	LAST	
CLK:	Time format	24h	
	Time hh/mm	00.00	
	Day/Month	01.01.	
	Year	2014	

Flow Measurement

1 
menu

2 

enter

3 

enter

1 Press **menu**.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▴ ▾ ◂ ▸,
press **enter**.
The next menu item appears.
Use the arrow keys ▴ ▾ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

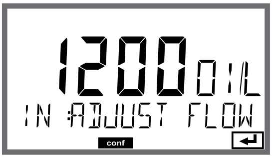
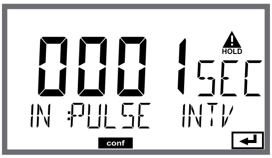
3

PROFIBUS address
…
Flow measurement
Alarm delay
Sensocheck
HOLD
Time and date

meas

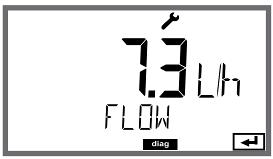
4 

3

Menu item	Action	Choices
PROFIBUS address 	Adjust value using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm. **Note:** When communication is active, the PROFIBUS address cannot be changed.	0000 … **0126**
Adjust to flow meter: 	You must adjust the device to the flow meter used. Enter value using ▲ ▼ keys, confirm by pressing **enter**.	0 … 20000 pulses/liter **12000 pulses/liter**
Set the pulse recording interval: 	Enter value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	1 … 20 SEC **0001 SEC**

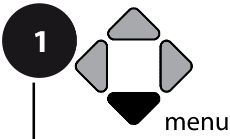
Display
Flow measurement in measuring mode

Display
Flow measurement (sensor monitor)



Note: The response speed may be reduced because the values are averaged.

Alarm, Alarm Delay, Sensocheck



enter

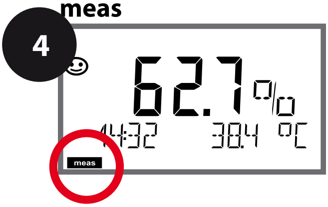
enter

1 Press **menu**.
2 Select **CONF** using ◀ ▶,
press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▲ ▼ ◀ ▶,
press **enter**.
The next menu item appears.
Use the arrow keys ▲ ▼ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

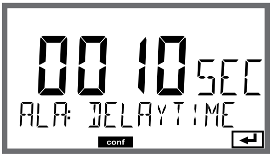
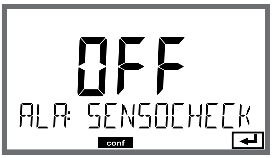
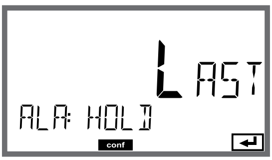
3

PROFIBUS address
…
Flow measurement
Alarm delay
Sensocheck
HOLD
Time and date

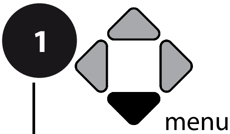
meas



3

Menu item	Action	Choices
Alarm delay 	Enter alarm delay using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm. The alarm delay time delays the color change of the display backlighting to red.	0 … 600 SEC (**010 SEC**)
Sensocheck 	Select Sensocheck (continuous monitoring of sensor membrane and lines). Select ON or OFF using ▲ ▼ keys. Press **enter** to confirm. (At the same time, Sensoface is activated. With OFF, Sensoface is also switched off.)	ON **OFF**
HOLD 	Status of measured value during calibration OFF: Measured value and status are updated as usual. LAST: Measured value and status remain at their last value (Last Usable Value).	OFF **LAST**

Setting the Time and Date



enter

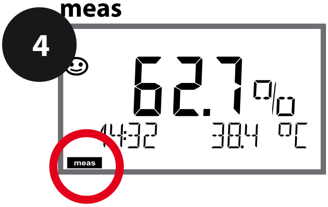
enter

1 Press **menu**.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Enter PROFIBUS address (0000 … 0126) using ▴ ▾ ◂ ▸,
press **enter**.
The next menu item appears.
Use the arrow keys ▴ ▾ for selection (see right-hand page).
Confirm (and proceed) by pressing **enter**.
4 Exit: Press **meas** key until the [meas] mode indicator is displayed.

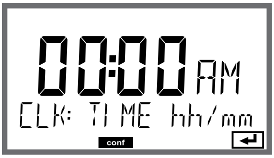
3

PROFIBUS address
…
Flow measurement
Alarm delay
Sensocheck
HOLD
Time and date

meas



3

Menu item	Action	Choices
Time format 	Select time format using ▲ ▼ keys. Press **enter** to confirm.	**24h** 12h
Time 	Enter time using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	hh:mm hh.mm (A/M) **00.00**
Day and month 	Enter day and month using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	dd.mm **01.01.**
Year 	Enter year using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	yyyy **2014**

Control of the calibration and cleaning cycles is based on the time and date of the integrated real-time clock. In measuring mode the time is shown in the lower display. When using digital sensors, the calibration data is written in the sensor head. In addition, the logbook entries (cf Diagnostics) are provided with a time stamp.

Note:

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

pH

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.

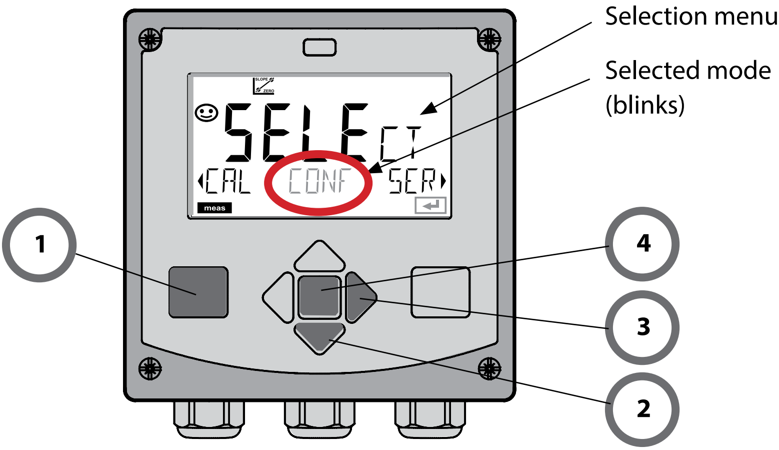
The device can only operate properly when the buffer solutions used correspond to the configured set. Other buffer solutions, even those with the same nominal values, may demonstrate a different temperature response.
This leads to measurement errors.

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.

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:

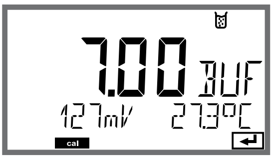
CAL_PH	Depending on configuation setting:	
	AUTO	Automatic buffer recognition (Calimatic)
	MAN	Manual buffer input
	DAT	Input of premeasured electrode data
CAL_ORP	ORP calibration	
P_CAL	Product calibration (calibration with sampling)	
ISFET-ZERO	Zero adjustment. Required for ISFET sensors. Subsequently 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 **menu** 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.



pH

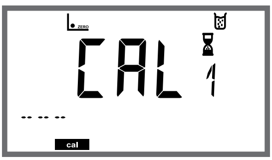
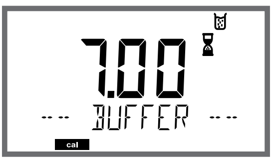
This adjustment allows the use of ISFET sensors with differing nominal zero (pH only). The function is available when ISFET has been selected during configuration. Zero adjustment is disabled for any other sensors.
The adjustment is made using a zero buffer (pH 7.00).
Permitted range for buffer value: pH 6.5 ... 7.5. Temperature-corrected input.
Maximum zero offset: ±200 mV

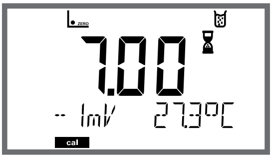
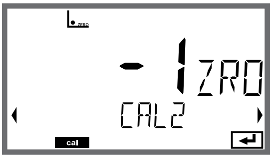
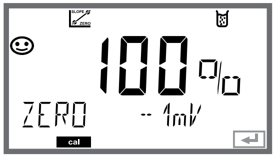
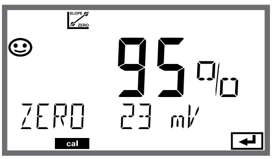
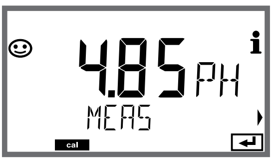
Display	Action	Remark
	Select Calibration. Press **enter** to proceed.	
	Ready for calibration. Hourglass blinks.	Display (3 sec)
	Immerse sensor in a pH 7.00 buffer. Enter the temperature-corrected pH value in the range 6.50 to 7.50 using the arrow keys (see buffer table). Press **enter** to confirm.	If the zero offset of the sensor is too large (> ±200 mV), a CAL ERR error message is generated. In that case the sensor cannot be calibrated.
	Stability check. The measured value [mV] is displayed. The “hourglass” icon is blinking.	Note: Stability check can be stopped (by pressing **enter**). However, this reduces calibration accuracy.

Display	Action	Remark
	At the end of the adjustment procedure the zero offset [mV] of the sensor is displayed (based on 25 °C). Sensoface is active. Press **enter** to proceed.	This is not the final calibration value of the sensor! Asymmetry potential and slope must be determined with a complete 2-point calibration.
	Use the arrow keys to select: • Repeat (repeat calibration) or • Measure Press **enter** to confirm.	
	Place sensor in process. Press **enter** to exit zero calibration.	

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.

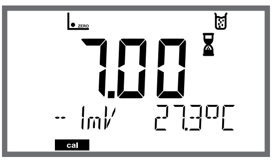
The AUTO calibration mode must have been preset during **configuration**.
Make sure that the buffer solutions used correspond to the configured buffer set. Other buffer solutions, even those with the same nominal values, may demonstrate a different temperature response. This leads to measurement errors.

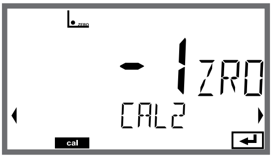
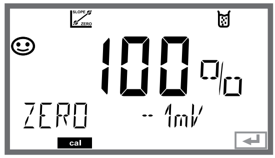
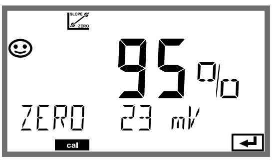
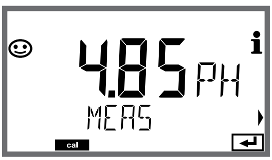
Display	Action	Remark
	Select Calibration. Press **enter** to proceed.	
	Ready for calibration. Hourglass blinks. Select calibration method: CAL_PH Press **enter** to proceed.	Display (3 sec)
	Remove the sensor, clean it, and immerse it in the first buffer solution (it does not matter which solution is taken first). Press **enter** to start.	
	Buffer recognition. While the “hourglass” icon is blinking, the sensor remains in the first buffer solution.	To reduce the sensor response time, first move it about in the buffer solution and then hold it still.
	Buffer recognition terminated, the nominal buffer value is displayed, then zero point and temperature.	

Display	Action	Remark
 	Stability check. The measured value [mV] is displayed, "CAL2" and "enter" are blinking. Calibration with the first buffer is terminated. Remove the sensor from the first buffer solution and rinse it thoroughly. **Use the arrow keys to select:** • END (1-point cal) • CAL2 (2-point cal) • REPEAT Press **enter** to proceed.	**Note:** Stability check can be stopped after 10 sec (by pressing **enter**). However, this reduces calibration accuracy. Display for 1-point cal:  Sensoface is active. Exit by pressing **enter**
	2-point calibration: Immerse sensor in second buffer solution. Press **enter** to start.	The calibration process runs as for the first buffer.
	Retract sensor out of second buffer, rinse off, re-install. Press **enter** to proceed.	The slope and asymmetry potential of the sensor (based on 25 °C) are displayed.
	**Use the arrow keys to select:** • MEAS (exit) • REPEAT Press **enter** to proceed.	When 2-point cal is exited: 

pH

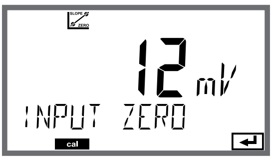
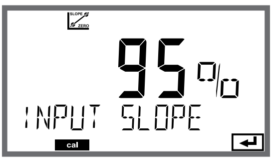
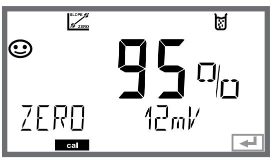
The MAN calibration mode and the type of temperature detection are selected during **configuration**. For calibration with manual buffer specification, you must enter the pH value of the buffer solution used in the device for the proper temperature. Any desired buffer solution can be used for calibration.

Display	Action	Remark
	Select Calibration. Press **enter** to proceed.	
	Ready for calibration. Hourglass blinks.	Display (3 sec)
	Remove the sensor and temperature probe, clean them, and immerse them in the first buffer solution. Press **enter** 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.
 	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.

Display	Action	Remark
	At the end of the stability check, the value will be saved and the asymmetry potential will be displayed. Calibration with the first buffer is terminated. Remove the sensor and temp probe from the first buffer solution and rinse them thoroughly. **Use the arrow keys to select:** • END (1-point cal) • CAL2 (2-point cal) • REPEAT Press **enter** to proceed.	**Note:** Stability check can be stopped after 10 sec (by pressing **enter**). However, this reduces calibration accuracy. Display for 1-point cal:  Sensoface is active. Exit by pressing **enter**
	2-point calibration: Immerse sensor and temperature probe in the second buffer solution. Enter pH value. Press **enter** to start.	The calibration process runs as for the first buffer.
	Rinse sensor and temperature probe and reinstall them. Press **enter** to proceed.	Display of slope and asymmetry potential of the sensor (based on 25 °C).
	**Use the arrow keys to select:** • MEAS (exit) • REPEAT Press **enter** to proceed.	When 2-point cal is exited: 

pH

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, eg, determined beforehand in the laboratory.

Display	Action	Remark
	Select Calibration. Press **enter** to proceed.	
	“Data Input“ Ready for calibration. Hourglass blinks.	Display (3 sec)
	Enter asymmetry potential [mV]. Press **enter** to proceed.	
	Enter slope [%].	
	The device displays the new slope and asymmetry potential (at 25 °C). Sensoface is active.	
	**Use the arrow keys to select:** • MEAS (exit) • REPEAT Press **enter** to proceed.	

Converting slope [%] to slope [mV] at 25 °C

%	mV
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
100	**59.2**
102	60.4

Converting asymmetry potential to sensor zero point

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

ZERO = Sensor zero

V_{AS} = Asymmetry potential

S = Slope

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.

$$\boxed{mV_{ORP} = mV_{meas} - \Delta mV}$$

mV_{ORP} = displayed ORP

mV_{meas} = direct sensor potential

ΔmV = delta value, determined during calibration

The sensor potential can also be related to another reference system – eg, 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.
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. Press **enter** to proceed.	
	Remove the sensor and temperature probe, clean them, and immerse them in the redox buffer.	Display (3 sec)
	Enter setpoint value for redox buffer. Press **enter** to proceed.	
	The ORP delta value is displayed (based on 25 °C). Sensoface is active. Press **enter** to proceed.	
	To repeat calibration: Select REPEAT. To exit calibration: Select MEAS, then **enter**	

pH Oxy Cond

(Example: pH)

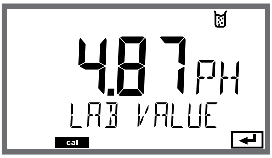
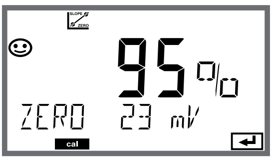
Calibration by sampling (one-point calibration).
During product calibration the sensor remains in the process.
The measurement process is only interrupted briefly.

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

Display	Action	Remark
	The device returns to measuring mode.	From the blinking CAL mode indicator, you see that product calibration has not been terminated.
	Product calibration step 2: When the sample value has been determined, open the product calibration once more (P_CAL).	Display (3 sec)
	The stored value is displayed (blinking) and can be over-written with the measured sample value. Press **enter** to proceed.	
	Display of new asymmetry potential (based on 25 °C). Sensoface is active. To exit calibration: Select MEAS, then **enter**	To repeat calibration: Select REPEAT, then **enter**
End of calibration.		

Oxy

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

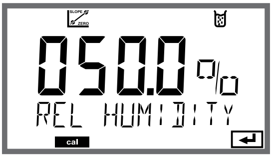
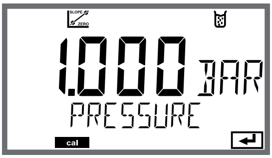
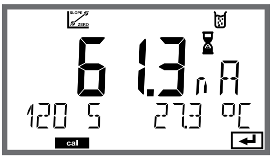
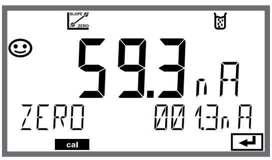
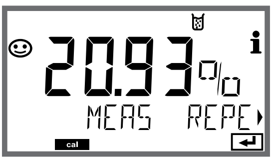
Note
All calibration procedures must be performed by trained personnel. Incorrectly set parameters may go unnoticed, but change the measuring properties.

Common Combination:
Process Variable / Calibration Mode

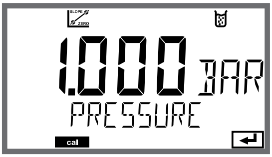
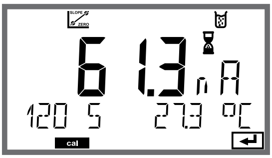
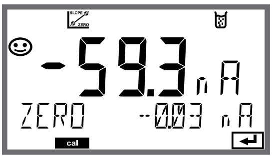
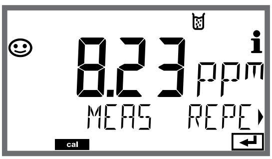
Measurement	Calibration	Application
Saturation	Water	Biotechnology; sensor cannot be removed for calibration (sterility)
Concentration	Air	Waters, open basins

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

Oxy

Display	Action	Remark
	Select calibration. Place sensor in air, press **enter** to start.	“Medium water“ or “Medium air“ is selected in the configuration.
	Enter relative humidity using **arrow keys** Press **enter** to proceed.	Default for relative humidity in air: rH = 50%
	Enter cal pressure using **arrow keys**. Press **enter** to proceed.	Default: **1.000 bar** Unit: bar/kpa/PSI
	Drift check: Display of: sensor current (nA), response time (s), temperature (°C/°F) Press **enter** to proceed.	The drift check can take some minutes.
	Display of calibration data (slope and zero). Press **enter** to proceed.	
	Display of selected process variable (here: %vol). MEAS exits calibration, REPEAT permits repetition.	

Slope Calibration in Water

Display	Action	Remark
	Select calibration (SLOPE). Immerse sensor in cal medium, start with **enter**	“Medium water“ or “Medium air“ is selected in the configuration.
	Enter cal pressure Press **enter** to proceed.	Default: **1.000 bar** Unit: bar/kpa/PSI
	Drift check: Display of: sensor current (nA), response time (s), temperature (°C/°F)	The drift check might take some time.
	Display of calibration data (slope and zero) and Sensoface Press **enter** to proceed.	Related to 25 °C and 1013 mbar
	Display of selected process value. To exit calibration: Select MEAS ◂ ▸, then **enter**	To repeat calibration: Select REPEAT ◂ ▸, then **enter**
	Place sensor in process. End of calibration	

(A451N only)

Calibrating/Adjusting the SE 740 Optical Oxygen Sensor

Every oxygen sensor has its individual slope (Stern-Volmer constant cvs) and its individual zero point (phase angle). Both values are altered, for example, by aging.
For sufficiently high accuracy of oxygen measurement, the analyzer must be regularly adjusted for the sensor data (adjustment).

Calibration/Adjustment Methods

- Automatic calibration in water/air
- Zero calibration
- Product calibration (saturation/concentration/partial pressure)
- Offset correction

Recommendations for Calibration

It is always recommended to calibrate in air. Compared to water, air is a calibration medium which is easy to handle, stable, and thus safe. In the most cases, however, the sensor must be removed for a calibration in air. In certain processes the sensor cannot be removed for calibration. Here, calibration must be performed directly in the process medium (e.g. by means of a product calibration).

If there is a temperature difference between the calibration medium and the measured medium, you must keep the sensor in the respective medium for several minutes before and after calibration in order to achieve stable measured values.
The type of calibration pressure detection is preset during parameter setting.

LDO Slope Calibration in Air

LDO

(A451N only)

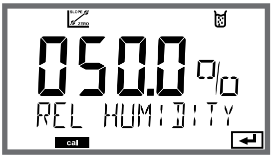
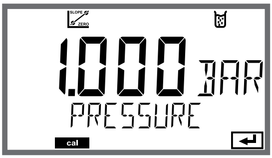
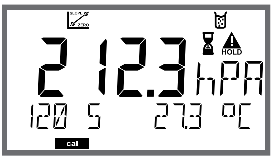
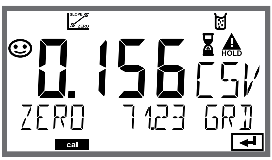
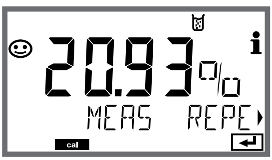
Automatic Calibration in Air

The slope is corrected using the saturation value (100 %), similar to air saturation of water. Since this analogy only applies to water-vapor saturated air (100 % relative humidity) and often the calibration air is less humid, the relative humidity of the calibration air must also be specified. If you do not know the exact value of the relative humidity of the calibration air, you can take the following reference values for a sufficiently precise calibration:

- Ambient air: 50 % rel. humidity (average)
- Bottled gas (synthetic air): 0 % rel. humidity

NOTICE!

The sensor membrane must be dry. Be sure to keep temperature and pressure constant during calibration. If there is a temperature difference between calibration medium and measured medium, you must keep the sensor in the respective medium for several minutes before and after calibration.

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

LDO Slope Calibration in Water

LDO

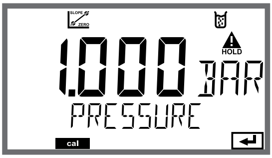
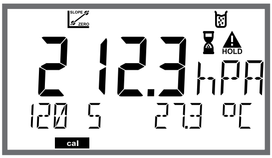
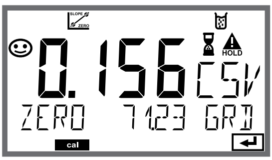
(A451N only)

Automatic Calibration in Water

The slope is corrected using the saturation value (100 %) of water in equilibrium with air.

NOTICE!

The calibration medium must be in equilibrium with air. Oxygen exchange between water and air is very slow. Therefore, it takes a relatively long time until water is saturated with atmospheric oxygen. If there is a temperature difference between calibration medium and measured medium, you must keep the sensor in the respective medium for several minutes before and after calibration.

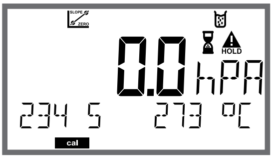
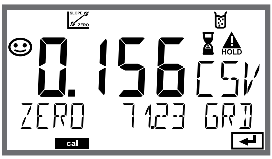
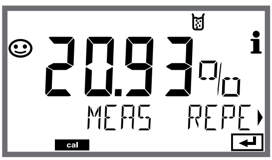
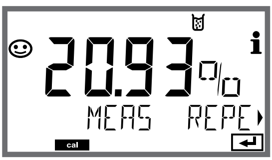
Display	Action	Remark
	Select calibration (SLOPE). Immerse sensor in cal medium, press **enter** to start.	“CAL WATER“ or “CAL AIR“ is selected in the configuration.
	Enter cal pressure Press **enter** to proceed.	Default: **1.013 bar** Unit: bar/kpa/PSI
	Drift check: Display of: Partial pressure (hPa) Response time (s) Temperature (°C/°F) Press **enter** to proceed.	Device goes to HOLD mode. The drift check might take some time.
	Display of calibration data Sensoface Stern-Volmer constant Press **enter** to proceed.	Phase angle with O_2=0
	Display of selected process value. To exit calibration: Select MEAS ◀ ▶, then **enter**	To repeat calibration: Select REPEAT ◀ ▶, then **enter**
	Place sensor in process. End of calibration	After end of calibration, the outputs remain in HOLD mode for a short time.

LDO

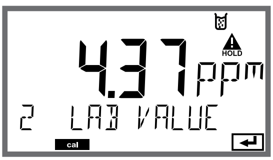
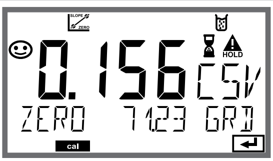
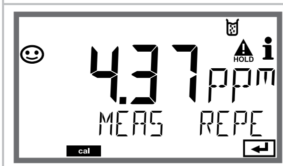
(A451N only)

Zero Correction

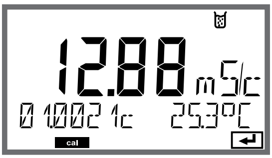
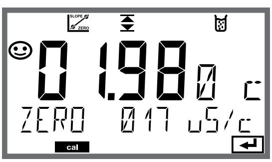
For trace measurements below 500 ppb, the zero point should be calibrated.
If you want to perform a zero correction, then you should keep the sensor in the calibration medium (eg, N_2 or sulfite solution) until the measured value has stabilized. This may well take several minutes. After that, you can start the calibration process.

Display	Action	Remark
	Select calibration. Place sensor in N_2, press **enter** to start. Device goes to HOLD mode.	"Zero Point" is selected in the configuration.
	Drift check: Display of: partial pressure (hPa), response time (s), temperature (°C/°F) Press **enter** to proceed.	The drift check can take some minutes.
	Display of calibration data Sensoface Stern-Volmer constant Press **enter** to proceed.	Phase angle with O_2=0
	Display of selected process value. To exit calibration: Select MEAS ◀ ▶, then **enter**	To repeat calibration: Select REPEAT ◀ ▶, then **enter**
	Place sensor in process. End of calibration	After end of calibration, the outputs remain in HOLD mode for a short time.

(A451N only)
When measuring in the oxygen trace range, you can use the product calibration menu to adjust an offset. The offset can only be determined for measured values < 20 mbar. For higher values, the analyzer corrects the slope and adjusts the Stern-Volmer constant in the sensor.
The offset is stored in the device, not in the sensor. It may be max. 2 mbar (approx. 1 % sat or 0,055 ppm / 0.055 mg/l).

Display	Action	Remark
	Ready for calibration. Hourglass blinks. Press **enter** to proceed.	Display (3 sec)
	Press **enter** to save the measured value.	
	Press **enter** to proceed.	
	The stored value is displayed (blinking). Enter offset. Press **enter** to proceed.	You can adjust an offset (%) when the oxygen concentration is below 20 mbar (20 hPa).
	Display of calibration data, Sensoface and Stern-Volmer constant Press **enter** to proceed.	
	Display of measured OXY value. Sensoface is active. To exit calibration: Select MEAS, then **enter** To repeat calibration: Select REPEAT, then **enter**	After end of calibration, the outputs remain in HOLD mode for a short time.

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

Display	Action	Remark
	Select Calibration. Press **enter** to proceed. Select CAL_SOL calibration method. Press **enter** to proceed.	
	Ready for calibration. Hourglass blinks.	Display (3 sec)
	Immerse sensor in calibration solution. Enter the temperature-corrected value of the calibration solution using the arrow keys (see table). Press **enter** to confirm.	Lower line: display of cell factor and temperature
	**Contacting conductivity measurement (COND)** The determined cell factor is displayed. The "hourglass" icon is blinking. Proceed by pressing **enter**	
	**Inductive conductivity measurement (CONDI)** The determined cell factor and zero point are displayed. The "hourglass" icon is blinking. Proceed by pressing **enter**	

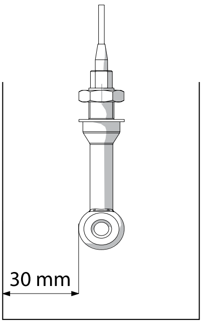
Display	Action	Remark
	Display of selected process variable (here: mS/cm). MEAS exits calibration, REPEAT permits repetition.	
	With MEAS selected: Press **enter** to exit calibration.	Display of conductivity and temperature, Sensoface is active. After display of GOOD BYE, the device automatically returns to measuring mode.

Note:

- Be sure to use known calibration solutions and the respective temperature-corrected conductivity values (see table on calibration solution).
- Make sure that the temperature does not change during the calibration procedure.

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

Calibration can be performed by:
- Determining the cell factor with a known calibration solution taking account of the temperature
- Input of cell factor
- Sampling (product calibration)
- Zero calibration in air or with calibration solution
- Temperature probe adjustment



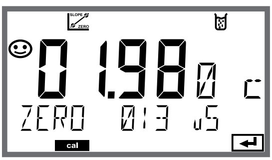
Note:
When the sensor is installed in a pipe/tank at a distance less than 30 mm from the wall, you should perform the calibration either with the sensor installed by means of sampling (product calibration) or in a suitable calibration beaker with dimensions and material corresponding to the process conditions.

Selecting a Calibration Mode

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

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

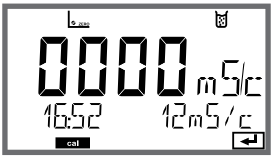
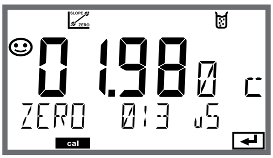
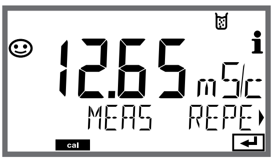
You can directly enter the value for the cell factor of a sensor. The value must be known, eg, determined beforehand in the laboratory. The selected process variable and the temperature are displayed. This method is suitable for all process variables.

Display	Action	Remark
	Select Calibration. Press **enter** to proceed. Select CAL_CELL calibration method. Press **enter** to proceed.	
	Ready for calibration. Hourglass blinks.	Display (3 sec)
	Enter cell factor. Press **enter** to proceed.	The selected process variable and the temperature are displayed.
	The device shows the calculated cell factor and zero point (at 25 °C). Sensoface is active.	
	**Use the arrow keys to select:** • MEAS (exit) • REPEAT Press **enter** to proceed.	

Please refer to the Specifications for the nominal cell factor.
When measuring in a restricted space, the individual cell factor must be determined.

Condl

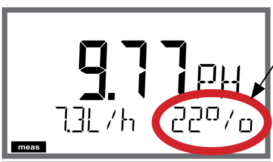
Zero Calibration in Oxygen-Free Gas

Display	Action	Remark
	Select Calibration. Press **enter** to proceed. Select CAL_ZERO calibration method. Press **enter** to proceed.	
	Ready for calibration. Hourglass blinks.	Display (3 sec)
	**Calibration in oxygen-free gas (e.g., nitrogen)** Edit digits until the lower display indicates Zero Press **enter** to proceed.	
	The device shows the cell factor (at 25 °C) and the zero point. Sensoface is active.	
	**Use the arrow keys to select:** • MEAS (exit) • REPEAT Press **enter** to proceed.	

Display	Remark
	From the configuration or calibration menus, you can switch the device to measuring mode by pressing the **meas** key. In the measuring mode the upper display line shows the configured process variable (pH, ORP [mV] or temperature), the lower display line shows the time and the second configured process variable (pH, ORP [mV] or temperature). The [meas] mode indicator lights. **Note:** • After prolonged power outage (> 5 days), the time display is replaced by dashes and cannot be used for processing. In that case, enter the correct time and the correct date.

By pressing the **meas** key you can step through the following displays.
1) Primary process value
2) Secondary process value
3) Flow
4) Pressure (Oxy only)
5) Calculation (Cond-Cond only)
6) Remaining capacity of the ion exchanger (Cond-Cond only)
7) Measured value of sensor A (Cond-Cond only)
8) Measured value of sensor B (Cond-Cond only)
9) Time and Date

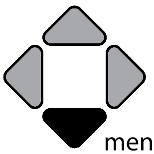
When no key has been pressed for 60 sec, the device returns to MAIN DISPLAY, see page 31.

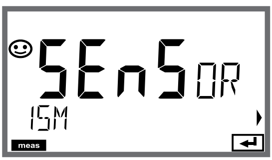
	When displaying the remaining capacity of the ion exchanger, the device can be directly informed of a replaced ion exchanger, see also page 161, "Service" chapter. 1) Press the **enter** key to show the following display: NEW EXCHANGER NO 2) Use ◀ ▶ to select YES 3) Press **enter** to confirm

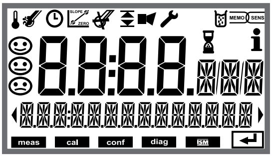
In the Diagnostics mode you can access the following menus without interrupting the measurement:

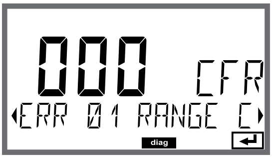
CALDATA	Viewing the calibration data
SENSOR	Viewing the sensor data
SELFTEST	Starting a device self-test
LOGBOOK	Viewing the logbook entries
MONITOR	Displaying currently measured values
VERSION	Displaying device type, software version, serial number

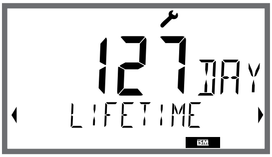
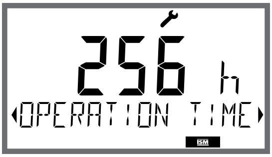
Access to diagnostics can be protected with a passcode (SERVICE menu).

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

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

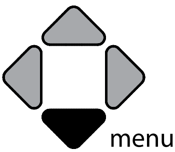
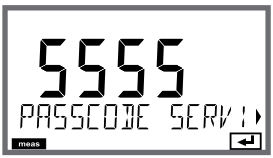
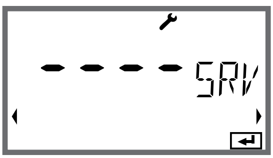
Display	Menu item
	**Device self-test** (To abort, you can press **meas**.) 1) **Display test**: Display of all segments with changing background colors (white/green/red). Proceed by pressing **enter**
	2) **RAM test:** Hourglass blinks, then display of --PASS-- or --FAIL-- Proceed by pressing **enter**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

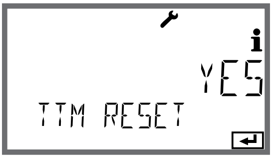
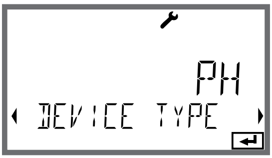
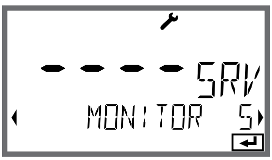
Display	Menu item
	**Displaying the logbook entries** Select LOGBOOK using ◀ ▶, press **enter** to confirm. With the ▲ ▼ keys, you can scroll backwards and forwards through the **Audit Trail** log (entries 00 … 99), 00 being the last entry.
	If the display is set to date/time, you can search for a particular date using the ▲ ▼ keys. Press ◀ ▶ to view the corresponding message text.
	If the display is set to the message text, you can search for a particular message using the ▲ ▼ keys. Press ◀ ▶ to display the date and time.
	In addition, function activations (CAL, CONFIG, SERVICE), some Sensoface messages (cal timer, wear), and opening of the enclosure (door contact) can be displayed. Press **meas** to return to measurement.

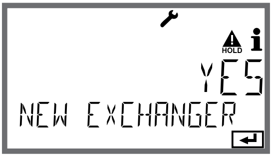
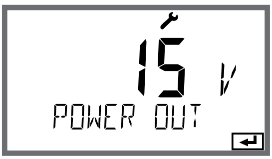
Display	Menu item
 Display examples:   	**Sensor monitor: Displaying the currently measured values (example: pH)** Select MONITOR using ◀ ▶, press **enter** to confirm. Use the ◀ ▶ keys to select the desired parameter from the bottom line of the display: mV_PH, mV_ORP, RTD, TEMP, R_GLASS, R_REF, FLOW, or EXCHANGER CAP (if activated). For digital sensors in addition: OPERATION TIME, SENSOR WEAR, LIFETIME, CIP, SIP and AUTOCLAVE. For ISM sensors in addition: ACT (adaptive calibration timer), TTM (adaptive maintenance timer), DLI (Dynamic Life Time Indicator). The selected parameter is shown in the upper display line. Press **meas** to return to measurement. Display of 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)
	**Version** Display of **device type, software/hardware version** and **serial number** for all device components. Use the ▲ ▼ keys to switch between software and hardware version. Press **enter** to proceed to next device component.

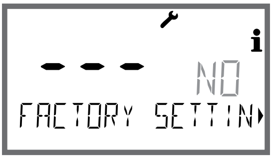
In the Service mode you can access the following menus:

SENSOR	Sensor (resetting diagnostics messages)
DEVICE TYPE	Selecting the process variable
MONITOR	Displaying measured values for validation (simulators)
NEW EXCHANGER	Resetting the consumption calculation after replacement of ion exchanger
POWER-OUT	Selecting the output voltage (A451N only)
CODES	Configuring the passcodes
DEFAULT	Reset to factory setting

Action	Key/Display	Remark
Activate Service		Press **menu** key to call the selection menu. Select SERVICE using ◀ ▶ keys, press **enter** to confirm.
Passcode		Enter passcode “5555“ for service mode using the ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.
Display		Service mode is indicated by the **Service** (wrench) icon.
Exit	**meas**	Exit by pressing **meas**.

Display	Menu item
SENSOR / TTM 	**Resetting the adaptive maintenance timer** Here, the interval is reset to its initial value. To do so, select "TTM RESET = YES" and confirm by pressing **enter**.
SENSOR / AUTOCLAVE 	**Incrementing the autoclaving counter** After having completed an autoclaving process, you must increment the autoclaving count. To do so, select "**YES**" and confirm by pressing **enter**. The device confirms with "INCREMENT AUTOCLAVE CYCLE".
DEVICE TYPE 	**Device type:** Changing the measuring function, eg, after having replaced a Memosens sensor.
MONITOR 	**Displaying the currently measured values (sensor monitor)** Select MONITOR using ◀ ▶, press **enter** to confirm. Select the process variable in the bottom text line using ◀ ▶. The selected variable is shown in the main display. Hold **meas** depressed for longer than 2 sec to return to Service menu. Press **meas** once more to return to measurement.

Display	Menu item
NEW EXCHANGER  	For calculating the pH according to VGB (-C6-), the consumption of the ion exchanger can be calculated. To do so, consumption calculation must be activated (EXCHER CAP ON) and the parameters of the ion exchanger (size, capacity, efficiency) must be entered. Depletion of the ion exchanger is signaled by the “wrench” maintenance icon and the “ERR 111 WARNING CATION EXCHANGER CAPACITY” message or the “ERR 110 CATION EXCHANGER CAPACITY” message (with 0 %). When you have replaced the ion exchanger, you must select NEW EXCHANGER YES to restart the calculation. You can also do this directly from within measuring mode; see page 155.
POWER OUT (**A451N only**)  	**POWER OUT, adjusting the output voltage** Here, you can select an output voltage of 3.1/12/15/24 V. When the SE740 optical oxygen sensor has been selected, the output voltage will be automatically set to 15 V, regardless of the setting in the SERVICE menu.
CODES  	**Assigning passcodes:** In the “SERVICE - CODES“ menu you can assign passcodes to DIAG, CAL, CONF and SERVICE modes (Service preset to 5555). **When you have lost the Service passcode,** you have to request an “Ambulance TAN“ from the manufacturer specifying the serial number and hardware version of your device. To enter the “Ambulance TAN“, call the Service function and enter passcode 7321. After correct input of the ambulance TAN the device signals “PASS“ for 4 sec and resets the Service passcode to 5555.

Display	Menu item
DEFAULT 	**Reset to factory settings:** In the “SERVICE - DEFAULT“ menu you can reset the device to factory settings. ***NOTICE!*** After a reset to factory setting the device must be reconfigured completely, including the sensor parameters and the PROFIBUS settings.

Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
ERR 01	NO SENSOR	**Sensor error** Device type not assigned Defective sensor Sensor not connected Break in sensor cable
ERR 02	WRONG SENSOR	**Wrong sensor**
ERR 03	CANCELED SENSOR	**Sensor devaluated**
ERR 04	SENSOR FAILURE	**Failure in sensor**
ERR 05	CAL DATA	**Error in cal data**
ERR 10	ORP RANGE	**ORP display range violation**
ERR 11	PH RANGE	**pH display range violation**
ERR 12	MV RANGE	**mV range**
ERR 13	TEMPERATURE RANGE	**Temperature range violation**
ERR 15	SENSOCHECK GLASS-EL	**Sensocheck glass**
ERR 16	SENSOCHECK REF-EL	**Sensocheck ref.**
ERR 69	TEMP. OUTSIDE TABLE	**Temperature value outside table**

Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
ERR 94	FB BLOCK ALARM	Alarm in function block: eg, actual mode and target mode do not match or AI limits are exceeded
ERR 95	SYSTEM ERROR	**System error** Restart required. If error still persists, send in the device for repair.
ERR 96	WRONG MODULE	**Module does not correspond to measuring function** Correct the setting in the SERVICE / DEVICE TYPE menu. Afterwards, configure and calibrate the device.
ERR 97	NO MODULE INSTALLED	**No module** Module, inserting
ERR 98	CONFIGURATION ERROR	**Error in configuration or calibration data** Configuration or calibration data defective; completely reconfigure and recalibrate the device.
ERR 99	DEVICE FAILURE	**Factory settings error**
ERR 102	pH: FAILURE BUFFERSET -U1-	**Parameter error** Specifiable buffer set U1

Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
ERR 01	NO SENSOR	**Sensor error** Device type not assigned Defective sensor Sensor not connected Break in sensor cable
ERR 02	WRONG SENSOR	**Wrong sensor**
ERR 03	CANCELED SENSOR	**Sensor devaluated**
ERR 04	SENSOR FAILURE	**Failure in sensor**
ERR 05	CAL DATA	**Error in cal data**
ERR 10	CONDUCTANCE TOO HIGH	**Conductance range exceeded** Conductance > +3500 mS
ERR 11	RANGE CONDUCTIVITY RANGE CONCENTRATION RANGE SALINITY LIMIT USP	**Measuring range violation** Conductivity > +999.9 mS/cm or > +99.99 S/m or < 1 MΩ cm Concentration > Table limit (see page 324 et seq.) Salinity > 45.0 ‰ Conductivity ≥ USP limit value
ERR 13	RANGE TEMPERATURE	**Temperature range violation** (see page 304)
ERR 15	SENSOCHECK	**Sensocheck**

Cond

Error	Info text **(is displayed in case of fault when the Info key is pressed)**	Problem Possible causes
ERR 94	FB BLOCK ALARM	Alarm in function block
ERR 95	SYSTEM ERROR	**System error** Restart required. If error still persists, send in the device for repair.
ERR 96	WRONG MODULE	**Module does not correspond to measuring function** Correct the setting in the SERVICE / DEVICE TYPE menu. Afterwards, configure and calibrate the device.
ERR 97	NO MODULE INSTALLED	**No module** Module, inserting
ERR 98	CONFIGURATION FAILURE	**Error in configuration or calibration data** Configuration or calibration data defective; completely reconfigure and recalibrate the device.
ERR 99	SYSTEM FAILURE	**Factory settings error**

Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
ERR 01	NO SENSOR	**Sensor error** Device type not assigned Defective sensor Sensor not connected Break in sensor cable
ERR 02	WRONG SENSOR	**Wrong sensor**
ERR 03	CANCELED SENSOR	**Sensor devaluated**
ERR 04	SENSOR FAILURE	**Failure in sensor**
ERR 05	CAL DATA	**Error in cal data**
ERR 10	CONDUCTANCE TOO HIGH	**Conductance range exceeded** Conductance > +3500 mS
ERR 11	RANGE CONDUCTIVITY RANGE CONCENTRATION RANGE SALINITY	**Measuring range violation** Conductivity > +1999 mS/cm or > +99.99 S/m or < 1 MΩ cm Concentration > Table limit (see page 324 et seq.) Salinity > 45.0 ‰
ERR 13	RANGE TEMPERATURE	**Temperature range violation** (see page 304)
ERR 15	SENSOCHECK	**Sensocheck**
ERR 69	TEMP. OUTSIDE TABLE	**Temperature value outside table**

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Error	Info text **(is displayed in case of fault when the Info key is pressed)**	Problem Possible causes
ERR 94	FB BLOCK ALARM	Alarm in function block
ERR 95	SYSTEM ERROR	**System error** Restart required. If error still persists, send in the device for repair.
ERR 96	WRONG MODULE	**Module does not correspond to measuring function** Correct the setting in the SERVICE / DEVICE TYPE menu. Afterwards, configure and calibrate the device.
ERR 97	NO MODULE INSTALLED	**No module** Module, inserting
ERR 98	CONFIGURATION FAILURE	**Error in configuration or calibration data** Configuration or calibration data defective; completely reconfigure and recalibrate the device.
ERR 99	SYSTEM FAILURE	**Factory settings error**

Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
ERR 01	NO SENSOR	**Sensor error** Device type not assigned Defective sensor Sensor not connected Break in sensor cable
ERR 02	WRONG SENSOR	**Wrong sensor**
ERR 03	CANCELED SENSOR	**Sensor devaluated**
ERR 04	SENSOR FAILURE	**Failure in sensor**
ERR 05	CAL DATA	**Error in cal data**
ERR 11	RANGE DO SATURATION RANGE DO CONCENTRATION RANGE GAS CONCENTRATION	**Display range violation** SAT saturation [%] or CONC concentraton or GAS volume concentration
ERR 12	RANGE SENSOR CURRENT	Sensor current exceeded
ERR 13	TEMPERATURE RANGE	**Temperature range violation**
ERR 14	OUT OF INTERNAL TABLE	**Tables exceeded**
ERR 15	SENSOCHECK	**Sensocheck**
ERR 17	OUT OF CAL TIME CALIBRATE OR CHANGE SENSOR	**Cal timer expired** (ACT for ISM)
ERR 18	SENSOR ZERO/SLOPE CALI-BRATE OR CHANGE SENSOR	**Cal timer expired** (ACT for ISM)

Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
ERR 20	SENSOR DRIFT CALIBRATE OR CHANGE SENSOR	Sensor response
ERR 21	SENSOR WEAR CHECK ELECTROLYTE AND MEMBRANE	Memosens sensor wear
ERR 22	CIP-CYCLES OVERRUN	CIP cycles exceeded
ERR 23	SIP-CYCLES OVERRUN	SIP cycles exceeded
ERR 24	ZERO xx.xx nA	Zero
ERR 25	SLOPE xxxx nA	Slope
ERR 26	TMAX xxx.x °C	Max. temp (CIP/SIP)
ERR 27	OXY VALUE NOT VALID	LDO OXY measurement Off

Error	Info text **(is displayed in case of fault when the Info key is pressed)**	Problem Possible causes
ERR 94	FB BLOCK ALARM	**Alarm in function block**
ERR 95	SYSTEM ERROR	**System error** Restart required. If error still persists, send in the device for repair.
ERR 96	WRONG MODULE	**Module does not correspond to measuring function** Correct the setting in the SERVICE / DEVICE TYPE menu. Afterwards, configure and calibrate the device.
ERR 97	NO MODULE INSTALLED	**No module** Module, inserting
ERR 98	CONFIGURATION FAILURE	**Error in configuration or calibration data** Configuration or calibration data defective; completely reconfig-ure and recalibrate the device.
ERR 99	SYSTEM FAILURE	**Factory settings error**
ERR 102	INVALID PARAMETER U-POL	Parameter error: polarization voltage
ERR 103	INVALID PARAMETER MEMBR. COMP	Parameter error: membrane correction

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Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
ERR 01	NO SENSOR	**Sensor error** Device type not assigned Defective sensor Sensor not connected Break in sensor cable
ERR 02	WRONG SENSOR	**Wrong sensor**
ERR 03	CANCELED SENSOR	**Sensor devaluated**
ERR 04	SENSOR FAILURE	**Failure in sensor**
ERR 05	CAL DATA	**Error in cal data**
Channel A		
ERR 10	A CONDUCTANCE TOO HIGH	**Conductance value out of range: > 250 mS**
ERR 11	A RANGE CONDUCTANCE	**Cond > 9999 µS/cm or < 0.1 kΩ cm**
ERR 13	A CONDUCTANCE TOO HIGH	**Temperature range violation**
ERR 15	A SENSOCHECK	**Sensocheck**
Channel B		
ERR 40	B CONDUCTANCE TOO HIGH	**Conductance value out of range: > 250 mS**
ERR 41	B RANGE CONDUCTANCE	**Cond > 9999 µS/cm or < 0.1 kΩ cm**
ERR 43	B CONDUCTANCE TOO HIGH	**Temperature range violation**
ERR 45	B SENSOCHECK	**Sensocheck**

Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
ERR 59	INVALID CALCULATION	**Invalid calculations**
ERR 74	CATION EXCHANGER INVALID CALCULATION	**Error during cation exchanger calculation** Flow too low or no flow: Flow ≤ 4.00 l/h Calculated pH value: < 7.5 or > 10.5 Conductivity values: B ≥ 3 x A
ERR 94	FB BLOCK ALARM	**Alarm in function block**
ERR 95	SYSTEM ERROR	**System error** Restart required. If error still persists, send in the device for repair.
ERR 96	WRONG MODULE	**Module does not correspond to measuring function** Correct the setting in the SERVICE / DEVICE TYPE menu. Afterwards, configure and calibrate the device.
ERR 97	NO MODULE INSTALLED	**No module** Module, inserting
ERR 98	CONFIGURATION FAILURE	**Error in configuration or calibration data** Configuration or calibration data defective; completely reconfigure and recalibrate the device.
ERR 99	SYSTEM FAILURE	**Factory settings error**

CC

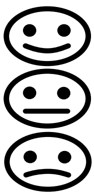
Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
ERR 110	CATION EXCHANGER CAPACITY	Capacity of ion exchanger used up – replace.
ERR 111	WARNING CATION EXCHANGER CAPACITY	Capacity of ion exchanger almost used up – replace soon.

Sensocheck

Sensocheck continuously monitors the sensor and its wiring. The Sensocheck message is also output as error message ERR 15 or ERR 45, resp. Measured value status changes to Bad. Sensocheck can be switched off in the configuration menu (then Sensoface is also disabled!).

Sensoface

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



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

Sensoface is automatically deactivated when Sensocheck has been switched off. Exception: After a calibration, a smiley is always displayed for confirmation.

Disposal

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

Returns

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

Standard version	Order No.
Stratos Pro A221N (basic unit for measurement with digital sensors)	A221N
Interchangeable modules for measurement with analog sensors	
pH	MK-PH015N
Oxy	MK-OXY046N
Cond	MK-COND025N
CondI	MK-CONDI035N
CC	MK-CC065N

Version for hazardous areas	Order No.
Stratos Pro A221X (basic unit for measurement with digital sensors)	A221X
Interchangeable modules for measurement with analog sensors	
pH, Ex	MK-PH015X
Oxy, Ex	MK-OXY045X
Cond, Ex	MK-COND025X
CondI, Ex	MK-CONDI035X

Accessories	Order No.
Pipe-mount kit	ZU 0274
Panel-mount kit	ZU 0738
Protective hood	ZU 0737

Please contact us for further information or if you have any questions concerning our product range:

Knick Elektronische Messgeräte GmbH & Co. KG

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

Standard version	Order No.
Stratos Evo A451N (basic unit for measurement with digital sensors)	A451N
Interchangeable modules for measurement with analog sensors	
pH	MK-PH015N
Oxy	MK-OXY046N
Cond	MK-COND025N
CondI	MK-CONDI035N
CC	MK-CC065N

Accessories	Order No.
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Introduction

PROFIBUS is a digital communication system that connects different field devices over a common cable and integrates them into a control system. In the long term, PROFIBUS will replace the 4–20 mA technology, which only supplies pure measured values.

Advantages of the PROFIBUS Technology are:

- easy and cost-saving cabling
- convenient operation over a central control station
- transmission, evaluation, and control of high amounts of data from field device to control station.
- devices installed in hazardous locations are configured and maintained from the control station

PROFIBUS is the leading open fieldbus system in Europe. Its application range covers manufacturing, process, and building automation. As open fieldbus standard to EN 50170 and IEC 61158, PROFIBUS ensures communication of different devices over one bus. The PROFIBUS User Organization (PNO) provides for further development and maintenance of the PROFIBUS technology. It combines the interests of users and manufacturers.

Variants and Basic Characteristics

PROFIBUS determines the technical and functional characteristics of a serial bus system. There are two different PROFIBUS variants:

- **PROFIBUS DP** (Decentralized Peripherals) is tailored for communication of automation systems and distributed peripherals. It operates according to the RS 485 standard with transmission rates up to 12 Mbits/s.
- **PROFIBUS PA** (Process Automation) is dedicated to the process industry. It permits connection of sensors and actuators to a common bus even in hazardous locations. PROFIBUS PA has a transfer rate of 31.25 kbits/s.

PROFIBUS distinguishes between two types of devices:

- **Master** devices control the data traffic on the bus. They send messages without external request.
- **Slave** devices are peripheral devices such as valves, drives, transmitters, and analyzers. They can react acyclically to servicing, configuration and diagnostic tasks of the master. The central controller cyclically reads the measurement data with status.

Device Certification

PROFIBUS PA/DP is an open bus standard which enables devices of different manufacturers to be integrated in one system. This is only feasible when all the devices exactly meet the specification. The devices are therefore certified by the PROFIBUS and PROFINET International (PI) organization.

Definitions for PROFIBUS PA

The bus protocol defines type and speed of the data exchange between master and slave devices and determines the transmission protocol of the respective PROFIBUS system.

PROFIBUS PA permits cyclic and acyclic services.

- **Cyclic services** are used for transmission of measurement data and actuating commands with status information.
- **Acyclic services** are used for device configuration, maintenance and diagnostics during operation.

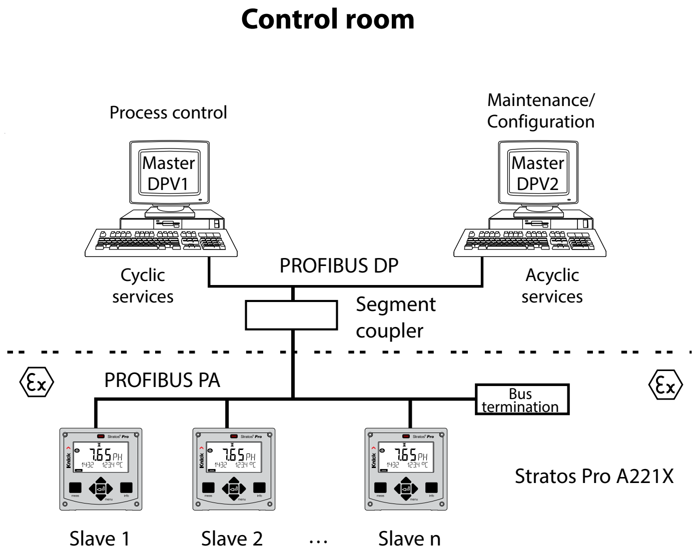
The device profile 3.02 defines the device class and typical functionalities with parameters, ranges, and limit values.

The FISCO model developed by the German PTB for hazardous locations permits connection of several devices to one common bus and defines permissible limits for device and cable parameters.

I&M Functions (Identification & Maintenance)

The Stratos PROFIBUS devices A221N/A221X and A451N support "Identification & Maintenance" functions. I&M functions specify how certain device-describing data shall be uniformly stored. Information on manufacturer, release number, order designation, etc allows for unambiguous device identification. In addition, you can retrieve information on projecting, commissioning, parameter setting, diagnostics, etc.

Typical Configuration



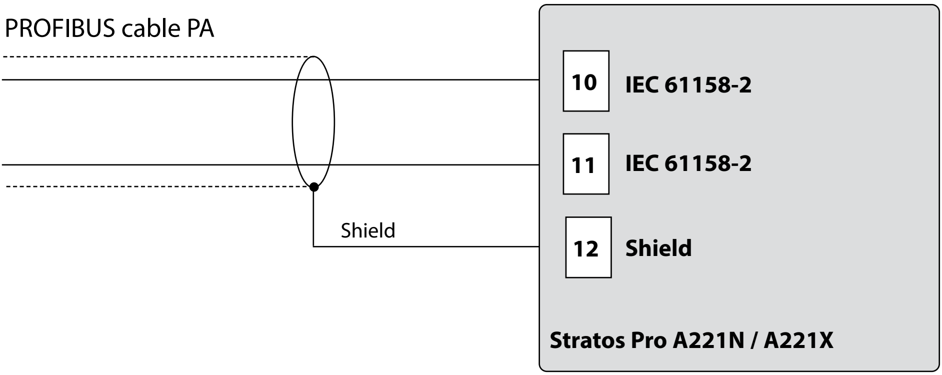
In hazardous locations the electrical connections to the PROFIBUS are made in accordance with FISCO.
(FISCO = Fieldbus Intrinsically Safe Concept, www.fieldbus.org)

Differences between PROFIBUS PA and PROFIBUS DP

	PROFIBUS PA	PROFIBUS DP
Max. data transfer rate	31.25 kbits/s	12 Mbits/s
Hazardous-area application	Yes	No
Power supply via BUS	Yes	No
Application	Production automation	Process automation
Transmission technology	MBP-IS*	RS-485

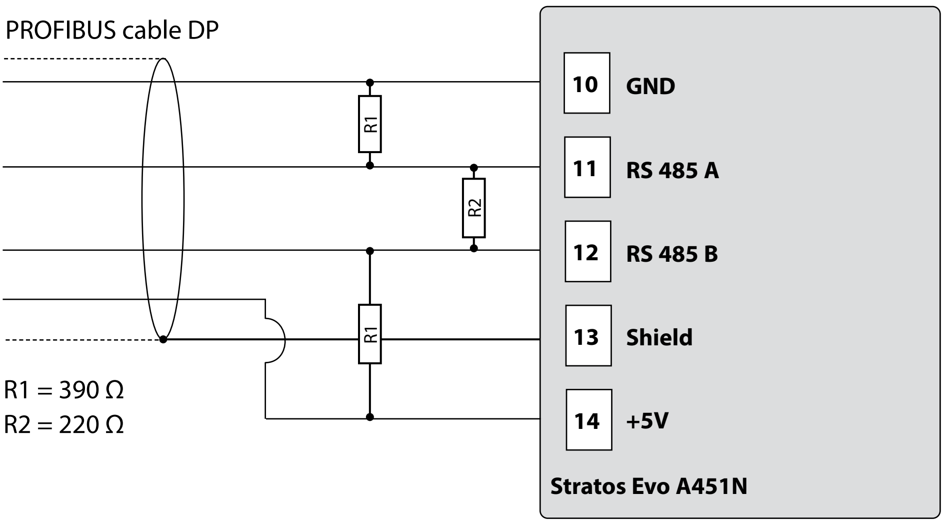
* **M**anchester Coded, **B**us **P**owered-Intrinsically Safe

PROFIBUS PA Terminal Assignments

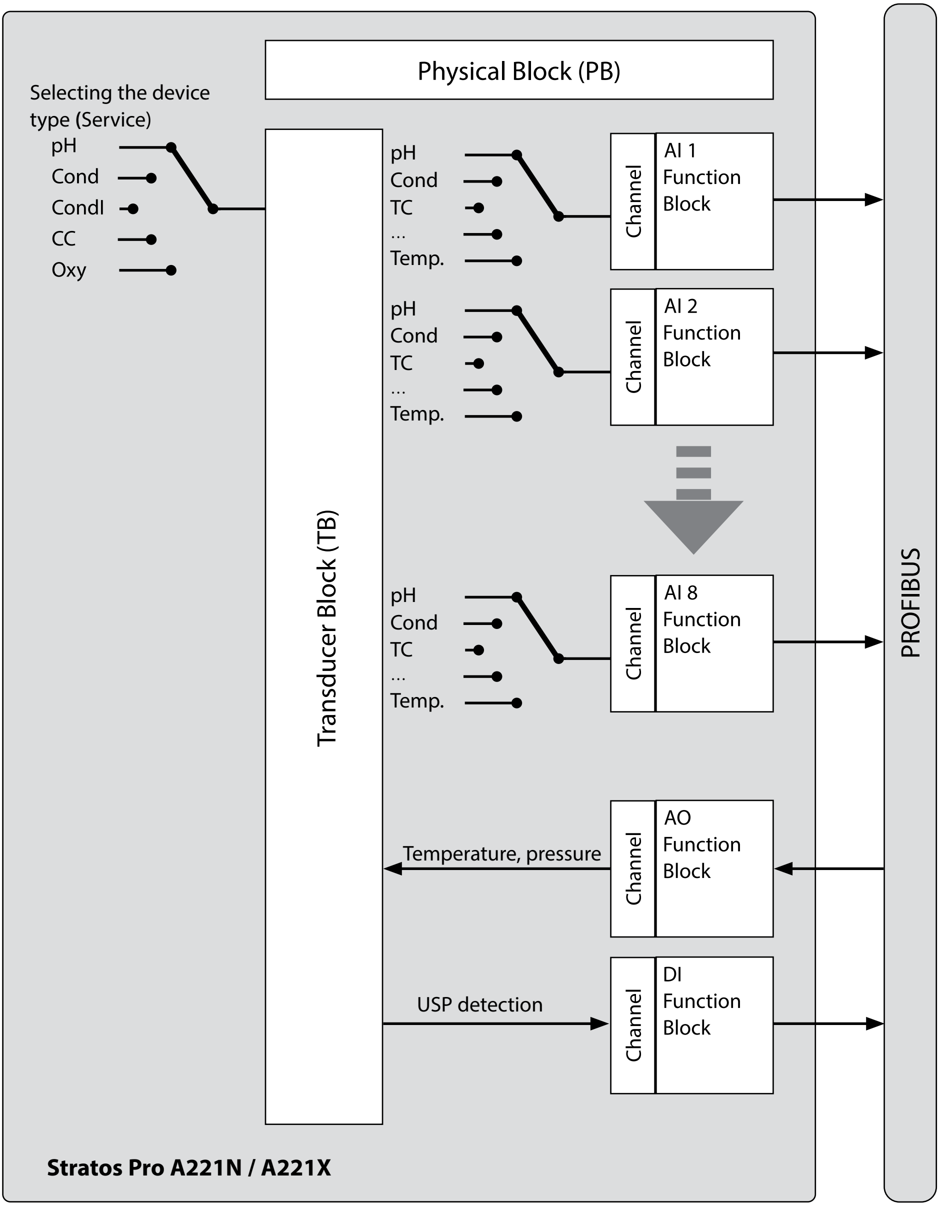


PROFIBUS DP Terminal Assignments

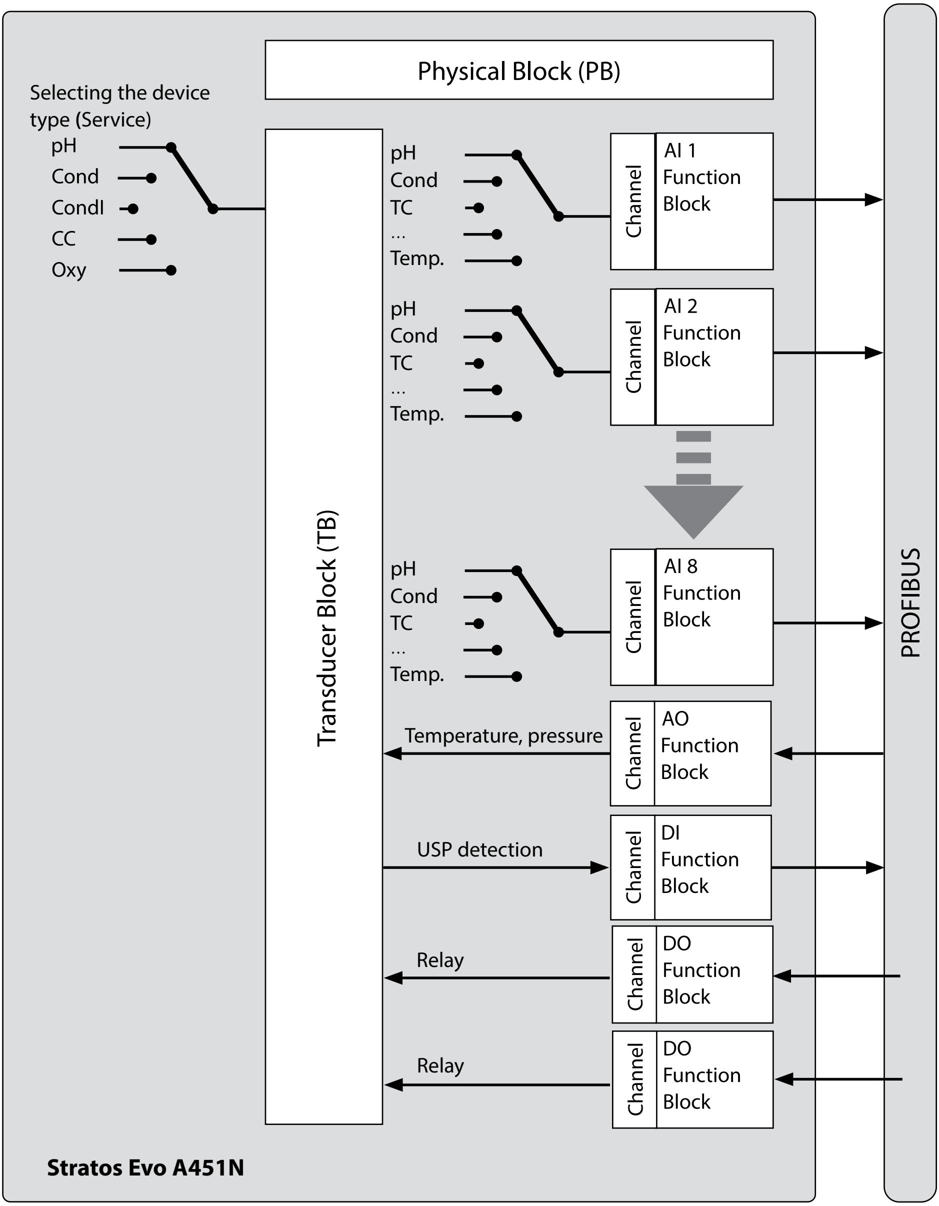
To ensure safe signal transmission, you must terminate the PROFIBUS cable on both ends of a PROFIBUS segment with a bus termination (combination of three resistors). Please note that the bus termination is not included with the Stratos Evo A451N.



Schematic Diagram of Block Types for PROFIBUS PA



Schematic Diagram of Block Types for PROFIBUS DP



The Block Model

The device parameters in the PROFIBUS protocol are assigned to different block types according to their characteristics. The different block types contain parameter groups and their functions.

PROFIBUS devices structure their parameters and functions in block objects:

- The **Device Management** describes the block objects.
- A **Physical Block**
- One or more **Function Blocks**
- One or more **Transducer Blocks**

The **Stratos Pro A221N / A221X** consists of the following blocks:

- 1 x Physical Block
- 1 x Transducer Block (AITB)
- 10 Function Blocks, consisting of:
  - 8 x AI (Analog Input)
  - 1 x AO (Analog Output)
  - 1 x DI (Digital Input)

The **Stratos Evo A451N** consists of the following blocks:

- 1 x Physical Block
- 1 x Transducer Block (AITB)
- 12 Function Blocks, consisting of:
  - 8 x AI (Analog Input)
  - 1 x AO (Analog Output)
  - 1 x DI (Digital Input)
  - 2 x DO (Digital Output)

Physical Block (PB)

The resource block contains device-specific information, which clearly identifies a device, such as: Model designation, manufacturer's name, device type, software version, hardware version and serial number.

Resetting

With the FACTORY_RESET parameter, you can reset the device to the factory settings.
***NOTICE!* Data loss.** Resets all configuration values to factory setting.

Transducer Block (TB)

The transducer block contains all device information, such as calibration data and sensor type. A device may have several transducer blocks, eg, for diagnostic, process variable or display. The sensor signal is first preprocessed in the transducer block. From here, the measured value is sent to the Analog Input blocks where it can be further processed (limit values, scaling). The transducer block provides the following information and configuration options:

- Product calibration
- Parameter setting
- Logbook
- Sensor diagnostics

Signal processing

The process variables are assigned to specific channels and are connected to input function blocks (AI).

Key lock

With the DEVICE_LOCK parameter, you can set a key lock in the CAL, CONF, and SERVICE modes.

- UNLOCKED   Device can be operated via keypad.
- LOCKED   Key lock is active.

Function Block (FB)

Function blocks describe a device's tasks and functions, which are controlled by the transmission schedules.
The PROFIBUS specification has defined sets of standard function blocks which can be used to describe all basic functions, eg:

- Analog Output (AO)
- Digital Output (DO)
- Analog Input (AI)
- Digital Input (DI)

Analog Input (AI)
The AI function block is a universal interface for transmitting the process variable to the PROFIBUS. AI function blocks allow simulating the input and output of the function block. They are used for cyclic transmission of measured values.

Selecting the Process Variables and Units
The process variables of the Transducer Block are assigned to the function block via the **Channel** parameter. The corresponding measurement unit is selected in the **Unit** parameter or the **Units** sub-parameter.

AI Block pH		
Parameter	**Channel**	**Unit**
pH value	90	pH = 1422
pH voltage	53	mV = 1243
ORP	54	mV = 1243
Glass impedance	55	Ω = 1281
Reference impedance	56	Ω = 1281
Temperature	57	°C = 1001 | °F = 1002
Slope	60	% = 1342
Zero point	62	mV = 1243
Calibration timer	59	h = 1059
Wear	63	% = 1342
Flow	64	l/h = 1353

AI Block Oxy		
Parameter	**Channel**	**Unit**
Saturation	90	% = 1342
Concentration	66	ppm = 1423 mg/l = 1558
Vol. concentration	68	Vol% = 1562
Partial pressure	69	mbar = 1138
Temperature	57	°C = 1001 | °F = 1002
Slope	60	nA = 1213
Zero point	62	nA = 1213
Calibration timer	59	h = 1059
Wear	63	% = 1342
Flow	64	l/h = 1353

AI Block Cond		
Parameter	**Channel**	**Unit**
Conductivity	90	µS/cm = 1552
Temperature	57	°C = 1001 | °F = 1002
Concentration	73	% = 1342
Salinity	75	g/kg = 1523
TDS	76	mg/l = 1558
Resistivity	72	MΩ * cm = 1555
Cell factor	79	1/cm = 1524
Flow	64	l/h = 1353

AI Block CondI		
Parameter	**Channel**	**Unit**
Conductivity	90	µS/cm = 1552
Temperature	57	°C = 1001 | °F = 1002
Concentration	73	% = 1342
Salinity	75	g/kg = 1523
TDS	76	mg/l = 1558
Cell factor	79	1/cm = 1524
Zero point	62	µS = 1290
Flow	64	l/h = 1353

AI Block CC (Dual Conductivity)		
Parameter	**Channel**	**Unit**
Conductivity A	70	µS/cm = 1552
Conductivity B	77	µS/cm = 1552
Temperature A	57	°C = 1001 | °F = 1002
Temperature B	80	°C = 1001 | °F = 1002
Cell factor A	79	1/cm = 1524
Cell factor B	62	1/cm = 1524
Flow	64	l/h = 1353
Calculation	78	without = 0
Resistivity A	72	MΩ * cm = 1555
Resistivity B	92	MΩ * cm = 1555
Ion exchanger consumption	63	% = 1342

Analog Output (AO Block)

The AO function block sends the value specified by the PROFIBUS to the device. You can enter a temperature or pressure value, for example, which is then used by the device.

Channel	Module type	Text	Info	XD_SCALE
83	PH, COND, CONDI, OXY	Temperature		°C, °F
85	OXY	Pressure		mbar, hPa, psi

Digital Input (DI Block)

The digital input is used for USP detection (with Cond only, “good”/”bad” assessment of water quality).

Channel	Text
89	USP

Parameter OUT_D

Bit	Value	Meaning
0	1	USP limit exceeded
1	1	Reduced USP limit exceeded

Digital Outputs (DO Block, A451N only)

The two digital outputs are used for freely controlling the two relays.

Channel	Text
87	Relay 1
88	Relay 2

SP_D Parameter

Bit	Value	Meaning
0	0	Open relay
0	1	Closed relay

Overview of Software

Overview of Software for Stratos Pro A221 N / A221X

GSD	GSD file from CD-ROM or website
GSD A221 N / A221X	Manufacturer-specific: **KNIC7535.GSD**
	Profile-specific: **PA139700.GSD**
Device profile	PROFIBUS PA Profile 3.02
Address range	0 … 126 (default = 126)
	0 … 125 via PROFIBUS service set_slave_add
	0 … 126 via local display
	0 … 126 via RESET = 2712
Function blocks	1 x TB = Transducer Block
	1 x PB = Physical Block
	8 x AI = Analog Input Blocks
	1 x AO = Analog Output Block
	1 x DI = Digital Input Block

Overview of Software for Stratos Evo A451N

GSD	GSD file from CD-ROM or website
GSD A451N	Manufacturer-specific: **KNIC7536.GSD**
	Profile-specific: **PA039700.GSD**
Device profile	PROFIBUS PA Profile 3.02
Address range	0 … 126 (default = 126)
	0 … 125 via PROFIBUS service set_slave_add
	0 … 126 via local display
	0 … 126 via RESET = 2712
Function blocks	1 x TB = Transducer Block
	1 x PB = Physical Block
	8 x AI = Analog Input Blocks
	1 x AO = Analog Output Block
	2 x DO = Digital Output Block
	1 x DI = Digital Input Block

Diagnostics

The PROFIBUS DP supports comprehensive diagnostics options. A DP master can query the current diagnostics from the DP slave at any time. Alongside standard diagnostics, diagnostic telegrams can describe other device-specific diagnostics in the GSD. The DP slave can report in the data telegram at any time that current diagnostics are queued. It does this during cyclic data exchange by marking the data telegram as high priority.

Version 3.02 of the PROFIBUS profile has been extended by the **condensed status** and **diagnosis** parameters. Diagnostics are coded bitwise, which allows multiple events to be transmitted simultaneously. The GSD file contains text for each diagnostics bit to provide a text message for the control room.

Cyclic Data Transmission

Float Format

Byte n								Byte n+1							
Bit 7	Bit 6							Bit 7	Bit 6						
Sign	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}	2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}	2^{-6}	2^{-7}
	Exponent								Mantissa						

Byte n+2								Byte n+3							
Bit 7								Bit 7							
2^{-8}	2^{-9}	2^{-10}	2^{-11}	2^{-12}	2^{-13}	2^{-14}	2^{-15}	2^{-16}	2^{-17}	2^{-18}	2^{-19}	2^{-20}	2^{-21}	2^{-22}	2^{-23}
Mantissa								Mantissa							

Example:

The COND_STATUS_DIAG parameter cannot be changed when cyclic data transmission is active.

MEAS MODE (Measurement Mode)

The MEAS MODE parameter specifies which process variables are available. The other channels also provide values. These, however, have no valid measured value status and therefore serve as information only. Depending on the configuration, the following process variables are available at the same time:

pH	
MEAS MODE	**Process variables**
pH	pH, ORP, temperature
mV	mV, temperature
ORP	ORP, temperature

Cond, CondI	
MEAS MODE	**Process variables**
Cond	Conductivity, temperature
USP	
Conc%	Conc%, conductivity, temperature
SAL	SAL, conductivity, temperature
TDS	TDS, conductivity, temperature

Oxy	
MEAS MODE	**Process variables**
DO%	Saturation, partial pressure, temperature
DO ppm	Concentration, partial pressure, temperature
DO mg/l	
GAS%	Gas concentration, partial pressure, temperature

CC (Dual Conductivity)	
MEAS MODE	**Process variables**
Conductivity	Conductivity 1, conductivity 2, temperature 1, temperature 2, calculation
Resistivity	Resistivity 1, resistivity 2

Condensed Status

For a better overview, the status of a PROFIBUS device is comprised in a condensed status. Here, all status messages are condensed to one message.

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
0	0							= bad
0	1							= uncertain
1	0							= good (Non Cascade)
1	1							= good (Cascade) - not supported

Status = bad

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
0	0	0	0	0	0	0	0	= non-specific
0	0	1	0	0	0	1	1	= passivated
0	0	1	0	0	1	x	x	= maintenance alarm, more diagnosis available
0	0	1	0	1	0	x	x	= process related, no maintenance
0	0	1	1	1	1	x	x	= function check / local override; value not usable

Status = uncertain

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
0	1	0	0	1	0	x	x	= substitute set
0	1	0	0	1	1	1	1	= initial value
0	1	1	0	1	0	x	x	= maintenance demanded
0	1	1	1	0	0	1	1	= simulated value, start
0	1	1	1	0	1	1	1	= simulated value, end
0	1	1	1	1	0	x	x	= process related, no maintenance

Status = good (Non Cascade)

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
1	0	0	0	0	0	x	x	= ok
1	0	0	0	0	1	x	x	= update event
1	0	0	0	1	0	x	x	= advisory alarm
1	0	0	0	1	1	x	x	= critical alarm
1	0	1	0	0	0	x	x	= initiate fail safe (not provided by signal converter)
1	0	1	0	0	1	x	x	= maintenance required
1	0	1	0	1	0	x	x	= maintenance demanded
1	0	1	1	1	1	x	x	= function check

Status = Limits

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
						0	0	= ok
						0	1	= low limited
						1	0	= high limited
						1	1	= constant

Bad:	Value is not usable.
Uncertain:	Value is still usable.
Good (Cascade):	Value is usable.
Good (Non-Cascade):	Value is usable.

Classic Status

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
0	0							= bad
0	1							= uncertain
1	0							= good (Non Cascade)
1	1							= good (Cascade) - not supported

Status = bad

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
0	0	0	0	0	0			= non-specific
0	0	0	0	0	1			= configuration error
0	0	0	0	1	0			= not connected
0	0	0	0	1	1			= device failure
0	0	0	1	0	0			= sensor failure
0	0	0	1	0	1			= no communication (last usable value)
0	0	0	1	1	0			= no communication (no usable value)
0	0	0	1	1	1			= out of service

Status = uncertain

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
0	1	0	0	0	0			= non-specific
0	1	0	0	0	1			= last usable value
0	1	0	0	1	0			= substitute-set
0	1	0	0	1	1			= initial value
0	1	0	1	0	0			= sensor conversion not accurate
0	1	0	1	0	1			= engineering unit violation (unit not in the valid set)
0	1	0	1	1	0			= sub-normal
0	1	0	1	1	1			= configuration error
0	1	1	0	0	0			= simulated value

Status = good (Non Cascade)

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
1	0	0	0	0	0			= ok
1	0	0	0	0	1			= update event
1	0	0	0	1	0			= active advisory alarm
1	0	0	0	1	1			= active critical alarm
1	0	0	1	0	0			= unacknowledged update event
1	0	0	1	0	1			= unacknowledged advisory alarm
1	0	0	1	1	0			= unacknowledged critical alarm
1	0	1	0	0	0			= initial fail safe
1	0	1	0	0	1			= maintenance required

Status = Limits

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
						0	0	= ok
						0	1	= low limited
						1	0	= high limited
						1	1	= constant

Bad: Value is not usable.
Uncertain: Value is still usable.
Good (Cascade): Value is usable.
Good (Non-Cascade): Value is usable.

Synoptic Table of DIAGNOSIS_EXTENSION

BIT	ERR	Condition Name	
0		Reserved	
1	ERR 23	Autoclaving counter exceeded	
2	ERR 24	CIP cycles exceeded	
3	ERR 25	SIP cycles exceeded	
4	ERR 102	Parameter error: User Buffer -U1-	
5		Reserved	
6		Reserved	
7		Reserved	
8	ERR 22	Sensor wear (Memosens)	
9	ERR 18	Maintenance counter exceeded	
10	ERR 17	Calibration timer expired	
11	ERR 21	Sensor response time exceeded (drift)	
12		Calibration data bad	
13	ERR 15, 16	Sensocheck (glass impedance, ref. impedance)	
14		Reserved	
15		Reserved	
16	ERR 14	Temperature value outside table	
17	ERR 13	Temperature range violation	
18	ERR 10,11,12	Measuring range violation	
19		Reserved	
20		Calibration is active	
21		Configuration is active	
22		Service is active	
23		Reserved	
24	ERR 05	Calibration data error	
25	ERR 03	Sensor devaluated	
26	ERR 02, 96	Wrong module/sensor	

	Measured Value Status, Condensed (PA)
	0xA8 Good-Maintenance demanded
	0xA8 Good-Maintenance demanded
	0xA8 Good-Maintenance demanded
	0xA8 Good-Maintenance demanded
	0xA8 Good-Maintenance demanded
	0xA8 Good-Maintenance demanded
	0xA8 Good-Maintenance demanded
	0xA8 Good-Maintenance demanded
	0xA8 Good-Maintenance demanded
	0xA8 Good-Maintenance demanded
	0x78 Uncertain-invalid process condition
	0x78 Uncertain-invalid process condition
	0x78 Uncertain-invalid process condition
	0xBC Good Function Check
	0xBC Good Function Check
	0xBC Good Function Check
	0x24 BAD-Maintenance alarm
	0x24 BAD-Maintenance alarm
	0x24 BAD-Maintenance alarm

Synoptic Table of DIAGNOSIS_EXTENSION

BIT	ERR	Condition Name	
27	ERR 01, 96	No sensor/module	
28	ERR 04	Defective sensor	
29	ERR 98	Configuration data defective	
30	ERR 99	Factory settings error	
31	ERR 95	Failure of internal communication / System error	

* depending on parameter setting

Note: Invalid values are set to 0 and have a bad status.

	Measured Value Status, Condensed (PA)
	0x24 BAD-Maintenance alarm
	0x24 BAD-Maintenance alarm
	0x24 BAD-Maintenance alarm
	0x24 BAD-Maintenance alarm
	0x24 BAD-Maintenance alarm

Commissioning on the PROFIBUS

Only when the Stratos is competently configured, can the PROFIBUS communication function correctly. Different configuration tools from different manufacturers are available (eg, SIMATIC PDM from Siemens). They can be used to configure the device and the PROFIBUS.

Note: Be sure to observe the operating instructions and the menu guidance of the control system (DCS) or the configuration tool during installation and configuration via the control system.

Device Database File (GSD File)

The GSD file contains the description of the device parameters and allows the device to be integrated in the PROFIBUS system. The included CD-ROM contains the GSD file (KNIC7535.gsd / KNICK7536.gsd) and the DD (Device Description) folder which contains further files. These additional files (eg, *.bmp or *.dib) contain icons which represent the PROFIBUS device in the configuration system. For that purpose, you must first load the files into the configuration program.

These files can be obtained from:

- the included CD
- the website **www.knick.de** or **www.profibus.com**

Initial Start-Up

1) Supply the device with power.
2) Connect the device to PROFIBUS.
3) Specify PROFIBUS address (see page 209).
4) Perform default initialization if required (see page 209).
5) Select ident number (see page 209).
6) Load the GSD file to the corresponding directory of the configuration program.
7) Open configuration program.

Specifying the PROFIBUS Address

To specify the PROFIBUS address, proceed as follows:

1) Press **menu**.
2) Select CONF using ◀ ▶, press **enter** to confirm.
3) Select ADDRESS and press **enter** to confirm.
4) Enter the desired PROFIBUS address between 0000 and 0126 using ◀ ▶ ▲ ▼, press **enter** to confirm.
   The PROFIBUS address is assigned to the device.

Default Initialization

To perform a default initialization, proceed as follows:

1) Press **menu**.
2) Select SERVICE using ◀ ▶, press **enter** to confirm.
3) Enter passcode (default: **5555**), press **enter** to confirm.
4) Select DEVICE TYPE using ◀ ▶, press **enter** to confirm.
5) Select desired process variable using ◀ ▶.
   Default initialization will be performed according to the tables below.

Selecting the Valid ID Number

For communicating with a Class 1 Master, a PROFIBUS DP device must be assigned an ID (ident number) which describes the unambiguous correlation between device and GSD file. The IDENT_NUMBER_SELECTOR parameter allows selecting the ident number that was used at the beginning of the cyclic data transmission:

a) Automation Adaption Mode (factory settings)
b) Profile Specific Ident. Number (profile)
c) Manufacturer Specific Ident. Number

You can select the ident number using a suitable configuration tool (eg, SIMATIC PDM). The ident numbers are issued by the PROFIBUS User Organization.

a) Automation Adaption Mode

Selected according to GSD file used.

b) Profile-Specific Ident Number (9700 HEX)
This setting provides limited functionality as specified in PA Profile 3.02.

pH		
Slot	**Description**	**Type of block**
1	Measured value 1	AI
2	Measured value 2	AI
3	Measured value 3	AI
4	Measured value 4	AI

Valid GSD modules:

AI-FB EMPTY_MODULE
AI

You require the **PA039700.GSD** GSD file.

Stratos Pro A221 N / A221X Combinations

Ident no. selection	Ident no.	GSD file	Status
Automation adaption mode	7535 HEX	KNIC7535.GSD	Classic/Condensed
	9700 HEX	PA139700.GSD	Classic
Manufacturer-spec ident no.	7535 HEX	KNIC7535.GSD	Classic/Condensed
Profile-spec. ident no.	9700 HEX	PA139700.GSD	Classic

Stratos Evo A451N Combinations

Ident no. selection	Ident no.	GSD file	Status
Automation adaption mode	7536 HEX	KNIC7536.GSD	Classic/Condensed
	9700 HEX	PA039700.GSD	Classic
Manufacturer-spec ident no.	7536 HEX	KNIC7536.GSD	Classic/Condensed
Profile-spec. ident no.	9700 HEX	PA039700.GSD	Classic

c) Manufacturer Specific Ident. Number
(A221 N / A221X: 7535 HEX | A451N: 7536 HEX)
This setting provides full functionality of the PROFIBUS device.
All function blocks are available for cyclic data traffic.

pH			
Slot	**Description**	**Block**	**Default value**
1	pH value	AI1	pH
2	Temperature	AI2	°C
3	pH voltage	AI3	mV
4	ORP value	AI4	mV
5	Glass impedance	AI5	Ω
6	Wear	AI6	%
7	Calibration timer	AI7	h
8	Flow	AI8	L/h
9	Temperature	AO	°C

Oxy			
Slot	**Description**	**Block**	**Default value**
1	Oxygen saturation	AI1	%
2	Temperature	AI2	°C
3	Concentration	AI3	ppm
4	Volume concentration	AI4	%vol
5	Partial pressure	AI5	mbar
6	Wear	AI6	%
7	Calibration timer	AI7	h
8	Flow	AI8	L/h
9	Pressure	AO	mbar

Valid GSD modules:

AI-FB EMPTY_MODULE
AI: Out

You require the **KNIC7535.GSD** / **KNIC7536.GSD** GSD file.

Cond			
Slot	**Description**	**Block**	**Default value**
1	Conductivity	AI1	µS/cm
2	Temperature	AI2	°C
3	Concentration	AI3	%
4	Salinity	AI4	g/kg
5	TDS	AI5	mg/l
6	Resistivity	AI6	MΩ*cm
7	Cell constant	AI7	1/cm
8	Flow	AI8	L/h
9	Temperature	AO	°C

CondI			
Slot	**Description**	**Block**	**Default value**
1	Conductivity	AI1	µS/cm
2	Temperature	AI2	°C
3	Concentration	AI3	%
4	Salinity	AI4	g/kg
5	TDS	AI5	mg/l
6	Zero point	AI6	1/cm
7	Cell constant	AI7	1/cm
8	Flow	AI8	L/h
9	Temperature	AO	°C

Cond-Cond			
Slot	**Description**	**Block**	**Default value**
1	Conductivity 1	AI1	µS/cm
2	Temperature 1	AI2	°C
3	Conductivity 2	AI3	µS/cm
4	Temperature 2	AI4	°C
5	Calculated value	AI5	
6	Cell constant 1	AI6	1/cm
7	Cell constant 2	AI7	1/cm
8	Flow	AI8	L/h

Configuration Data

The "Cyclic Data Communication" table shows the maximum configuration of the cyclic data telegram. The telegram can be adapted to the respective system requirements if you do not require all data. For projecting, proceed as follows:

1) Load the GSD file in the software of the automation system.
2) From the configuration software of the automation system, select those data which are required in the cyclic telegram.

From your projecting data, the configuration software of the automation system collects the configuration data which will be transferred from the process control to the field device. The configuration data (CHK_CFG) determine the contents of the cyclic data telegram.

The configuration data consist of twelve sections, each section being assigned to a Function Block. The content determines whether a Function Block takes part in the cyclic data traffic or not. The sequence of data in the cyclic Input/Output data telegram corresponds to the position of the respective Function Block in the configuration data.

Slot Model

Slot No.	Block	Usage
0	Physical Block (PB)	General data
1	AI 1	Measured value 1
2	AI 2	Measured value 2
3	AI 3	Measured value 3
4	AI 4	Measured value 4
5	AI 5	Measured value 5
6	AI 6	Measured value 6
7	AI 7	Measured value 7
8	AI 8	Measured value 8
9	AO	Analog output
10	DI	Sense Unical status
11	DO 1	Control of relay 1
12	DO 2	Control of relay 2
13	Transducer Block (TB)	

Cyclic Data Communication

Slot	Block	Configuration Data	Description	Input	Output
1	AI 1	0x00	Free Place	-	-
		0x42, 0x84, 0x08, 0x05 oder 0x94	Process Value 1	5 bytes	-
2	AI 2	0x00	Free Place	-	-
		0x42, 0x84, 0x08, 0x05 oder 0x94	Process Value 2	5 bytes	-
3	AI 3	0x00	Free Place	-	-
		0x42, 0x84, 0x08, 0x05 oder 0x94		5 bytes	-
4	AI 4	0x00	Free Place	-	-
		0x42, 0x84, 0x08, 0x05 oder 0x94	Process Value 4	5 bytes	-
5	AI 5	0x00	Free Place	-	-
		0x42, 0x84, 0x08, 0x05 oder 0x94	Process Value 5	5 bytes	-
6	AI 6	0x00	Free Place	-	-
		0x42, 0x84, 0x08, 0x05 oder 0x94	Process Value 6	5 bytes	-
7	AI 7	0x00	Free Place	-	-
		0x42, 0x84, 0x08, 0x05 oder 0x94	Process Value 7	5 bytes	-
8	AI 8	0x00	Free Place	-	-
		0x42, 0x84, 0x08, 0x05 oder 0x94	Process Value 8	5 bytes	-
9	AO	0x00	Free Place	-	-
		0xA4 oder 0x82,0x84,0x08,0x05	Compensation Value	2 bytes	-
10	DI	0x00	Free Place	-	-
		0x91	USP Status	2 bytes	-
11	DO 1	0x00	Free Place	-	-
		0xA1	Relay 1	2 bytes	-
12	DO 2	0x00	Free Place	-	-
		0xA1	Relay 2	2 bytes	-

Physical Block Parameters

Index rel	Index abs	Parameter	Data Type	Size	Store
0	16	BLOCK_OBJECT	DS-32	12	Record
1	17	ST_REV	UNSIGNED16	2	Simple
2	18	TAG_DESC	OCTET_STRING	32	Simple
3	19	STRATEGY	UNSIGNED16	2	Simple
4	20	ALERT_KEY	UNSIGNED8	1	Simple
5	21	TARGET_MODE	UNSIGNED8	1	Simple
6	22	MODE_BLK	DS_37	3	Record
7	23	ALARM_SUM	DS_42	4	Record
8	24	SOFTWARE_REVISION	VISIBLE_STRING	16	Simple
9	25	HARDWARE_REVISION	VISIBLE_STRING	16	Simple
10	26	DEVICE_MAN_ID	UNSIGNED16	1	Simple
11	27	DEVICE_ID	VISIBLE_STRING	16	Simple
12	28	DEVICE_SER_NUM	VISIBLE_STRING	16	Simple
13	29	DIAGNOSIS	OCTET_STRING	4	Simple
14	30	DIAGNOSIS_EXT	OCTET_STRING	6	Simple
15	31	DIAGNOSIS_MASK	OCTET_STRING	4	Simple
16	32	DIAGNOSIS_MASK_EXT	OCTET_STRING	6	Simple
17	33	DEVICE_CERTIFICATION	VISIBLE_STRING	32	Simple
18	34	WRITE_LOCKING	UNSIGNED16	2	Simple
19	35	FACTORY_RESET	UNSIGNED16	2	Simple
20	36	DESCRIPTOR	OCTET_STRING	32	Record
21	37	DEVICE_MESSAGE	OCTET_STRING	32	Simple
22	38	DEVICE_INSTAL_DATE	OCTET_STRING	16	Simple
24	40	IDENT_NUMBER_SELECT	UNSIGNED8	1	Simple
25	41	HW_WRITE_PROTECTION	UNSIGNED8	1	Simple
26	42	FEATURE	DS_68	2	Record
27	43	COND_STATUS_DIAG	UNSIGNED8	1	Simple
28	44	DIAG_EVENT_SWITCH	DS_69	3	Record

Default Value	Access	Writable Range	Slot
	R		0
0	SR		0
“	SRW		0
0	SRW		0
0	SRW		0
8	SRW		0
8; 0x88; 8	DR		0
0; 0; 0; 0	DR		0
	R		0
	R		0
	R		0
	R		0
	R		0
0	DR		0
0	DR		0
	R		0
	R		0
	R		0
	NRW		0
0	SRW		0
“	SRW		0
“	SRW		0
“	SRW		0
	SRW		0
0	DR		0
	R		0
1	SRW		0
0, 0	SRW		0

AI Function Block Parameters

Index rel	Index abs	Parameter	Data Type	Size	Store	
0	16	BLOCK_OBJECT	DS-32	12	Record	
1	17	ST_REV	UNSIGNED16	2	Simple	
2	18	TAG_DESC	OCTET_STRING	32	Simple	
3	19	STRATEGY	UNSIGNED16	2	Simple	
4	20	ALERT_KEY	UNSIGNED8	1	Simple	
5	21	TARGET_MODE	UNSIGNED8	1	Simple	
6	22	MODE_BLK	DS_37	3	Record	
7	23	ALARM_SUM	DS_42	4	Record	
8	24	BATCH	DS_67	4	Record	
10	26	OUT	DS_101	2	Record	
11	27	PV_SCALE	FLOATING_POINT	2	Array	
12	28	OUT_SCALE	DS_36	4	Record	
13	29	LIN_TYPE	UNSIGNED8	1	Simple	
14	30	CHANNEL	UNSIGNED16	2	Simple	
16	32	PV_FTIME	FLOATING_POINT	1	Simple	
17	33	FSAFE_TYPE	UNSIGNED8	1	Simple	
18	34	FSAFE_VALUE	FLOATING_POINT	1	Simple	
19	35	ALARM_HYS	FLOATING_POINT	1	Simple	
21	37	HI_HI_LIM	FLOATING_POINT	1	Simple	
23	39	HI_LIM	FLOATING_POINT	1	Simple	
25	41	LO_LIM	FLOATING_POINT	1	Simple	
27	43	LO_LO_LIM	FLOATING_POINT	1	Simple	
30	46	HI_HI_ALM	DS_39	5	Record	
31	47	HI_ALM	DS_39	5	Record	
32	48	LO_ALM	DS_39	5	Record	
33	49	LO_LO_ALM	DS_39	5	Record	
34	50	SIMULATE	DS_50	3	Record	
35	51	OUT_UNIT_TEXT	OCTET_STRING	16	Simple	

Default Value	Access	Writable Range	Slot
	R		1-8
0	SR		1-8
“	SRW		1-8
0	SRW		1-8
0	SRW		1-8
8	SRW	Auto	1-8
128; 152; 8	DR	OS, OS/MAN/AUTO, AUTO	1-8
0; 0; 0; 0	DR		1-8
0; 0; 0; 0	SRW		1-8
0.0; 0x4F	NRWO	UNCERTAIN, INITIAL_VALUE; writable	1-8
100.0; 0.0	SRW	0% to 100%	1-8
100.0; 0.0; 1342; 0	SRW	0% to 100%	1-8
0	SRW		1-8
0	SRW		1-8
0.0	SRW		1-8
1	SRW		1-8
0.0	SRW		1-8
0.5	SRW	0.5% out of range	1-8
	SRW		1-8
	SRW		1-8
	SRW		1-8
	SRW		1-8
0; 0; 0,0; 0; 0.0	DR		1-8
0; 0; 0,0; 0; 0.0	DR		1-8
0; 0; 0,0; 0; 0.0	DR		1-8
0; 0; 0,0; 0; 0.0	DR		1-8
0; 0.0;	SRW	disabled	1-8
“	SRW		1-8

AO Function Block Parameters

Index rel	Index abs	Parameter	Data Type	Size	Store
0	16	BLOCK_OBJECT	DS-32	12	Record
1	17	ST_REV	UNSIGNED16	2	Simple
2	18	TAG_DESC	OCTET_STRING	32	Simple
3	19	STRATEGY	UNSIGNED16	2	Simple
4	20	ALERT_KEY	UNSIGNED8	1	Simple
5	21	TARGET_MODE	UNSIGNED8	1	Simple
6	22	MODE_BLK	DS_37	3	Record
7	23	ALARM_SUM	DS_42	4	Record
8	24	BATCH	DS_67	4	Record
9	25	SP	DS_101	2	Record
11	27	PV_SCALE	DS_36	4	Record
12	28	READBACK	DS_101	2	Record
14	30	RCAS_IN	DS_101	2	Record
21	37	IN_CHANNEL	UNSIGNED16	2	Simple
22	38	OUT_CHANNEL	UNSIGNED16	2	Simple
23	39	FSAVE_TIME	FLOATING_POINT	1	Simple
24	40	FSAVE_TYPE	UNSIGNED8	1	Simple
25	41	FSAVE_VALUE	FLOATING_POINT	1	Simple
27	43	RCAS_OUT	DS_101	2	Record
31	47	POS_D	DS_102	2	Record
32	48	SETP_DEVIATION	FLOATING_POINT	1	Simple
33	49	CHECK_BACK	OCTET_STRING	3	Simple
34	50	CHECK_BACK_MASK	OCTET_STRING	3	Simple
35	51	SIMULATE	DS_50	3	Record
36	52	INCREASE_CLOSE	UNSIGNED8	1	Simple
37	53	OUT	DS_101	2	Record
38	54	OUT_SCALE	DS_36	4	Record

Default Value	Access	Writable Range	Slot
	R		9
0	SR		9
“	SRW		9
0	SRW		9
0	SRW		9
0x08	SRW	Auto	9
0x80; 0x9A; 0x08	DR	OS, OS/MAN/AUTO/RCAS, AUTO	9
0; 0; 0; 0	DR		9
0; 0; 0; 0	SRW		9
0.0; 0x18	DRWI	bad, no comm. no value	9
100.0; 0.0; 1001; 0	SRW		9
0.0; 0	DRO	bad, non-specific	9
0.0; 0x18	DRWI	bad, no comm. no value	9
0	SRW		9
0	SRW		9
0.0	SRW		9
2	SRW		9
0.0	SRW		9
0.0; 0	DRO	bad, non-specific	9
0; 0	DRO	bad, non-specific	9
0.0	DR		9
0, 0, 0	DRO		9
0x0D, 0x4C, 0x00	R		9
0; 0.0; 0	SRW	disabled	9
0	SRW		9
0.0; 0	DRO	bad, non-specific	9
100.0; 0.0; 1001; 0	SRW		9

DI Function Block Parameters

Index rel	Index abs	Parameter	Data Type	Size	Store	
0	16	BLOCK_OBJECT	DS-32	12	Record	
1	17	ST_REV	UNSIGNED16	2	Simple	
2	18	TAG_DESC	OCTET_STRING	32	Simple	
3	19	STRATEGY	UNSIGNED16	2	Simple	
4	20	ALERT_KEY	UNSIGNED8	1	Simple	
5	21	TARGET_MODE	UNSIGNED8	1	Simple	
6	22	MODE_BLK	DS_37	3	Record	
7	23	ALARM_SUM	DS_42	4	Record	
8	24	BATCH	DS_67	4	Record	
10	26	OUT_D	DS_102	2	Record	
14	30	CHANNEL	UNSIGNED16	2	Simple	
15	31	INVERT	UNSIGNED8	1	Simple	
20	36	FSAFE_TYPE	UNSIGNED8	1	Simple	
21	37	FSAVE_VALUE_D	UNSIGNED8	1	Simple	
24	40	SIMULATE	DS_51	3	Record	

	Default Value	Access	Writable Range	Slot
		R		10
	0	SR		10
	“	SRW		10
	0	SRW		10
	0	SRW		10
	8	SRW	Auto	10
	0x80; 0x98; 0x08	DR	OS, OS/MAN/AUTO, AUTO	10
	0; 0; 0; 0	DR		10
	0; 0; 0; 0	SRW		10
	0; 0x00	NRWO	bad, non-specific	10
	0	SRW		10
	0	SRW		10
	1	SRW		10
	0	SRW		10
	0; 0; 0	SRW	disabled	10

DO Function Block Parameters

Index rel	Index abs	Parameter	Data Type	Size	Store	
0	16	BLOCK_OBJECT	DS-32	12	Record	
1	17	ST_REV	UNSIGNED16	2	Simple	
2	18	TAG_DESC	OCTET_STRING	32	Simple	
3	19	STRATEGY	UNSIGNED16	2	Simple	
4	20	ALERT_KEY	UNSIGNED8	1	Simple	
5	21	TARGET_MODE	UNSIGNED8	1	Simple	
6	22	MODE_BLK	DS_37	3	Record	
7	23	ALARM_SUM	DS_42	4	Record	
8	24	BATCH	DS_67	4	Record	
9	25	SP_D	DS_102	2	Record	
10	26	OUT_D	DS_102	2	Record	
12	28	READBACK_D	DS_102	2	Record	
14	30	RCAS_IN_D	DS_102	2	Record	
17	33	CHANNEL	UNSIGNED16	2	Simple	
18	34	INVERT	UNSIGNED8	1	Simple	
19	35	FSAFE_TIME	FLOATING_POINT	1	Simple	
20	36	FSAFE_TYPE	UNSIGNED8	1	Simple	
21	37	FSAFE_VALUE_D	UNSIGNED8	1	Simple	
22	38	RCAS_OUT_D	DS_102	2	Record	
24	40	SIMULATE	DS_51	3	Record	
33	49	CHECK_BACK_D	OCTET_STRING	3	Simple	
34	50	CHECK_BACK_MASK	OCTET_STRING	3	Simple	

	Default Value	Access	Writable Range	Slot
		R		11-12
	0	SR		11-12
	“	SRW		11-12
	0	SRW		11-12
	0	SRW		11-12
	0x08	SRW	Auto	11-12
	0x80; 0x9A; 0x08	DR	OS, OS/MAN/AUTO/RCAS/LO, AUTO	11-12
	0; 0; 0; 0	DR		11-12
	0; 0; 0; 0	SRW		11-12
	0; 0x18	DRWI	bad, no communication (no usable value)	11-12
	0; 0x00	DRWO	bad, non-specific	11-12
	0; 0x00	DRO	bad, non-specific	11-12
	0; 0x18	DRWI	bad, no communication (no usable value)	11-12
	0	SRW		11-12
	0	SRW		11-12
	0.0	SRW		11-12
	2	SRW		11-12
	0	SRW		11-12
	0; 0x00	DRO	bad, non-specific	11-12
	0; 0; 0	SRW	disabled	11-12
	0, 0, 0	DRO		11-12
	0x0D, 0x4C, 0x00	R		11-12

Bus Parameters of Standard Transducer Block (TB)

Index rel	Index abs	Parameter	Description	
0	16	BLOCK_OBJECT	Block type	
1	17	ST_REV	Identification counter which is incremented with every change of configuration parameters	
2	18	TAG-DESC	Unambiguous TAG in the system, can be specified by the user	
3	19	STRATEGY	Can be used to identify grouping of blocks	
4	20	ALERT_KEY	Value can be written by the user for alarm handling	
5	21	TARGET_MODE	Target mode = Auto	
6	22	MODE_BLK	Configured block mode	
7	23	ALARM_SUM	Alarm status	
8	24	VALUE_AO	Value for analog output	
9	25	VALUE_DI	Value for digital input	
10	26	VALUE_DO	Value for digital output	

Default Value	R/W	Bytes	Data Type	Range
The revision value is incremented every time a static parameter in the block is changed.	R	2		
Text		32		
0		2		
0		1		
Available Modes: Automatic, Out Of Service (OOS), Manual		1 1 1 1		
		2		
0 0 0 0 0	R	1 1 8 2 2		
	R/W	5	FLOAT_S	
	R/W	2	DISC_2	
	R/W	2	DISC_2	

Bus Parameters of Manufacturer-Specific Transducer Block (TB)

Index rel	Index abs	Parameter	Description	
11	27	Meas Type	Select measuring mode	
12	28	pH	Parameter: pH	
		Sensortype	Select pH sensor type	
		Meas Mode	Select measuring mode	
		RTD Type	Select temperature sensor type	
		Temperature Unit	Select temperature unit of display	
		Temperature Meas	Select temperature detection during measurement	
		Temperature Meas Manual Value	Enter temperature value (MAN)	
		Temperature Calibration	Select temperature detection during calibration	
		Temperature Cal Manual Value	Enter temperature value (MAN)	
		Nominal Zero	Enter nominal zero for Pfaudler sensors	
		Nominal Slope	Enter nominal slope for Pfaudler sensors	
		pH Iso	Enter pHiso value for Pfaudler sensors	
		Calibration Mode	Select calibration mode	
		Buffer Set	Select buffer set (AUTO)	
		Calibration Timer	Select calibration timer	
		Calibration Cycle	Set calibration cycle	
		ACT	Select adaptive cal timer (ISM only)	
		ACT Cycle	Select adaptive cal cycle (ISM only)	
		TTM	Select adaptive maintenance timer (ISM only)	
		TTM Cycle	Select adaptive maintenance cycle (ISM only)	
		CIP Count	Switch cleaning cycles on/off	
		CIP Cycles	Enter cleaning cycles (ON)	
		SIP Count	Enable/disable sterilization cycles	
		SIP Cycles	Enter sterilization cycles (ON)	
		Autoclave	Enable/disable autoclaving counter	
		AC Cycles	Enter autoclaving cycle (ON)	
		Tc Select	Select temperature compensation	
		Tc Liquid	Enter value for linear temperature compensation (LIN)	

Default Value	R/W	Bytes	Data Type	Range
0 = pH	R/W	1	U8	0-5
	R/W		Record	
0 = Standard	R/W	1	U8	0-20
0 = pH	R/W	1	U8	0-2
0 = 100 PT	R/W	1	U8	0-8
0 = °C	R/W	1	U8	0-1
0 = Auto	R/W	1	U8	0-2
0	R/W	4	Float	
0 = Auto	R/W	1	U8	0-2
0	R/W	4	Float	
7.0	R/W	4	Float	0-14
59.2	R/W	4	Float	30-60
7.0	R/W	4	Float	0-14
0 = Auto	R/W	1	U8	0-2
0 = -02- Knick	R/W	1	U8	0-255
0 = Off	R/W	1	U8	0-2
168	R/W	4	Float	0-9999
0 = Off	R/W	1	U8	0.2
30	R/W	4	Float	0-2000
0 = Off	R/W	1	U8	0-2
365	R/W	4	Float	0-2000
0 = Off	R/W	1	U8	0-1
0	R/W	2	U16	0-9999
0 = Off	R/W	1	U8	0-1
0	R/W	2	U16	0-9999
0 = Off	R/W	1	U8	0-1
0	R/W	2	U16	0-9999
0 = Off	R/W	1	U8	0-3
0	R/W	4	Float	-19.99-19.99

Bus Parameters of Manufacturer-Specific Transducer Block (TB)

Index rel	Index abs	Parameter	Description	
13	29	Conductivity	Parameter: conductivity	
		Sensor Type	Select Cond sensor type	
		Meas Mode	Select measuring mode	
		Display Unit	Select measuring range	
		Solution	Concentration determination	
		RTD Type	Select temperature sensor type	
		Temperature Unit	Select temperature unit of display	
		Temperature	Select temperature detection during measurement	
		Temperature Manual Value	Enter temperature value (MAN)	
		CIP Count	Switch cleaning cycles on/off	
		SIP Count	Enable/disable sterilization cycles	
		Tc Select	Select temperature compensation	
		Tc Liquid	Enter value for linear temperature compensation (LIN)	
		Reference Temperature	Enter value for reference temperature (LIN)	
		Tds Factor	Enter TDS factor (Meas Mode = TDS)	
		Usp Factor	Enter USP factor (Meas Mode = USP)	

Default Value	R/W	Bytes	Data Type	Range
	R/W		Record	
0 = 2-Electrode	R/W	1	U8	0-20
0 = Cond	R/W	1	U8	0-2
0 = 000.0 mS/cm	R/W	1	U8	0-8
0 = -01- (NaCl)	R/W	1	U8	0-1
0 = 100 PT	R/W	1	U8	0-2
0 = °C	R/W	1	U8	
0 = Auto	R/W	1	U8	0-2
0	R/W	4	Float	
0 = Off	R/W	1	U8	0-1
0 = Off	R/W	1	U8	0-1
0 = Off	R/W	1	U8	0-1
0	R/W	4	Float	0-2
0	R/W	4	Float	0-255
0	R/W	4	Float	0-2
0	R/W	4	Float	0-9999

Bus Parameters of Manufacturer-Specific Transducer Block (TB)

Index rel	Index abs	Parameter	Description	
14	30	Toroidal Conductivity	Parameter: inductive conductivity	
		Sensor Type	Select Cond sensor type	
		Meas Mode	Select measuring mode	
		Display Unit	Select measuring range	
		Solution	Concentration determination	
		RTD Type	Select temperature sensor type	
		Temperature Unit	Select temperature unit of display	
		Temperature	Select temperature detection during measurement	
		Temperature Manual Value	Enter temperature value (MAN)	
		CIP Count	Switch cleaning cycles on/off	
		SIP Count	Enable/disable sterilization cycles	
		Tc Select	Select temperature compensation	
		Tc Liquid	Enter value for linear temperature compensation (LIN)	
		Reference Temperature	Enter value for reference temperature (LIN)	
		Tds Factor	Enter TDS factor (Meas Mode = TDS)	

	Default Value	R/W	Bytes	Data Type	Range
		R/W		Record	
	0 = SE 655	R/W	1	U8	0-4
	0 = Cond	R/W	1	U8	0-2
	0 = 0.000 mS/cm	R/W	1	U8	0-5
	0 = -01- (NaCl)	R/W	1	U8	0-9
	0 = 100 PT	R/W	1	U8	0-5
	0 = °C	R/W	1	U8	0-1
	0 = Auto	R/W	1	U8	0-2
	0	R/W	4	Float	25.0
	0 = Off	R/W	1	U8	0-1
	0 = Off	R/W	1	U8	0-1
	0 = Off	R/W	1	U8	0-5
	0	R/W	4	Float	0-19.99
	0	R/W	4	Float	
	0	R/W	4	Float	

Bus Parameters of Manufacturer-Specific Transducer Block (TB)

Index rel	Index abs	Parameter	Description
15	31	Dissolved Oxygen	Parameter: Oxy
		Sensor Type	Sensor type selection
		Meas Mode	Select measuring mode
		Polarization Voltage Meas	Enter polarization voltage during meas
		Polarization Voltage Cal	Enter polarization voltage during cal
		Membrane Compensation	Enter membrane compensation
		RTD Type	Select type of temperature probe
		Temperature Unit	Select temperature unit of display
		Calibration Mode	Select calibration mode
		Calibration Timer	Enable/disable calibration timer
		Cal Cycle	Set calibration cycle (ON)
		ACT	Select adaptive cal timer (ISM only)
		ACT Cycle	Select adaptive cal cycle (ISM only)
		TTM	Select adaptive maintenance timer (ISM only)
		TTM Cycle	Select adaptive maintenance cycle (ISM only)
		CIP Count	Enable/disable cleaning cycles
		CIP Cycles	Enter cleaning cycles (ON)
		SIP Count	Enable/disable sterilization cycles
		SIP Cycles	Enter sterilization cycles (ON)
		Autoclave	Enable/disable autoclaving counter
		AC Cycles	Enter autoclaving cycle (ON)
		Salinity	Enter salinity correction
		Pressure Unit	Select pressure unit
		Pressure	Select pressure correction
		Pressure Manual Value	Enter pressure value (MAN)

	Default Value	R/W	Bytes	Data Type	Range
		R/W		Record	
	0 = Standard	R/W	1	U8	0-4
	0 = DO%	R/W	1	U8	0-2
	0	R/W	4	Float	
	0	R/W	4	Float	
	0	R/W	4	Float	
	4 = 22 NTC	R/W	1	U8	4-5
	0 = °C	R/W	1	U8	0-1
	0 = Cal air	R/W	1	U8	0-1
	0 = Off	R/W	1	U8	0-2
	168	R/W	4	Float	0-9999
	0 = Off	R/W	1	U8	0-2
	30	R/W	4	Float	0-9999
	0 = Off	R/W	1	U8	0-2
	365	R/W	4	Float	0-2000
	0 = Off	R/W	1	U8	0-1
	0	R/W	2	U16	0-9999
	0 = Off	R/W	1	U8	0-1
	0	R/W	2	U16	0-9999
	0 = Off	R/W	1	U8	0-1
	0	R/W	2	U16	0-9999
	0	R/W	4	Float	
	0 = BAR	R/W	1	U8	0-2
	0 = MAN	R/W	1	U8	0-1
	0	R/W	4	Float	

Bus Parameters of Manufacturer-Specific Transducer Block (TB)

Index rel	Index abs	Parameter	Description	
16	32	CC	Cond-Cond parameter	
		Tc Select A	Select temperature compensation	
		Tc Liquid A	Enter value for linear temperature compensation (LIN)	
		Reference Temperature A	Enter value for reference temperature (LIN)	
		Tc Select B	Select temperature compensation	
		Tc Liquid B	Enter value for linear temperature compensation (LIN)	
		Reference Temperature B	Enter value for reference temperature (LIN)	
		Meas Range	Select measuring range	
		Temp Unit	Select temperature unit of display	
		Calculation	Switch calculation on/off	
		Calculation Type	Select calculation type (ON)	
		Factor 1	Enter factor 1 (-C7-)	
		Factor 2	Enter factor 2 (-C7-)	
		Parameter A	Enter factor 1 (-C8-)	
		Parameter A	Enter factor 2 (-C8-)	
		Parameter B	Enter factor 3 (-C8-)	
24	33	Flow Adjust	Enter flow measurement (pulses/liter)	
25	34	Alarm Delay	Enter alarm delay in seconds	
26	35	Sensocheck	Enable/disable Sensocheck	

	Default Value	R/W	Bytes	Data Type	Range
		R/W		Record	
	0 = Off	R/W	1	U8	0-6
	0	R/W	4	Float	0-19.99
	0	R/W	4	Float	
	0 = Off	R/W	1	U8	0-6
	0	R/W	4	Float	0-19.99
	0	R/W	4	Float	
	1 = 00.00 µS/cm	R/W	1	U8	22-25, 55
	0 = °C	R/W	1	U8	0-1
	0 = Off	R/W	1	U8	0-1
	0 = -C1- Difference	R/W	1	U8	0-7
	3	R/W	4	Float	
	243	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	12000	R/W	4	Float	0-20000
	10	R/W	4	Float	0-600
	1 = On	R/W	1	U8	0-1

Bus Parameters of Manufacturer-Specific Transducer Block (TB)

Index rel	Index abs	Parameter	Description	
20	36	Clock	Parameter: clock	
		Format	Select time format	
		Minute	Enter minutes	
		Hour	Enter hours	
		am or pm	Select AM / PM	
		Day	Enter day	
		Month	Enter month	
		Year	Enter year	

	Default Value	R/W	Bytes	Data Type	Range
		R/W		Record	
	0 = 24 h	R/W	1	U8	0-1
	0	R/W	1	U8	0-59
	0	R/W	1	U8	0-24
	0 = am	R/W	1	U8	0-1
	1	R/W	1	U8	1-31
	1	R/W	1	U8	1-12
	2000	R/W	2	U16	2000-2099

Bus Parameters of Manufacturer-Specific Transducer Block (TB)

Index rel	Index abs	Parameter	Description	
21	37	pH Tc Liquid Table	Table for temperature compensation (TC_SELECT = user tab) Values from 0 °C to 100 °C in 5 °C steps	
		0 °C	Enter value for 0 °C	
		5 °C	Enter value for 5 °C	
		10 °C	Enter value for 10 °C	
		15 °C	Enter value for 15 °C	
		20 °C	Enter value for 20 °C	
		25 °C	Enter value for 25 °C	
		30 °C	Enter value for 30 °C	
		35 °C	Enter value for 35 °C	
		40 °C	Enter value for 40 °C	
		45 °C	Enter value for 45 °C	
		50 °C	Enter value for 50 °C	
		55 °C	Enter value for 55 °C	
		60 °C	Enter value for 60 °C	
		65 °C	Enter value for 65 °C	
		70 °C	Enter value for 70 °C	
		75 °C	Enter value for 75 °C	
		80 °C	Enter value for 80 °C	
		85 °C	Enter value for 85 °C	
		90 °C	Enter value for 90 °C	
		95 °C	Enter value for 95 °C	

Note: Use a configuration tool such as **SIMATIC PDM** from Siemens for convenient data entry.

	Default Value	R/W	Bytes	Data Type	Range
		R/W		Record	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	

Bus Parameters of Manufacturer-Specific Transducer Block (TB)

Index rel	Index abs	Parameter	Description	
22	38	pH User Buffer 1	Table for 1st buffer solution (BUFFER = User buffer)	
		Nominal Value	Enter nominal value (25 °C) for 1st pH buffer	
		0 °C	Enter value for 1st pH buffer	
		5 °C	Enter value for 1st pH buffer	
		10 °C	Enter value for 1st pH buffer	
		15 °C	Enter value for 1st pH buffer	
		20 °C	Enter value for 1st pH buffer	
		25 °C	Enter value for 1st pH buffer	
		30 °C	Enter value for 1st pH buffer	
		35 °C	Enter value for 1st pH buffer	
		40 °C	Enter value for 1st pH buffer	
		45 °C	Enter value for 1st pH buffer	
		50 °C	Enter value for 1st pH buffer	
		55 °C	Enter value for 1st pH buffer	
		60 °C	Enter value for 1st pH buffer	
		65 °C	Enter value for 1st pH buffer	
		70 °C	Enter value for 1st pH buffer	
		75 °C	Enter value for 1st pH buffer	
		80 °C	Enter value for 1st pH buffer	
		85 °C	Enter value for 1st pH buffer	
		90 °C	Enter value for 1st pH buffer	
		95 °C	Enter value for 1st pH buffer	

	Default Value	R/W	Bytes	Data Type	Range
		R/W		Record	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	

Bus Parameters of Manufacturer-Specific Transducer Block (TB)

Index rel	Index abs	Parameter	Description
23	39	pH User Buffer 2	Table for 2nd buffer solution (BUFFER = User buffer)
		Nominal Value	Enter nominal value (25 °C) for 2nd pH buffer
		0 °C	Enter value for 2nd pH buffer
		5 °C	Enter value for 2nd pH buffer
		10 °C	Enter value for 2nd pH buffer
		15 °C	Enter value for 2nd pH buffer
		20 °C	Enter value for 2nd pH buffer
		25 °C	Enter value for 2nd pH buffer
		30 °C	Enter value for 2nd pH buffer
		35 °C	Enter value for 2nd pH buffer
		40 °C	Enter value for 2nd pH buffer
		45 °C	Enter value for 2nd pH buffer
		50 °C	Enter value for 2nd pH buffer
		55 °C	Enter value for 2nd pH buffer
		60 °C	Enter value for 2nd pH buffer
		65 °C	Enter value for 2nd pH buffer
		70 °C	Enter value for 2nd pH buffer
		75 °C	Enter value for 2nd pH buffer
		80 °C	Enter value for 2nd pH buffer
		85 °C	Enter value for 2nd pH buffer
		90 °C	Enter value for 2nd pH buffer
		95 °C	Enter value for 2nd pH buffer
24	40	Sample Product	Start step 1 of product calibration.
25	41	Stored Value	Display value saved for product calibration – step 1.
26	42	Reference Value	Step 2 of product calibration: Enter value of sample.
27	43	Calibration Product Step	Progress of calibration
28	44	Calibration Result	Result of last calibration
29	45	Logbook Entry	Specify group index that is to be read
30	46	Logbook Binary Data	Raw data of logbook
31	47	Logbook Erase	Logbook entries are deleted

	Default Value	R/W	Bytes	Data Type	Range
				Record	
	1	R	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	1	R/W	4	Float	
	0 = No operation	R/W	1	U8	
	0	R	4	Float	
	0	R/W	4	Float	
	0	R	1	U8	
	0 = Good	R/W	1	U8	
	0	R/W	1	U8	
		R	78	U8	
	0 = No Operation	R/W	1	U8	

Bus Parameters of Manufacturer-Specific Transducer Block (TB)

Index rel	Index abs	Parameter	Description
32	48	Sensor	Sensor data
		Sensor Serial No.	Serial number of digital sensor
		Sensor Order No.	Order number of digital sensor
		Tag	Tag number (TAG) of digital sensor
		Status	Mode indication
		Runtime	Operating time of digital sensor
		SIP Cycles	SIP cycles
		CIP Cycles	CIP cycles
		TTM	Adaptive maintenance timer
		DLI	Digital Lifetime Indicator
		ACT	Adaptive calibration timer
		Autoclave	Autoclaving
		Wear	Sensor wear for Memosens pH or Oxy sensors
		Smiley	Sensoface status
		Calibration Timer	Calibration timer
33	49	Sensor Request Binary	Query sensor information
34	50	Sensor Response Binary	Response data with sensor information
35	51	Slope	pH slope with read/write access
36	52	Zero	pH zero with read/write access
37	53	Isfet Offset	ISFET offset with read/write access (ISM only)
38	54	ORP Zero	ORP zero with read/write access
39	55	Slope	Oxygen slope with read/write access
40	56	Zero	Oxygen zero with read/write access
41	57	rH	Relative humidity during calibration [%]
42	58	Cellconstant	Enter cell factor
43	59	Cellfactor	Enter cell factor
44	60	Install	Enter installation factor
45	61	Zero	Enter zero point
46	62	Trans Ratio	Enter transfer ratio
47	63	Cellfactor A	Enter cell factor for sensor A (CC only)
48	64	Cellfactor B	Enter cell factor for sensor B (CC only)
49	65	Calibration Time	Last calibration (date)
50	66	Hold	Select measured value status during calibration, configuration and service

Default Value	R/W	Bytes	Data Type	Range
			Record	
0	R	16	Oct	
0	R	18	Oct	
0	R	32	Oct	
0	R	2	U16	
0	R	4	Float	
0	R	2	U16	
0	R	2	U16	
0	R	4	Float	
0	R	4	Float	
0	R	4	Float	
0	R	4	Float	
0	R	4	Float	
0	R	2	U16	
0	R	4	Float	
	R/W	20	Oct	
	R	32	Oct	
59.2	R/W	4	Float	
7.0	R/W	4	Float	
0	R/W	4	Float	
0	R/W	4	Float	
60.0	R/W	4	Float	
0	R/W	4	Float	
100	R/W	4	Float	
0.75	R/W	4	Float	
1	R/W	4	Float	
1	R/W	4	Float	
0	R/W	4	Float	
0	R/W	4	Float	
1	R/W	4	Float	
1	R/W	4	Float	
	R/W	19	Oct	
0 = Off	R/W	1	U8	

Bus Parameters of Manufacturer-Specific Transducer Block (TB)

Index rel	Index abs	Parameter	Description	
51	67	Version	Version	
		Device Serial No	Serial number of device	
		Device Software Version	Software version	
		Device Hardware Version	Hardware version	
		Meas Module Serial No.	Serial number of digital sensor	
		Meas Module Software Version	Software serial number of digital sensor	
		Meas Module Hardware Version	Hardware serial number of digital sensor	

	Default Value	R/W	Bytes	Data Type	Range
		R		Record	
	0	R	4	U32	
	0	R	8	Oct	
	0	R	2	Oct	
	0	R	16	Oct	
	0	R	8	Oct	
	0	R	2	Oct	

Bus Parameters of Manufacturer-Specific Transducer Block (TB)

Index rel	Index abs	Parameter	Description	
52	68	Value pH [pH]	pH value	
		Value pH [pH]	pH value	
		Status	pH status	
53	69	Value mV [mV]	mV value	
		Value mV [mV]	mV value	
		Status	mV status	
54	70	Value ORP [mV]	ORP value	
		Value ORP [mV]	ORP value	
		Status	ORP status	
55	71	Value Glass Impedance [MOhm]	Glass impedance value	
		Value Glass Impedance [MOhm]	Glass impedance value	
		Status	Glass impedance status	
56	72	Value Reference Impedance [kOhm]	Reference impedance value	
		Value Reference Impedance [kOhm]	Reference impedance value	
		Status	Reference impedance status	
57	73	Value Temperature	Temperature value	
		Value Temperature	Temperature value	
		Status	Temperature status	
58	74	Temperature Unit	Select temperature unit	
59	75	Value Calibration Timer [h]	Cal timer value (not for ISM)	
		Value Calibration Timer [h]	Cal timer value (not for ISM)	
		Status	Cal timer status	
60	76	Value Slope	Slope value	
		Value Slope	Slope value	
		Status	Slope status	
61	77	Slope Unit	Select unit for slope	
62	78	Value Zero	Zero point value	
		Value Zero	Zero point value	
		Status	Zero point status	

Default Value	R/W	Bytes	Data Type	Range
	R		DS_101	
0.0	R	4	Float	
0	R	1	U8	
	R		DS_101	
0.0	R	4	Float	
0	R	1	U8	
	R		DS_101	
0.0	R	4	Float	
0	R	1	U8	
	R		DS_101	
0.0	R	4	Float	
0	R	1	U8	
	R		DS_101	
0.0	R	4	Float	
0	R	1	U8	
	R		DS_101	
0.0	R	4	Float	
0	R	1	U8	
1001 = °C	R	2	U16	
	R		DS_101	
0.0	R	4	Float	
0	R	1	U8	
	R		DS_101	
0.0	R	4	Float	
0	R	1	U8	
1342 = %	R	2	U16	
	R		DS_101	
0.0	R	4	Float	
0	R	1	U8	

Bus Parameters of Manufacturer-Specific Transducer Block (TB)

Index rel	Index abs	Parameter	Description	
63	79	Value Wear [%]	Sensor wear value (Memosens pH/Oxy sensors)	
		Value Wear [%]	Sensor wear value (Memosens pH/Oxy sensors)	
		Status	Sensor wear status (Memosens pH/Oxy sensors)	
64	80	Value Flow [l/h]	Flow value	
		Value Flow [l/h]	Flow value	
		Status	Flow status	
65	81	Value DO Saturation Air [%]	Air saturation value	
		Value DO Saturation Air [%]	Air saturation value	
		Status	Air saturation status	
66	82	Value DO Concentration	Concentration value	
		Value DO Concentration	Concentration value	
		Status	Concentration status	
67	83	DO Concentration Unit	Select unit for concentration	
68	84	Value Gas Volume Concentration [Vol %]	Gas concentration value	
		Value Gas Volume Concentration [Vol %]	Gas concentration value	
		Status	Gas concentration status	
69	85	Value Partial Pressure [mbar]	Partial pressure value	
		Value Partial Pressure [mbar]	Partial pressure value	
		Status	Partial pressure status	
70	86	Value Conductivity	Conductivity value	
		Value Conductivity	Conductivity value	
		Status	Conductivity status	
71	87	Conductivity Unit	Select unit for conductivity	
72	88	Value Specific Resistance [MOhm*cm]	Resistivity value	
		Value Specific Resistance [MOhm*cm]	Resistivity value	
		Status	Resistivity status	

	Default Value	R/W	Bytes	Data Type	Range
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
	1423 = ppm	R	2	U16	
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
	1552 = µS/cm	R	2	U16	
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	

Bus Parameters of Manufacturer-Specific Transducer Block (TB)

Index rel	Index abs	Parameter	Description	
73	89	Value Concentration [%]	Concentration value	
		Value Concentration [%]	Concentration value	
		Status	Concentration status	
74	90	Value Conductance	Conductance value	
		Value Conductance	Conductance value	
		Status	Conductance status	
75	91	Value Salinity [g/kg]	Salt content value	
		Value Salinity [g/kg]	Salt content value	
		Status	Salt content status	
76	92	Value Tds [mg/l]	TDS value	
		Value Tds [mg/l]	TDS value	
		Status	TDS status	
77	93	Value Conductivity 2 [µS/cm]	CC: 2nd conductivity value	
		Value Conductivity 2 [µS/cm]	CC: 2nd conductivity value	
		Status	CC: Status of 2nd conductivity value	
78	94	Value Calculation	CC: Value calculated acc. to calculation type	
		Value Calculation	CC: Value calculated acc. to calculation type	
		Status	CC: CC: Status of value calculated acc. to calculation type	
79	95	Value Cell [1/cm]	Cell factor value	
		Value Cell [1/cm]	Cell factor value	
		Status	Cell factor status	
80	96	Value Temperature 2	CC: 2nd temperature value	
		Value Temperature 2	CC: 2nd temperature value	
		Status	CC: Status of 2nd temperature value	
81	97	Temperature 2 Unit	CC: Select temperature unit	
82	98	Unit	Unit used during product calibration	

	Default Value	R/W	Bytes	Data Type	Range
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
	1001 = °C	R	2	U16	
	0	R	2	U16	

Bus Parameters of Manufacturer-Specific Transducer Block (TB)

Index rel	Index abs	Parameter	Description
83	99	AO Final Value Temperature	Analog output: last temperature value
		AO Final Value Temperature	Analog output: last temperature value
		Status	Analog output: last temperature value – Status
84	100	AO Feedback Value (not used)	Analog output: actual value
		AO Feedback Value (not used)	Analog output: actual value
		Status	Analog output: actual value – Status
85	101	AO Final Value Pressure	Analog output: final pressure value
		AO Final Value Pressure	Analog output: final pressure value
		Status	Analog output: final pressure value – Status
86	102	AO Feedback Value (not used)	Analog output: actual value
		Value	Analog output: actual value
		Status	Analog output: actual value – Status
87	103	DO Final Value 1	Digital output: final value 1
		Value	Digital output: final value 1
		Status	Status
88	104	DO Final Value 2	Digital output: final value 2
		Value	Digital output: final value 2
		Status	Status
89	105	DI Value USP	Digital input: USP value
		Value	USP value
		Status	Digital input: USP value – Status
90	106	Primary Value	Primary value
		Value	Primary value
		Status	Primary value – Status
91	107	Current Error	Current device error
92	108	Specific Resi.2 [MOhm*cm]	CC: Resistivity 2
		Status	Resistivity 2 – Status
		Value	Resistivity 2 – Value
93	109	Sensor Fix	Sensor data
		Sensor Serial No.	Serial number of digital sensor
		Sensor Order No.	Order number of digital sensor
		Tag	Tag number of digital sensor
		Manufacturer	Manufacturer of digital sensor
		Initial Operation	Date of initial operation

	Default Value	R/W	Bytes	Data Type	Range
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
		R		DS_102	
	0	R	1	U8	
	0	R	1	U8	
		R		DS_102	
	0	R	1	U8	
	0	R	1	U8	
		R		DS_102	
	0	R	1	U8	
	0	R	1	U8	
		R		DS_101	
	0.0	R	4	Float	
	0	R	1	U8	
	0	R	1	U8	
		R		DS_101	
	0	R	1	Float	
	0.0	R	4	U8	
		R		Record	
		R	16	Oct	
		R	18	Oct	
		R	32	Oct	
		R	16	Oct	
		R	19	Oct	

Product Calibration

With three parameters, product calibration for pH, ORP, Cond, CondI, Oxy and Cond-Cond can be performed via PROFIBUS.

Typical pH Product Calibration via PROFIBUS

1) Set SAMPLE_PRODUCT parameter to Sample. The device saves the pH value of the sample. After the writing, the parameter is automatically reset to NOP.
2) Read out STORED_VALUE parameter. It contains the stored value.
3) Write lab value of the sample in the REFERENCE_VALUE parameter.
   The STORED_VALUE parameter is reset to 0. Now the device is calibrated.

Note: When step 1 has been performed directly on the site on the device, the operation on the PROFIBUS as described in point 1 is omitted.

Installation Instructions

- Installation of the device must be carried out by trained experts in accordance with this user manual and as per applicable local and national codes.
- Be sure to observe the technical specifications and input ratings during installation!
- Be sure not to notch the conductor when stripping the insulation!
- All parameters must be set by a system administrator prior to commissioning.

Terminals

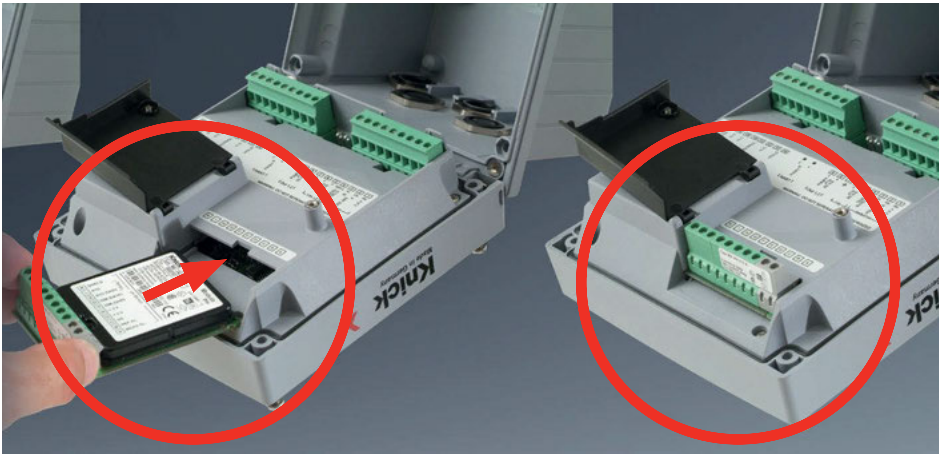
With a tightening torque of 0.5 to 0.6 Nm, the following conductor cross-sections are permitted:

Connection	**Cross-section**
Conductor cross-section rigid/flexible	0.2 … 2.5 mm^2
Conductor cross-section flexible with ferrule without plastic sleeve	0.25 … 2.5 mm^2
Conductor cross-section flexible with ferrule with plastic sleeve	0.2 … 1.5 mm^2

Application in Hazardous Locations

(Stratos Pro A221X only)

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

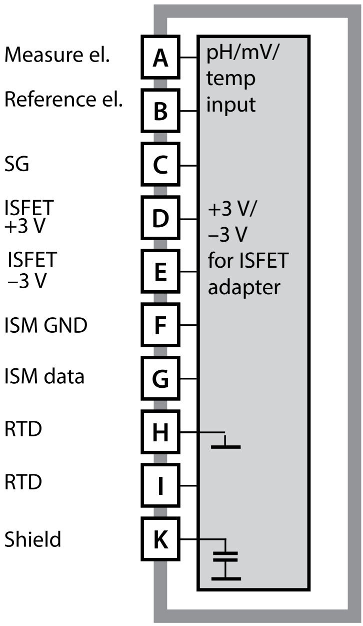


Measuring modules for connection of analog sensors:
pH, oxygen (Oxy), conductivity (Cond, CondI, Cond-Cond)

Measuring modules for the connection of analog sensors are simply inserted into the module slot.

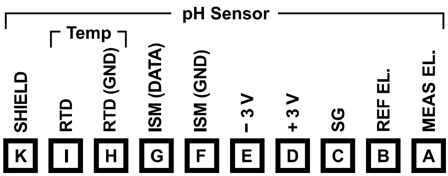
Changing the Measuring Function

When you replace the measuring module, you must select the corresponding measuring function in the “Service” menu.



Module for pH Measurement

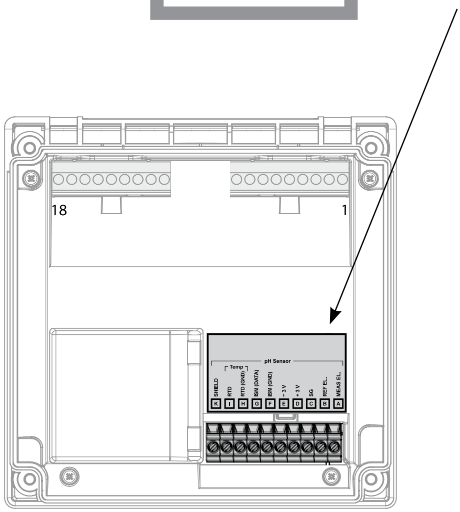
Order codes MK-PH015N / MK-PH015X
See the following pages for wiring examples.



Terminal Plate of pH Module

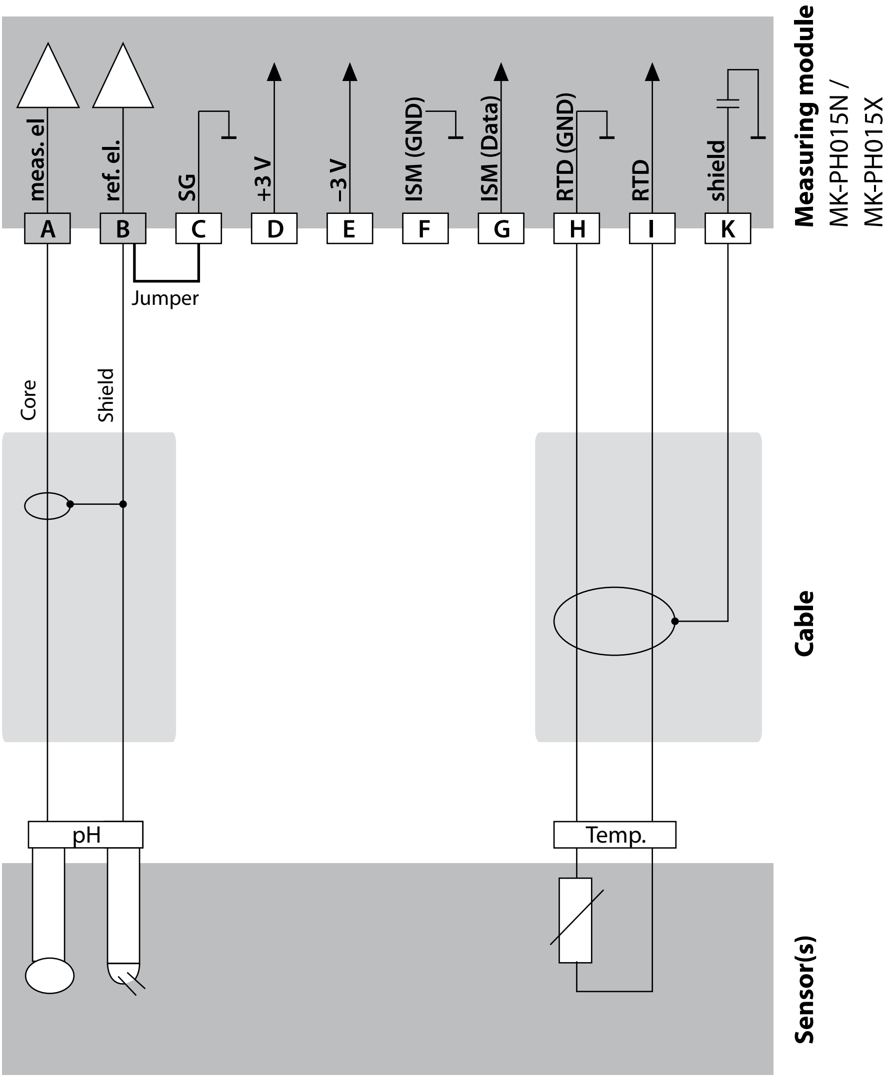
The terminals are suitable for single or stranded wires up to 2.5 mm² (AWG 14).

The measuring module comes with a self-adhesive label. Stick the label to the module slot on the device front. This way, you have the wiring “under control”.



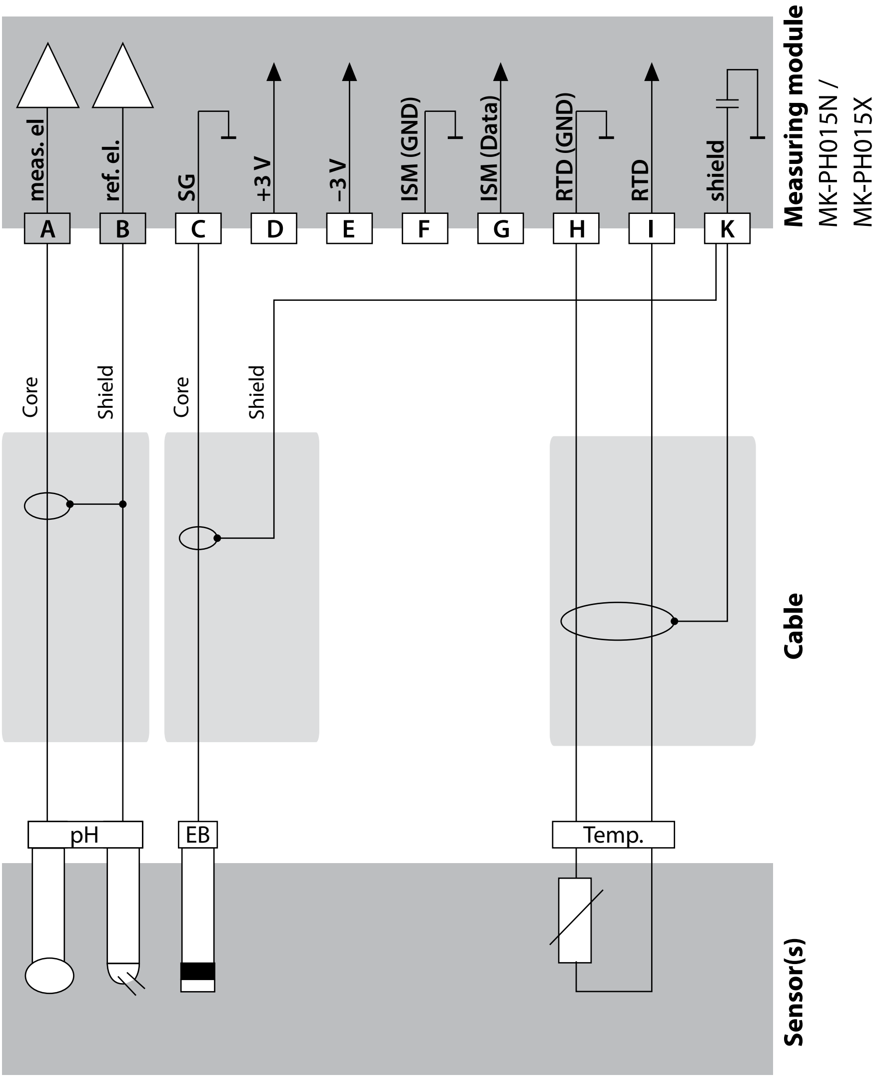
Example 1

Measuring task: pH, temperature, glass impedance
Sensor: pH sensor, eg, SE 555X/1-NS8N, cable: ZU 0318
Temperature detector: separate



Example 2

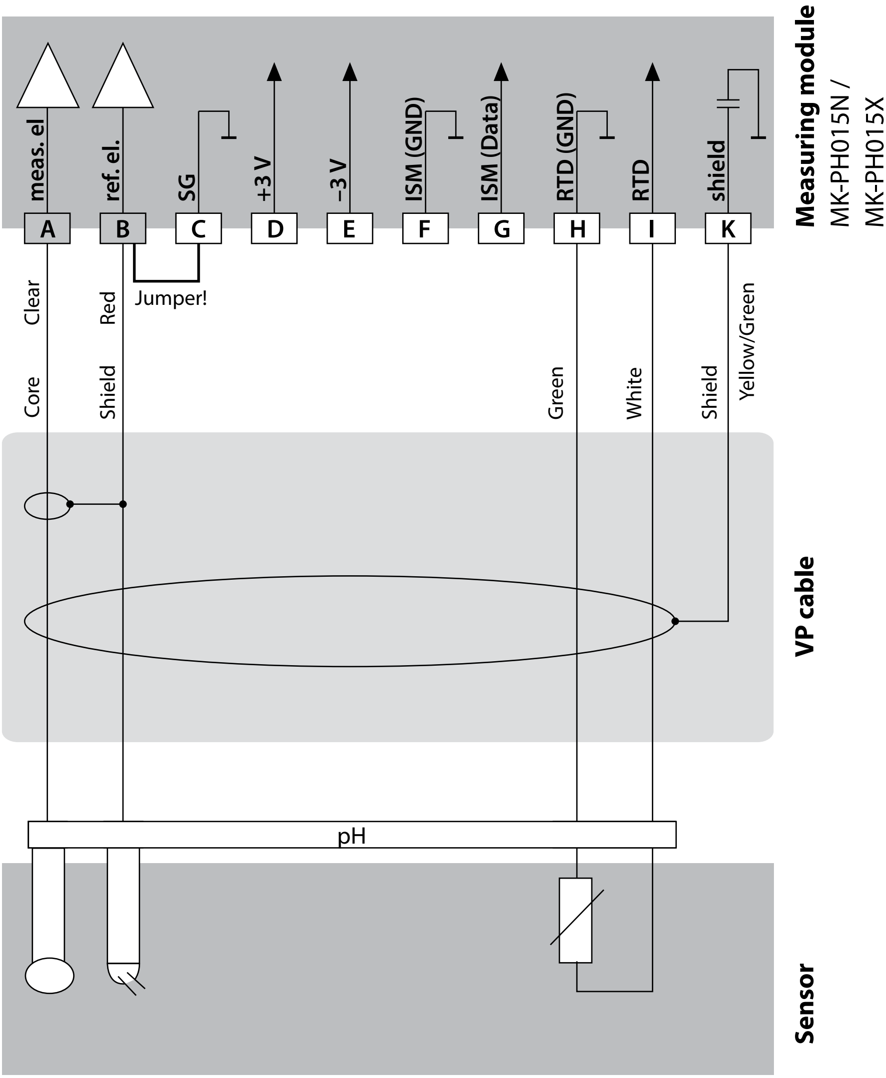
Measuring task:	pH/ORP, temperature, glass impedance, ref. impedance
Sensor:	pH sensor, eg, SE 555X/1-NS8N, cable: ZU 0318
Temperature detector:	separate
Equipotential bonding electrode:	ZU 0073



pH

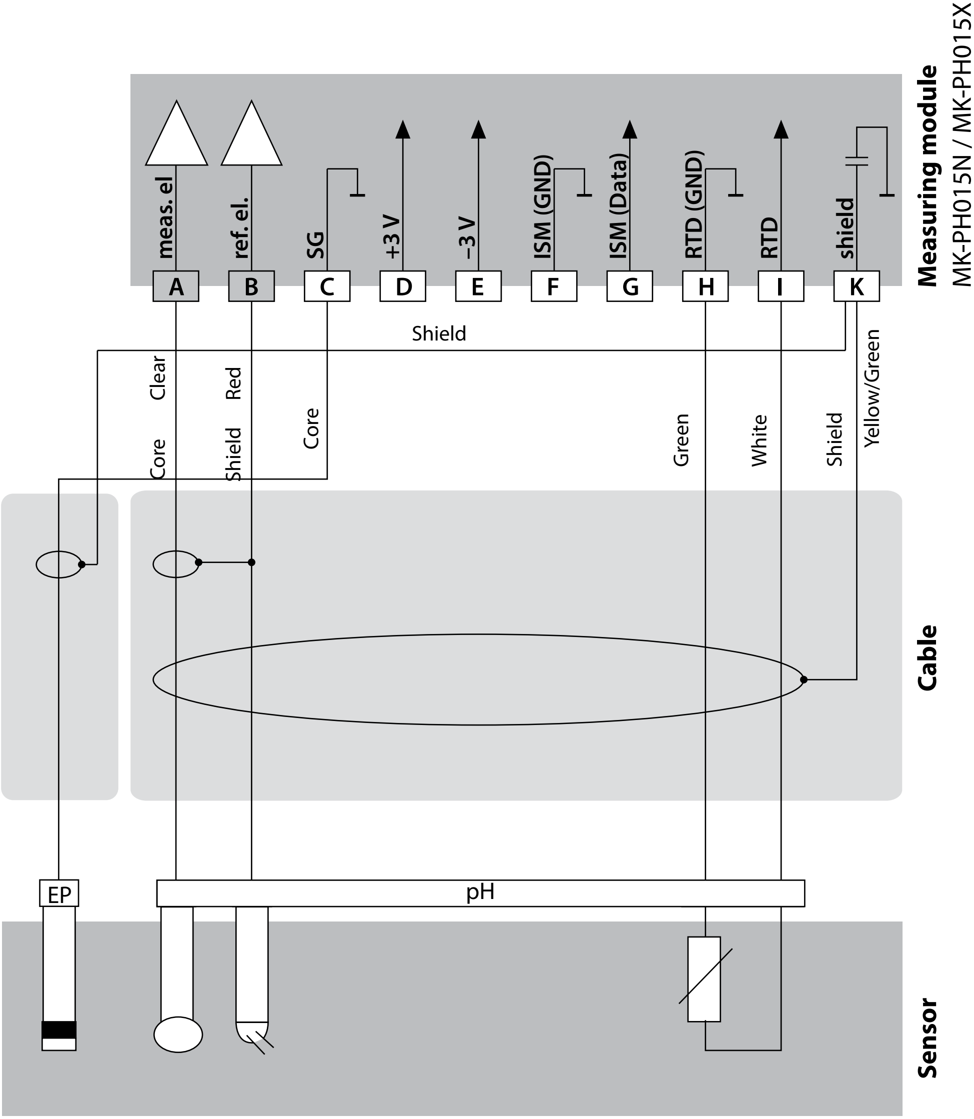
Example 3

Measuring task:	pH, temperature, glass impedance
Sensor:	pH sensor, eg, SE 554X/1-NVPN,
Cable:	CA/VP6ST-003A (ZU 0313)
Temperature detector:	integrated



Example 4

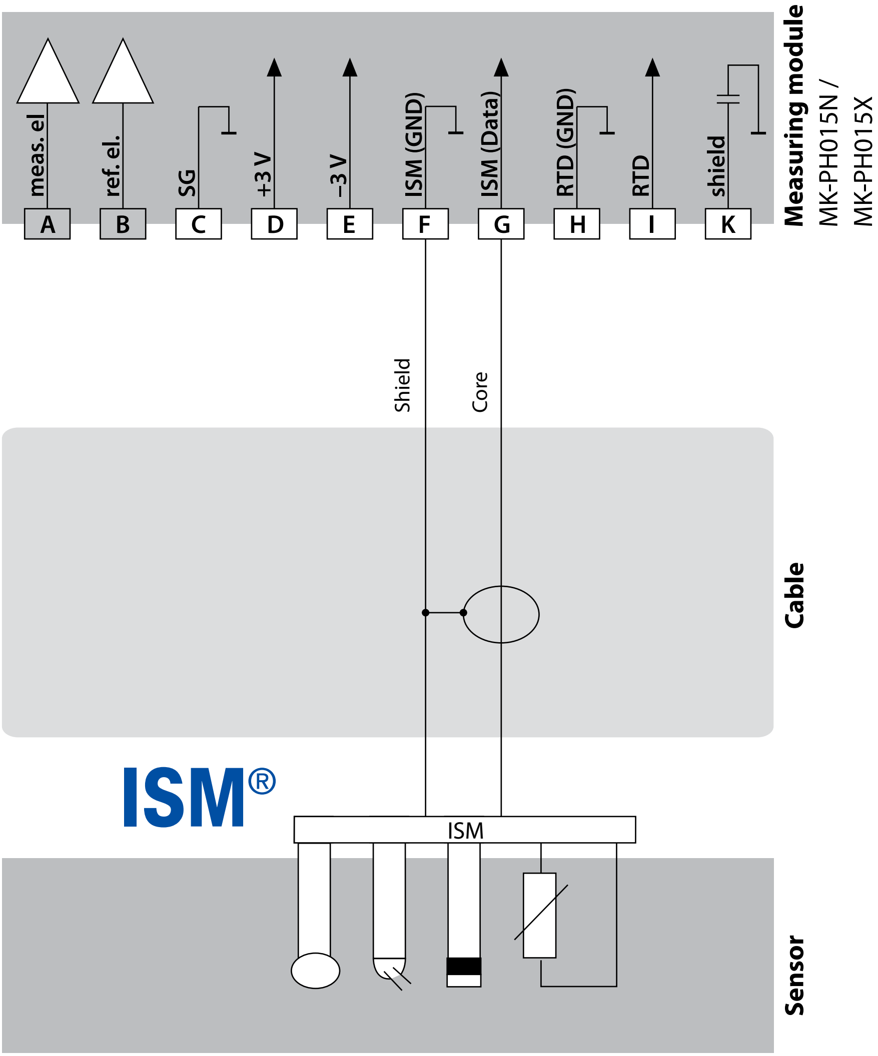
Measuring task:	pH/ORP, temperature, glass impedance, ref. impedance
Sensor:	pH sensor, eg, SE 555X/1-NVPN, cable: ZU 0313
Temperature detector:	integrated
Equipotential bonding electrode:	ZU 0073



Example 5

NOTICE! Do not connect an additional analog sensor!

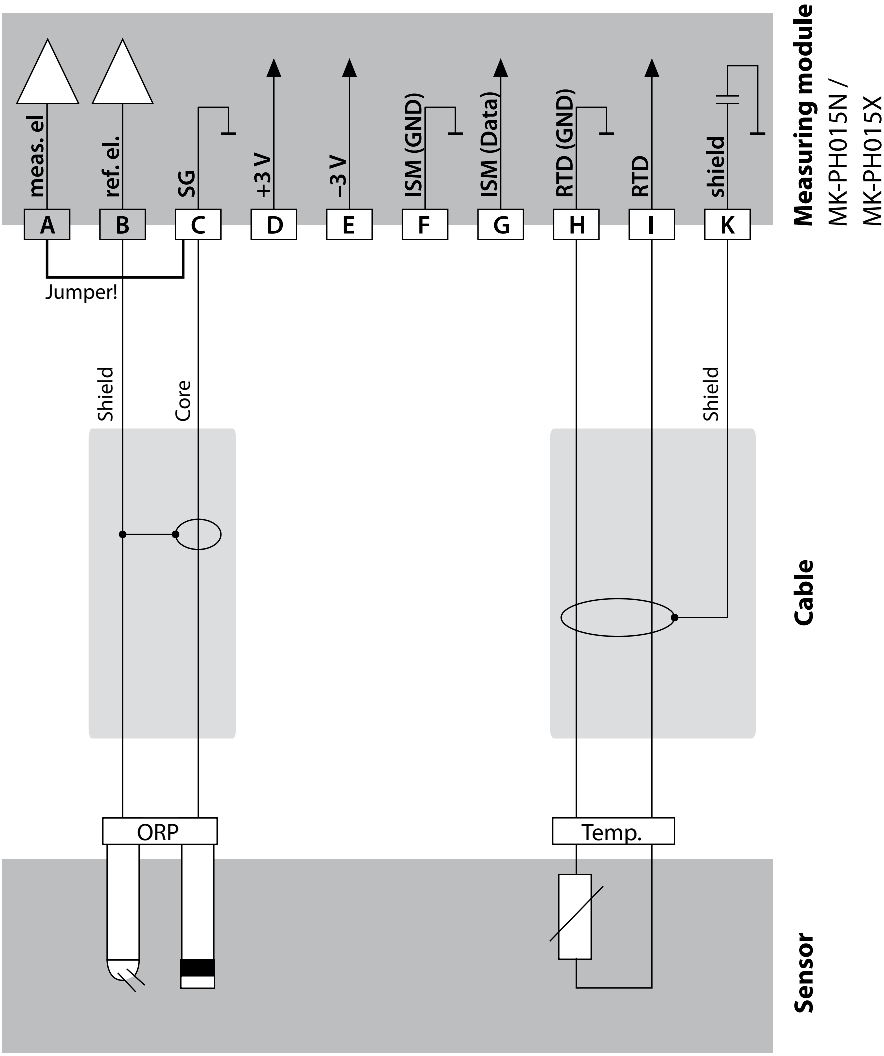
Measuring task:	pH/ORP, temperature, glass impedance, ref. impedance
Sensor:	pH sensor, eg, ISM digital, cable: AK9
Temperature detector:	integrated
Equipotential bonding electrode:	integrated



Example 6

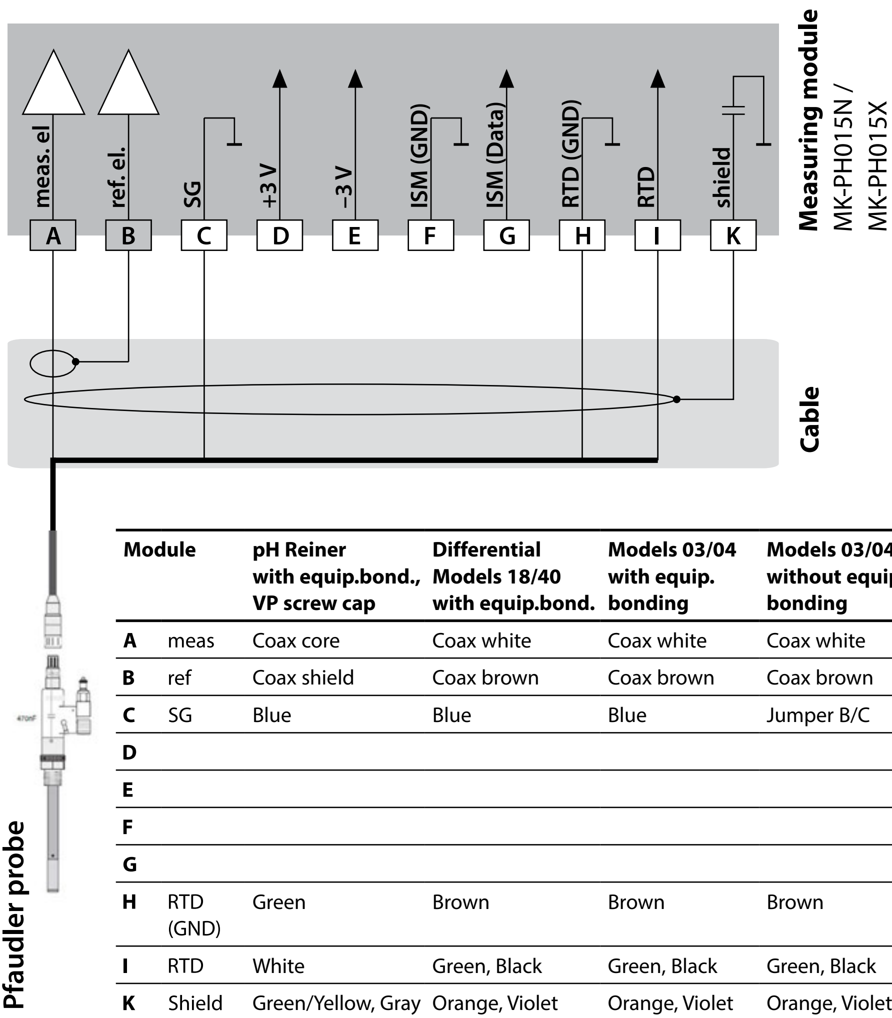
Note: Switch off Sensocheck!

Measuring task:	ORP, temperature, ref. impedance
Sensor:	ORP sensor, eg, SE 564X/1-NS8N, cable: ZU 0318
Temperature detector:	separate

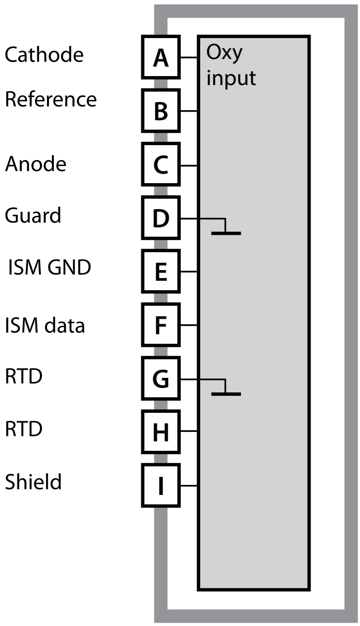


Example 7

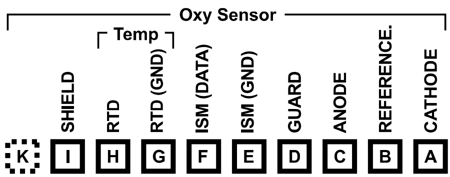
Connecting a Pfaudler probe



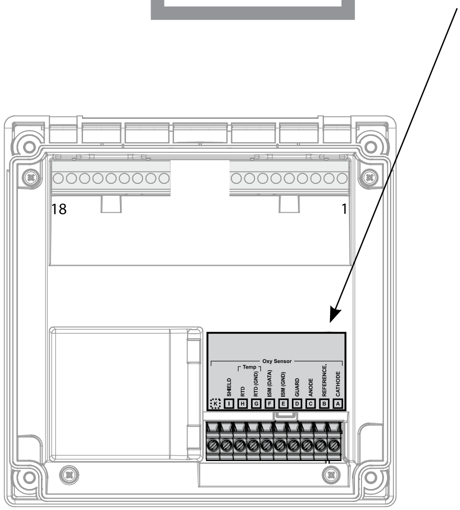
Module		pH Reiner with equip.bond., VP screw cap	Differential Models 18/40 with equip.bond.	Models 03/04 with equip. bonding	Models 03/04 without equip. bonding
A	meas	Coax core	Coax white	Coax white	Coax white
B	ref	Coax shield	Coax brown	Coax brown	Coax brown
C	SG	Blue	Blue	Blue	Jumper B/C
D					
E					
F					
G					
H	RTD (GND)	Green	Brown	Brown	Brown
I	RTD	White	Green, Black	Green, Black	Green, Black
K	Shield	Green/Yellow, Gray	Orange, Violet	Orange, Violet	Orange, Violet



Module for Oxygen Measurement
Order codes:
MK-OXY046N / MK-OXY045X
See the following pages for wiring examples.



Terminal Plate of Oxy Module
The terminals are suitable for single or stranded wires up to 2.5 mm² (AWG 14).

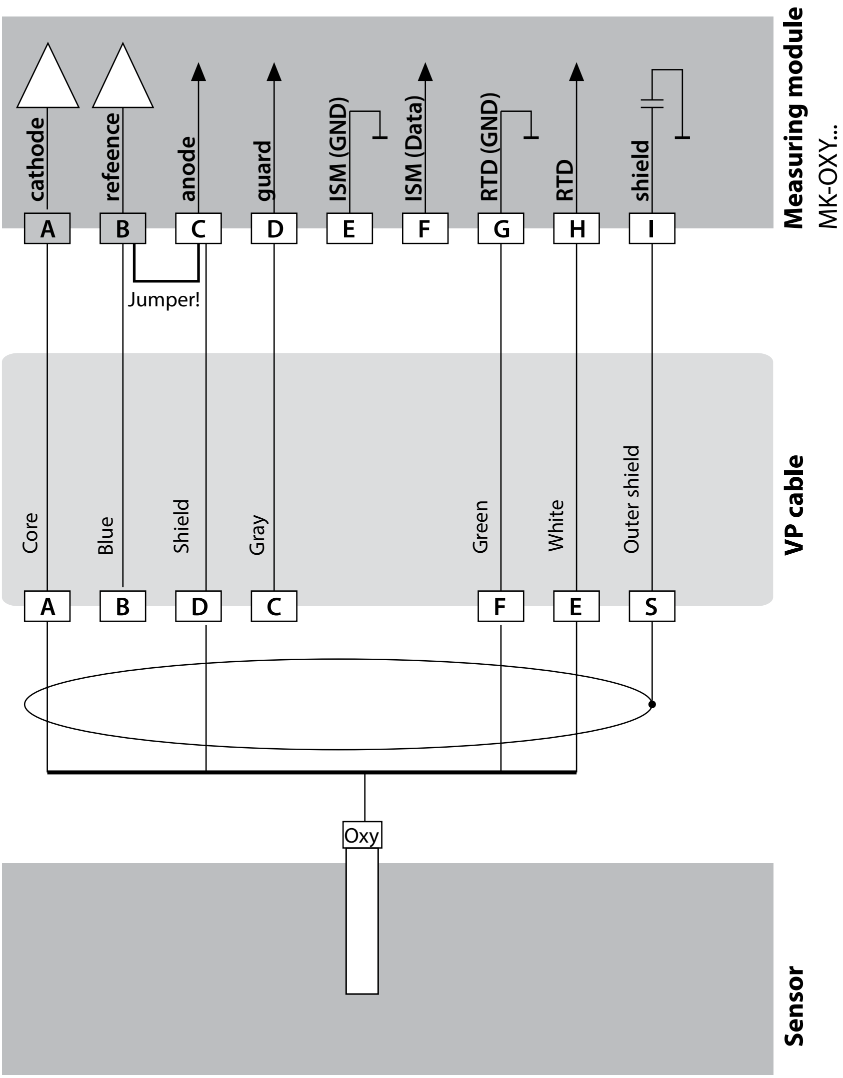


The measuring module comes with a self-adhesive label. Stick the label to the module slot on the device front. This way, you have the wiring "under control".

Example 1

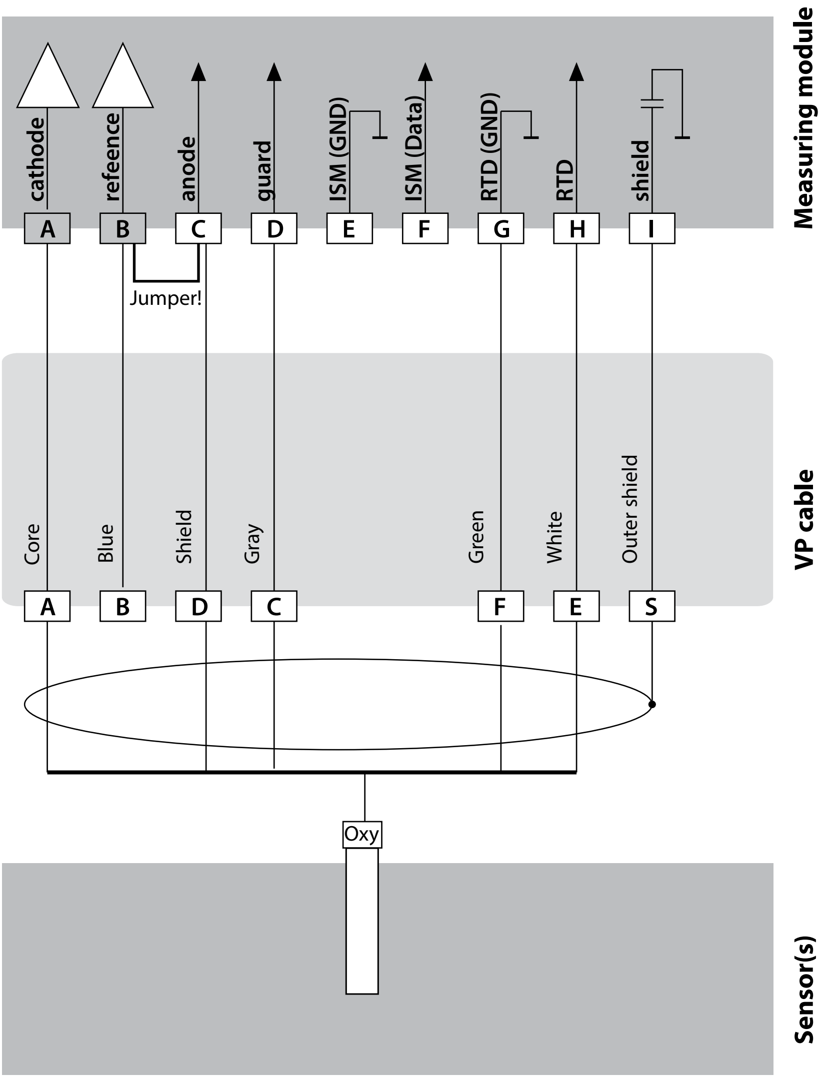
Measuring task: Oxygen STANDARD

Sensor: “10“ (eg, SE 706), cable: CA/VP6ST-003A (ZU 0313)



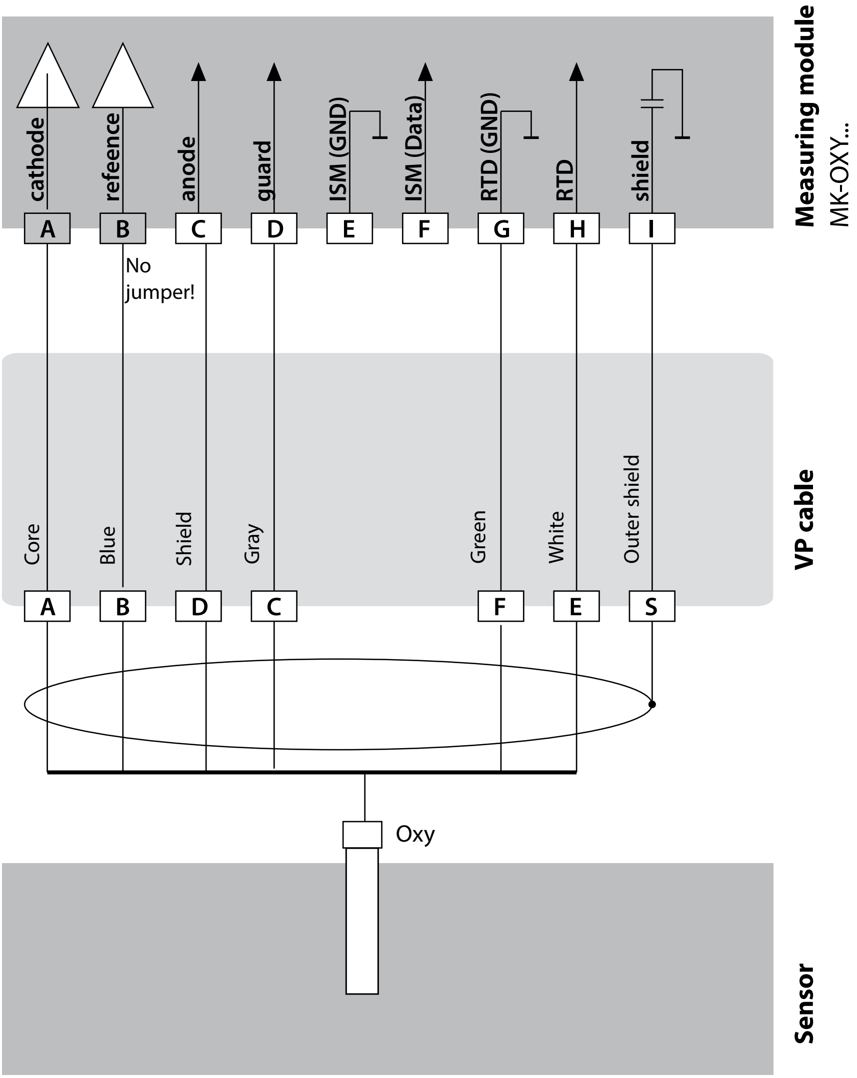
Example 2

Measuring task: Oxygen TRACES
Sensor: “01“ (eg, SE 707), cable: CA/VP6ST-003A (ZU 0313)



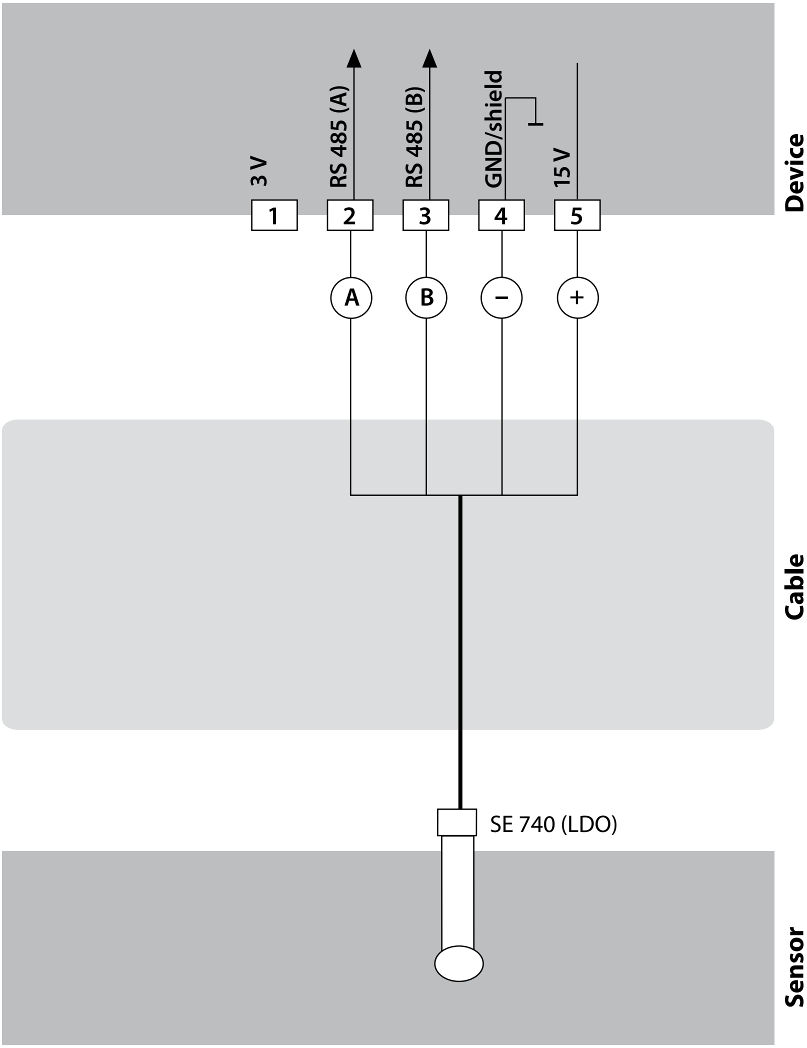
Example 3

Measuring task: Oxygen SUBTRACES
Sensor: “001“ (eg, SE 708), cable: CA/VP6ST-003A (ZU 0313)

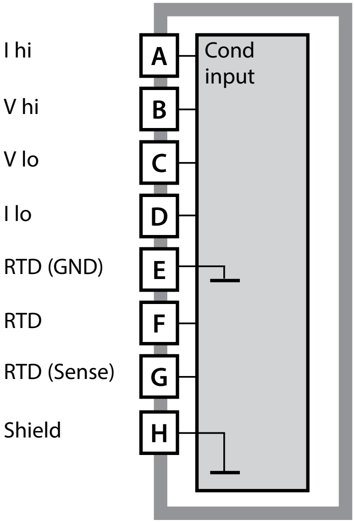


Example 1

Measuring task:	Optical oxygen (LDO)	A451N only
Sensor:	SE 740, cable, eg, CA/M12-005N485	



Cond

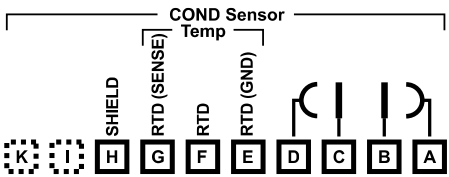


Module for Contacting Conductivity Measurement (Cond)

Order codes:

MK-COND025N / MK-COND025X

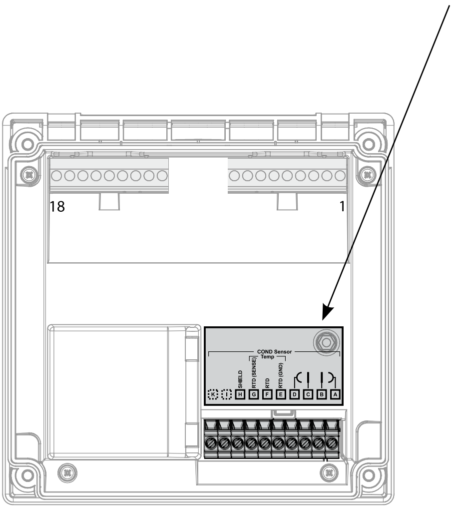
See the following pages for wiring examples.



Terminal Plate of Module for Cond Measurement

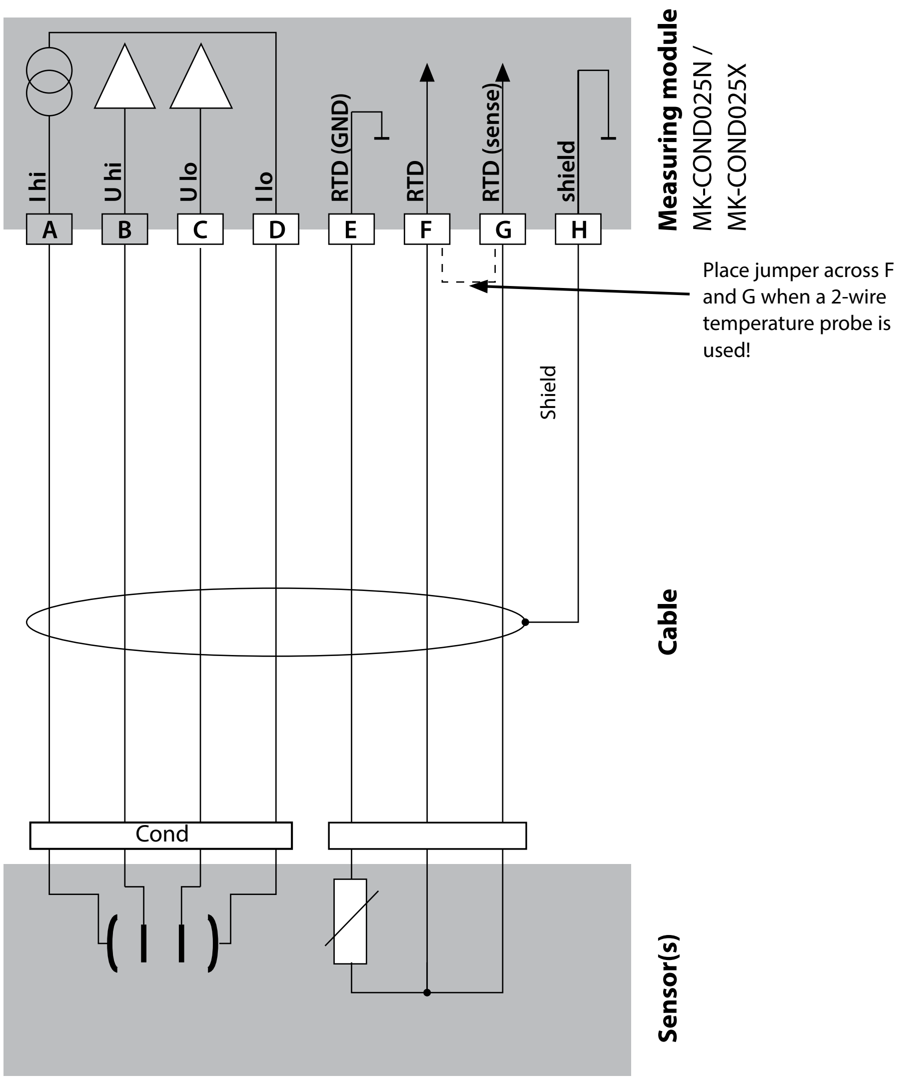
The terminals are suitable for single or stranded wires up to 2.5 mm² (AWG 14).

The measuring module comes with a self-adhesive label. Stick the label to the module slot on the device front. This way, you have the wiring "under control".



Example 1

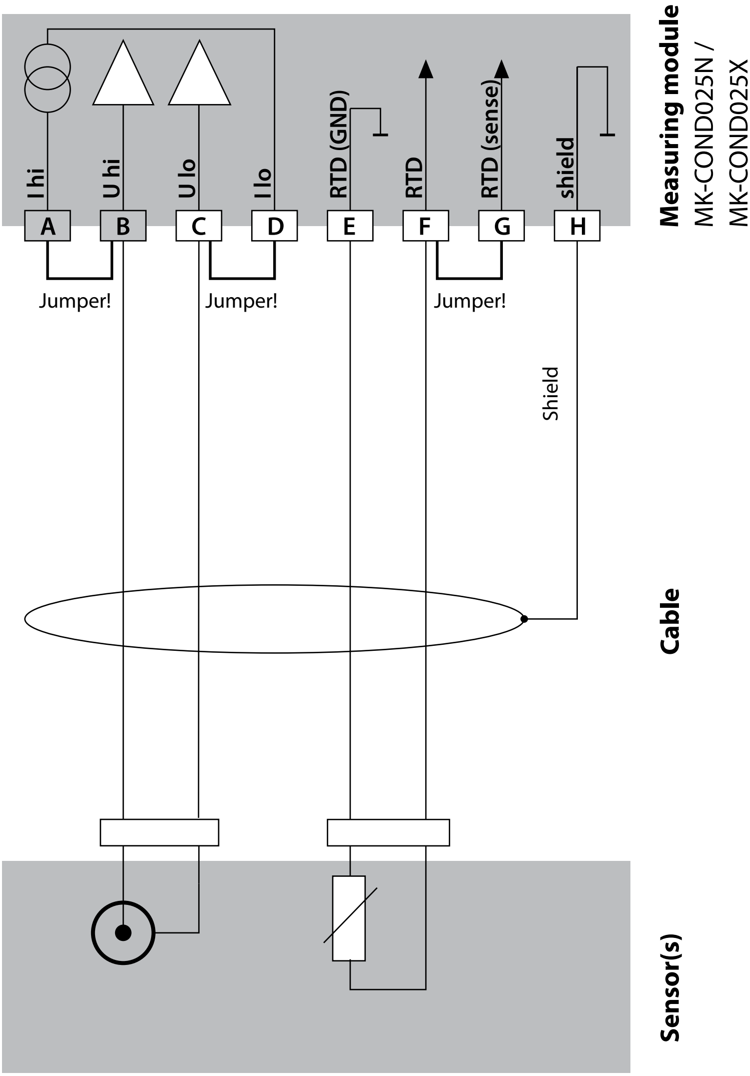
Measuring task: Conductivity, temperature
Sensor: 4 electrodes



Cond

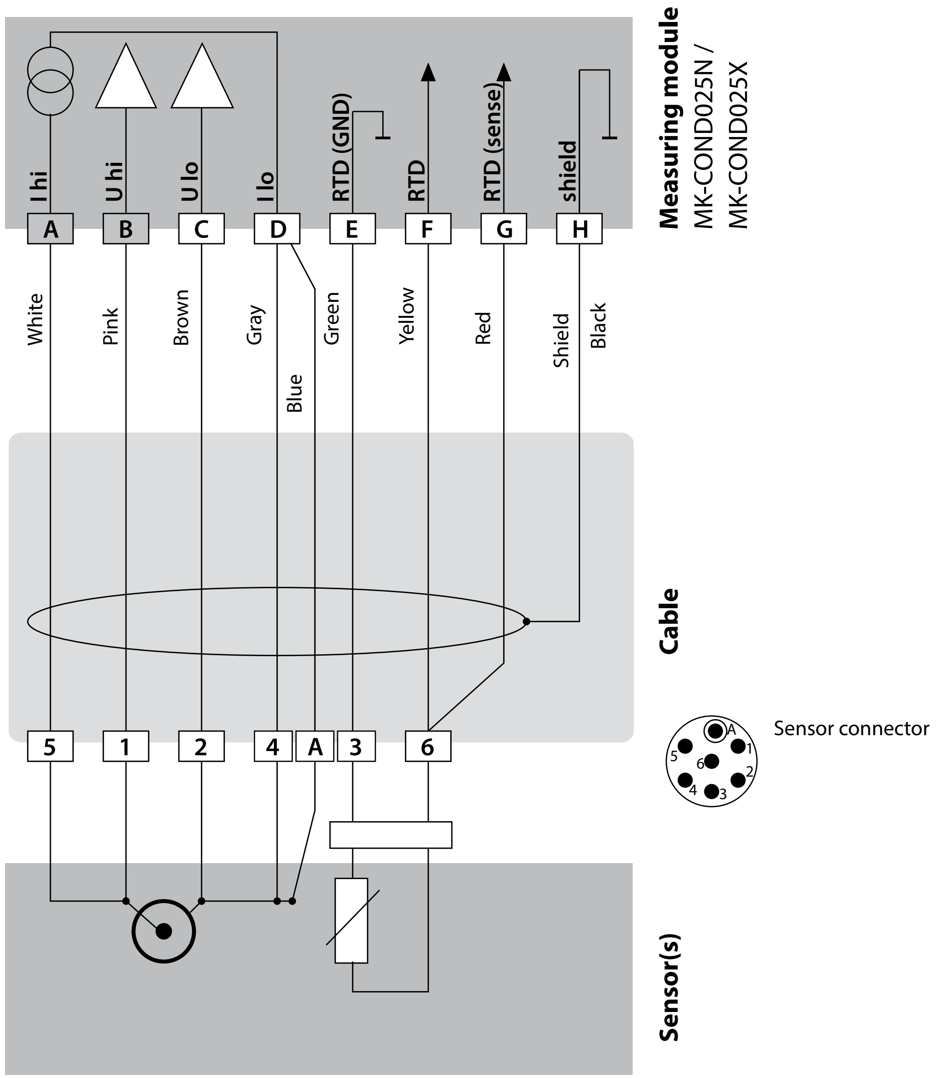
Example 2

Measuring task: Conductivity, temperature
Sensor: 2 electrodes, coaxial



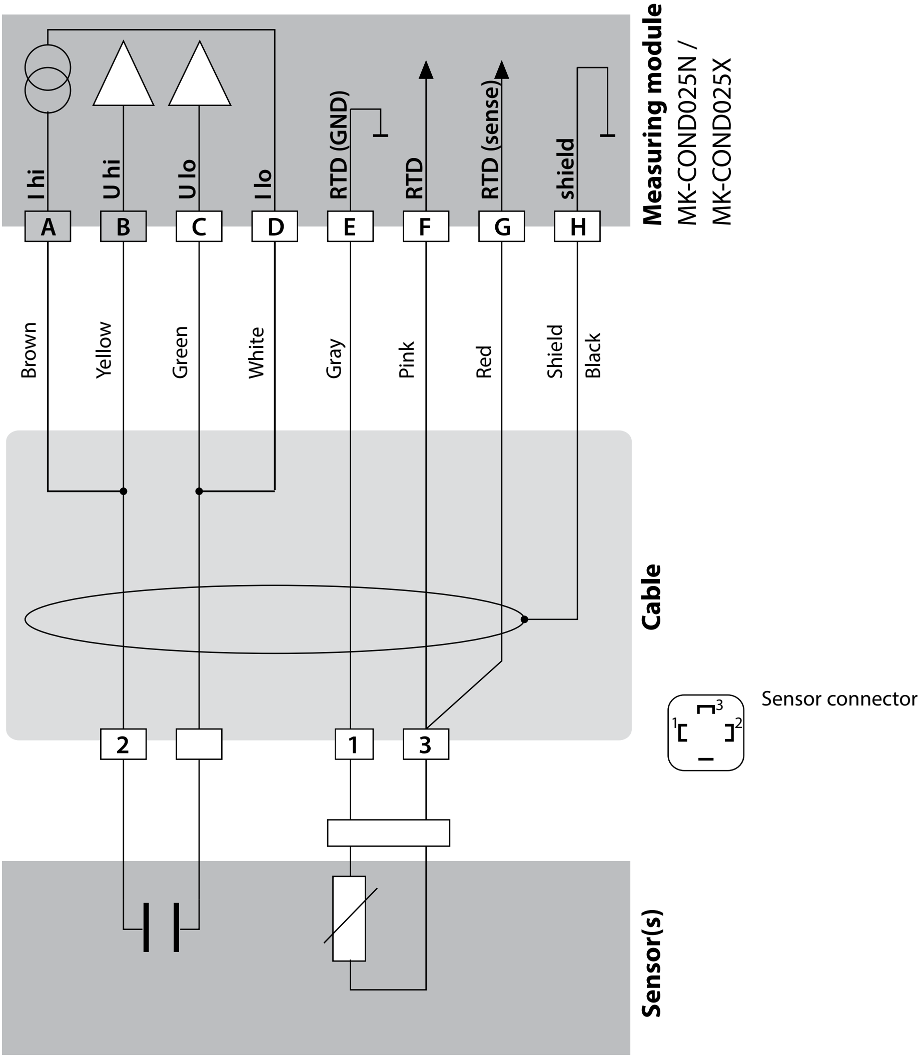
Example 3

Measuring task: Conductivity, temperature
Sensor: SE 604, cable: ZU 0645



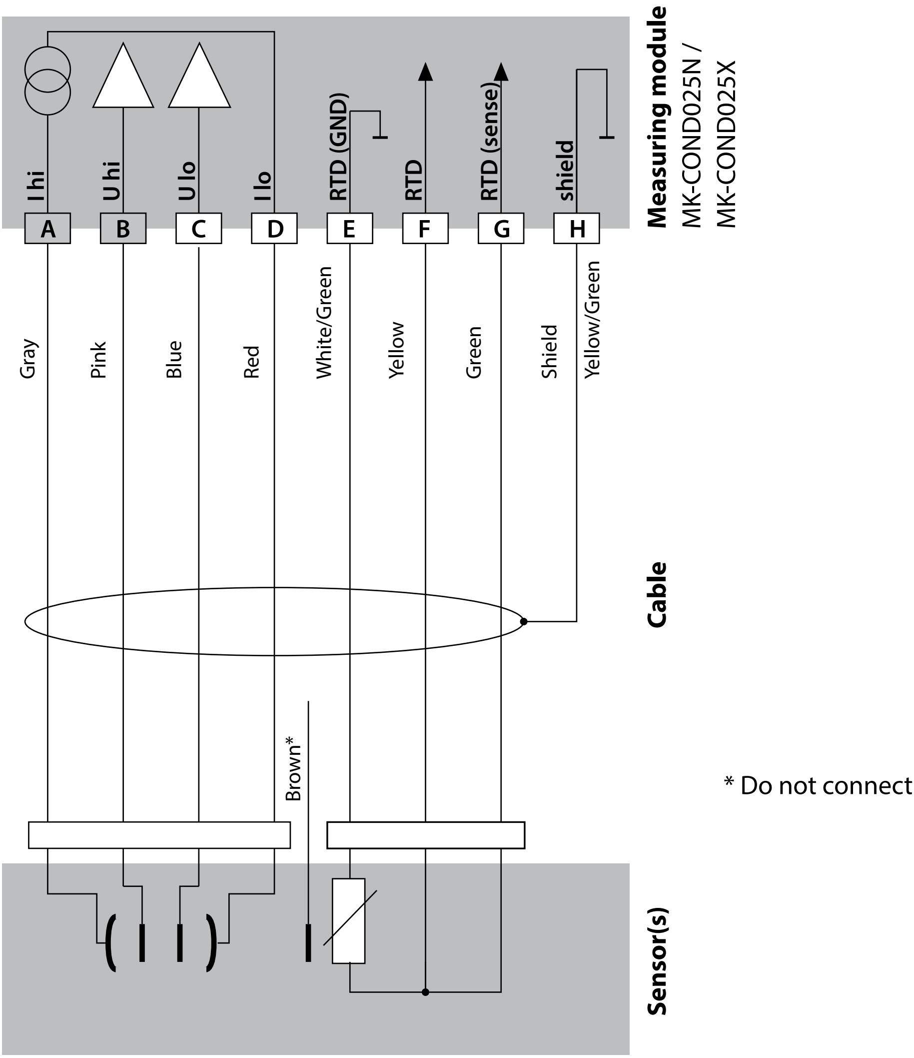
Example 4

Measuring task: Conductivity, temperature
Sensor: SE 630



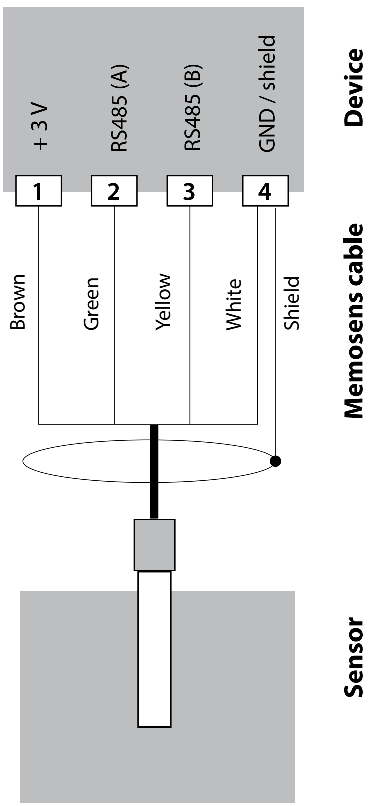
Example 5

Measuring task: Conductivity, temperature
Sensor: SE 600 or SE 603 4-EL fringe-field sensor



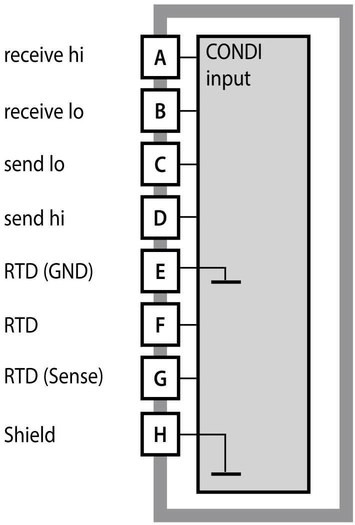
Example 6

Measuring task: Conductivity, temperature
Sensor: Memosens
NOTICE! Connection to RS-485 interface!
Remove the measuring module.

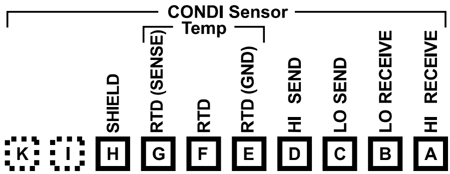


Examples:
SE 604(X)-MS
SE 605H-**
SE 615(X)MS
SE 630(X)MS

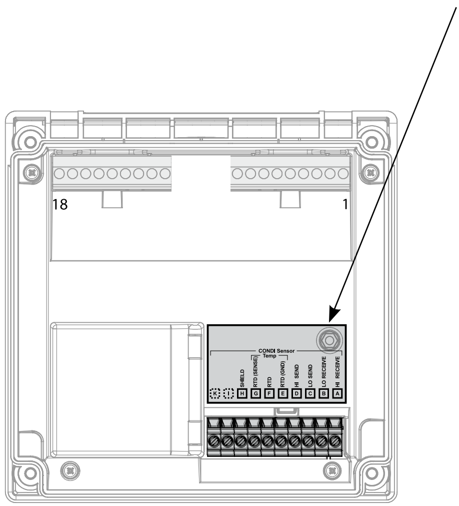
Connect the Memosens sensor to the RS-485 interface of the device.



Module for Inductive Conductivity Measurement (CondI)
Order codes: MK-CONDI035 N / MK-CONDI035X
See the following pages for wiring examples.



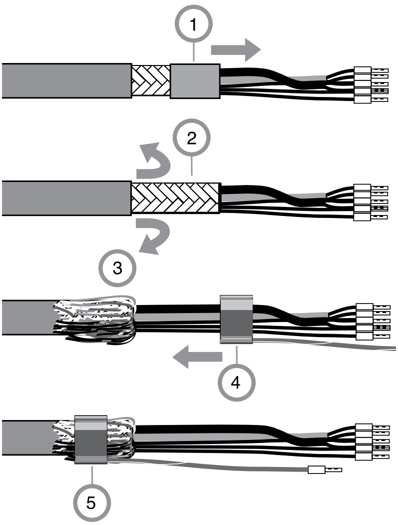
Terminal Plate of CondI Module
The terminals are suitable for single or stranded wires up to 2.5 mm² (AWG 14).



The measuring module comes with a self-adhesive label. Stick the label to the module slot on the device front. This way, you have the wiring “under control”.

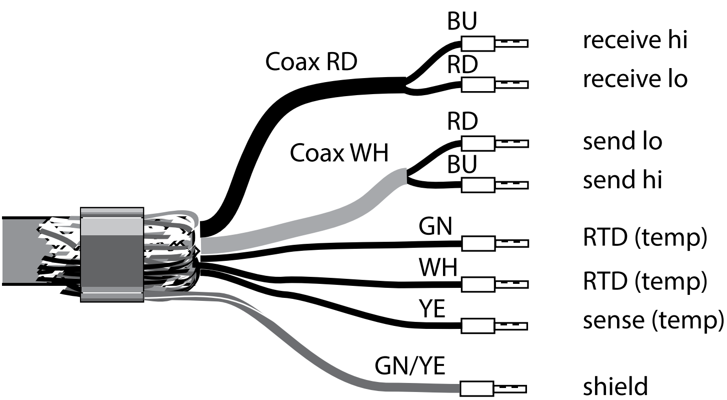
Preparing the Shield Connection

Pre-assembled special cable for SE 655 / SE 656 sensors



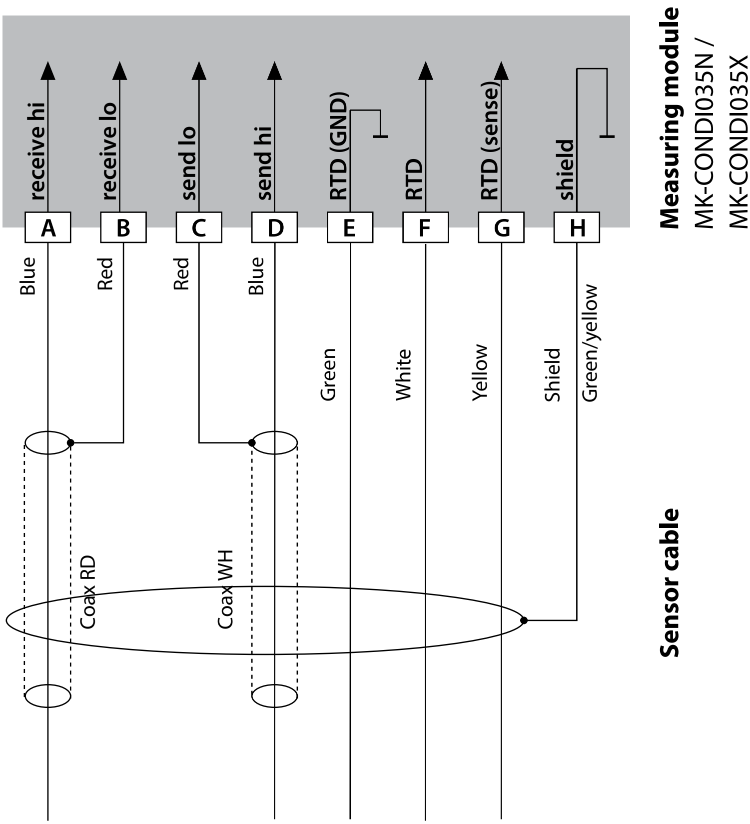
- Insert the special cable through the cable entry into the terminal compartment.
- Remove the already separated part of the cable insulation (1).
- Turn the shielding mesh (2) over the cable insulation (3).
- Then shift the crimp ring (4) over the shielding mesh and tighten it using a pince (5)

The pre-assembled special cable:



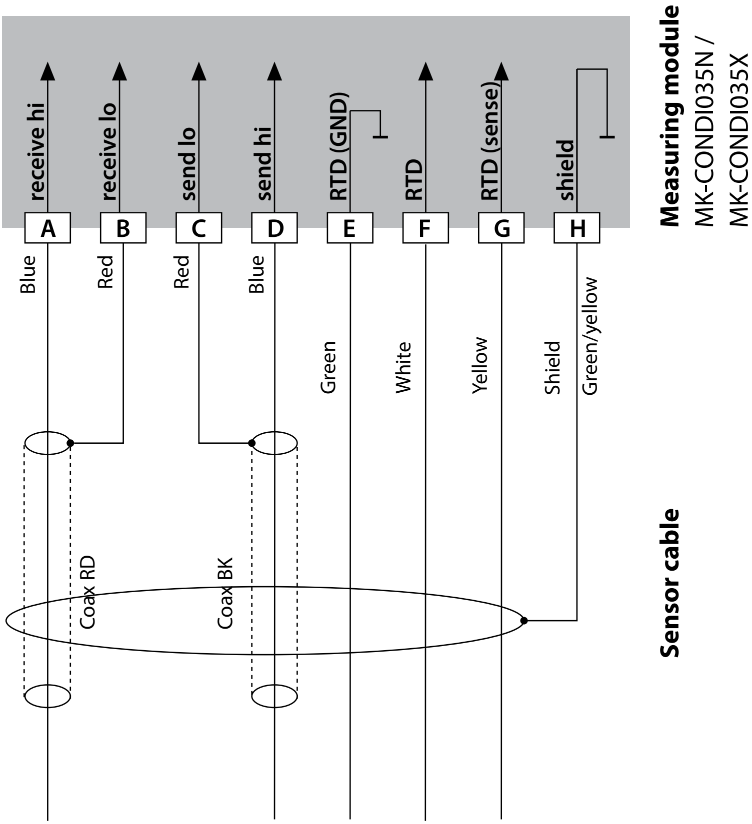
Example 1

Measuring task: Noncontacting conductivity, temperature
Sensor: SE 655 or SE 656



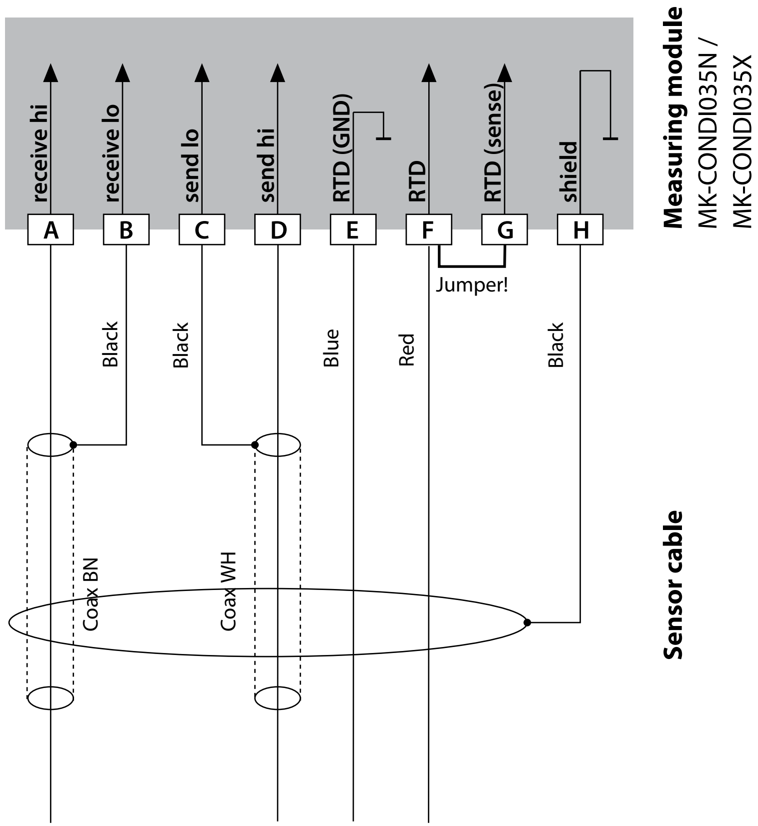
Example 2

Measuring task: Noncontacting conductivity, temperature
Sensor: SE 660



Example 3

Measuring task: Noncontacting conductivity, temperature
Sensor: Yokogawa ISC40 (Pt1000)



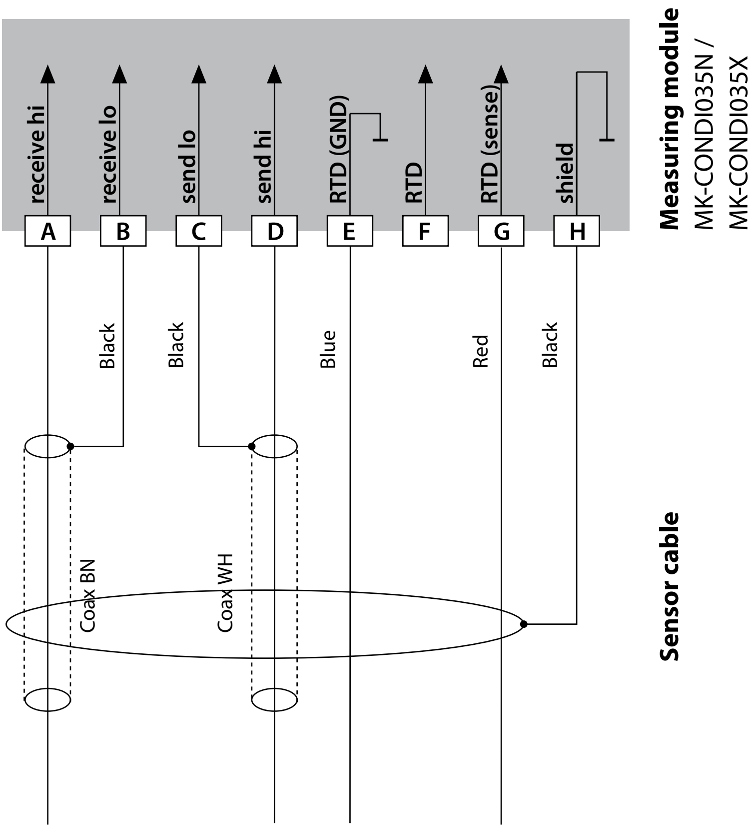
Configuration settings for this sensor:

SENSOR	Conductivity, temperature
Sensor:	OTHER
RTD TYPE	1000Pt
CELL FACTOR	1.88
TRANS RATIO	125

CondI

Example 4 **for Stratos Pro A221N / A221X only**

Measuring task: Noncontacting conductivity, temperature
Sensor: Yokogawa IC40S (NTC 30k)

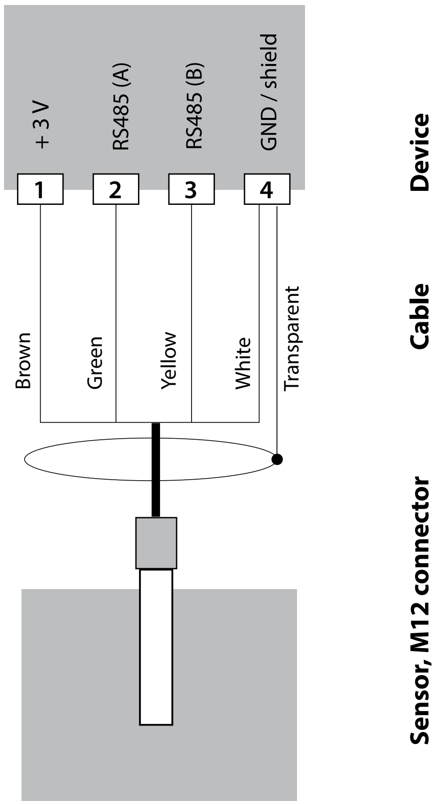


Configuration settings for this sensor:

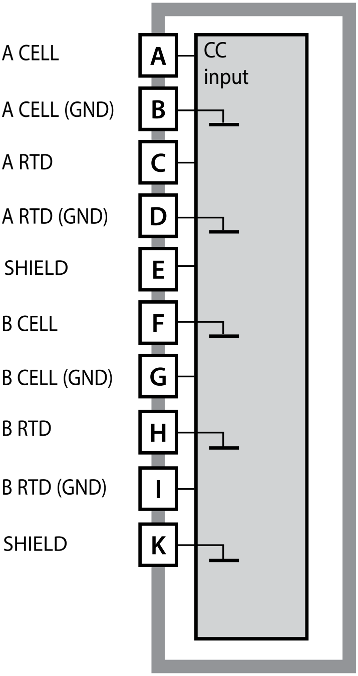
SENSOR	Conductivity, temperature
Sensor:	OTHER
RTD TYPE	30 NTC
CELL FACTOR	approx. 1.7
TRANS RATIO	125

Example 5

Measuring task:	Noncontacting conductivity, temperature
Sensor:	SE 670/C1, SE 680/D1, SE 680N-C1N4U00M
Cable:	CA/M12-005NA
	NOTICE! Connection to RS-485 interface!
	Remove the measuring module.

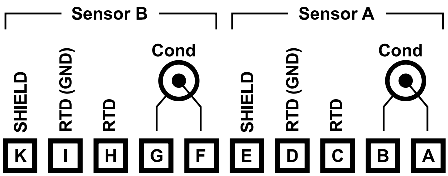


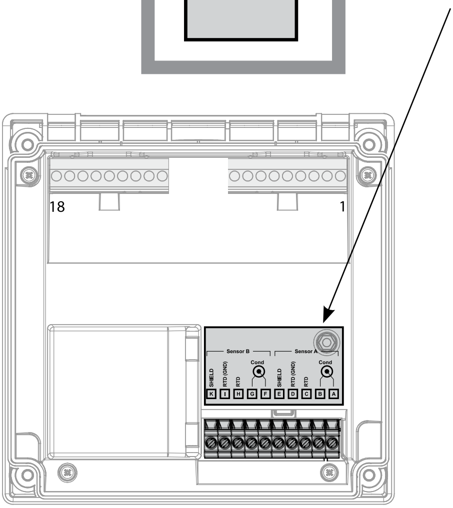
When the SE 670/C1 (SE 680/D1) sensor is selected in the Configuration menu, the default values are taken as calibration data. They can then be modified by calibration.
NOTICE! The calibration data of the SE 670/C1 (SE 680/D1) are saved in the analyzer and not in the sensor.



NOTICE! Do not use this module with Stratos Pro A221X!

Dual-Conductivity Module
Order code MK-CC065N
See the following pages for wiring examples.



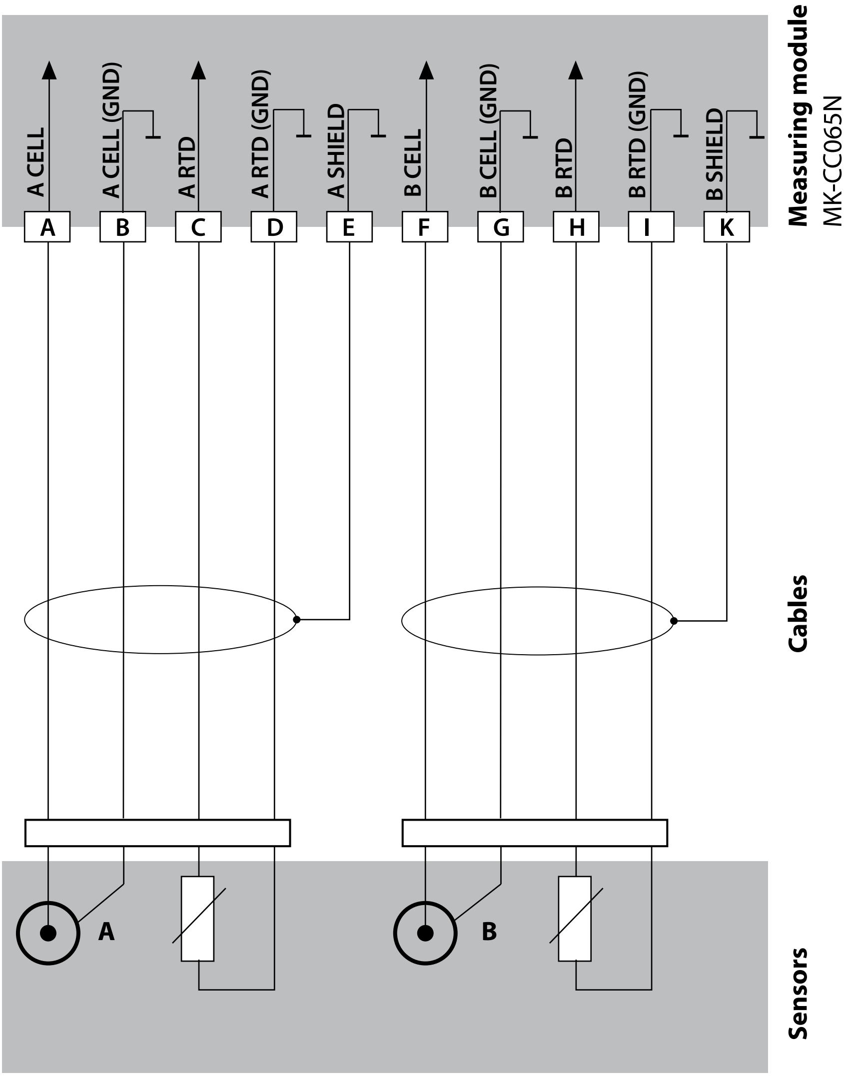


Terminal Plate
Dual Conductivity Measurement
The terminals are suitable for single or stranded wires up to 2.5 mm^2 (AWG 14).

The measuring module comes with a self-adhesive label. Stick the label to the module slot on the device front. This way, you have the wiring “under control”.

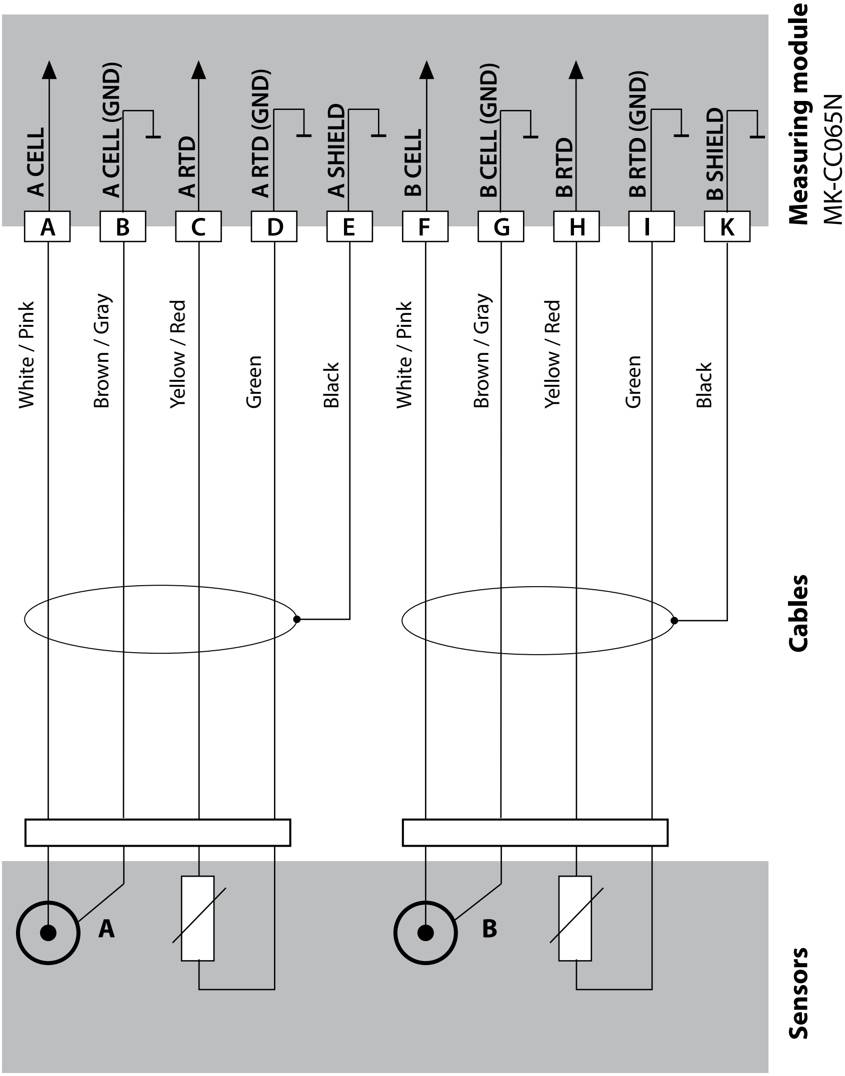
Example 1

Measuring task:	Dual conductivity, temperature
Sensor:	2 coaxial sensors



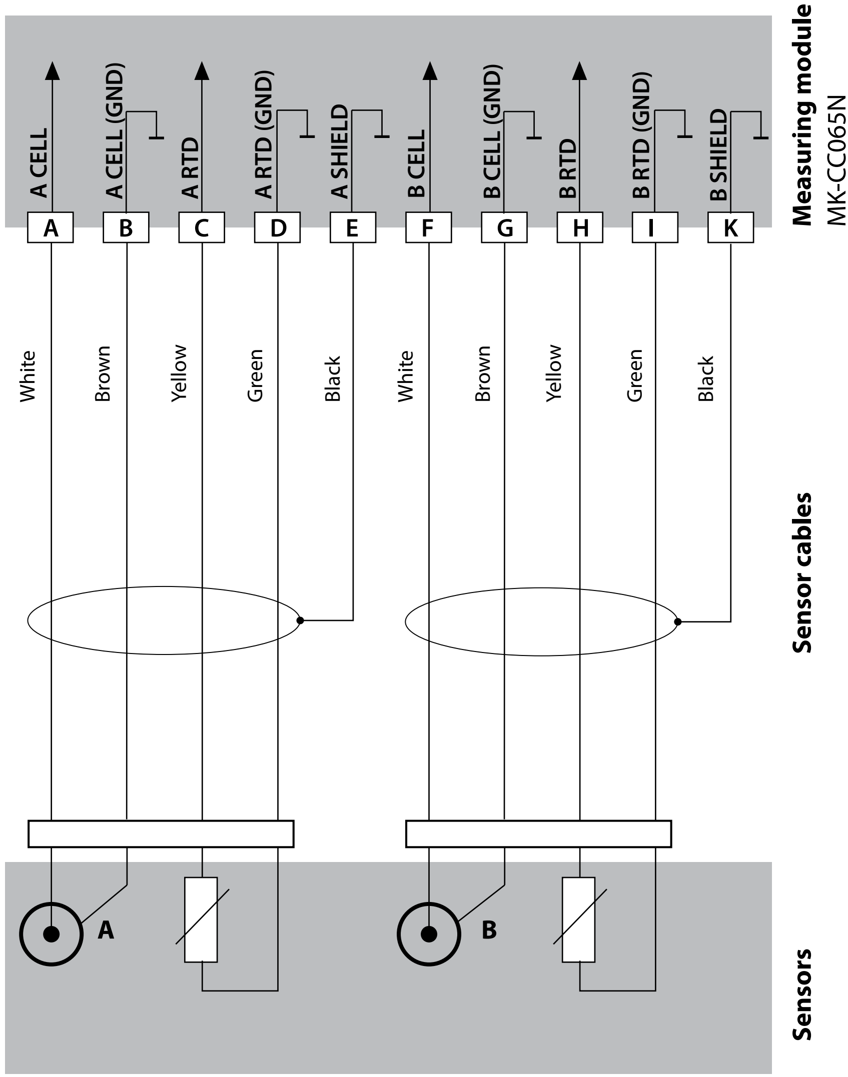
Example 2

Measuring task:	Dual conductivity, temperature
Sensor:	2 x SE 604
Cable:	2 x ZU 0645



Example 3

Measuring task: Dual conductivity, temperature
Sensor: 2 x SE 610



Changing the Measuring Function

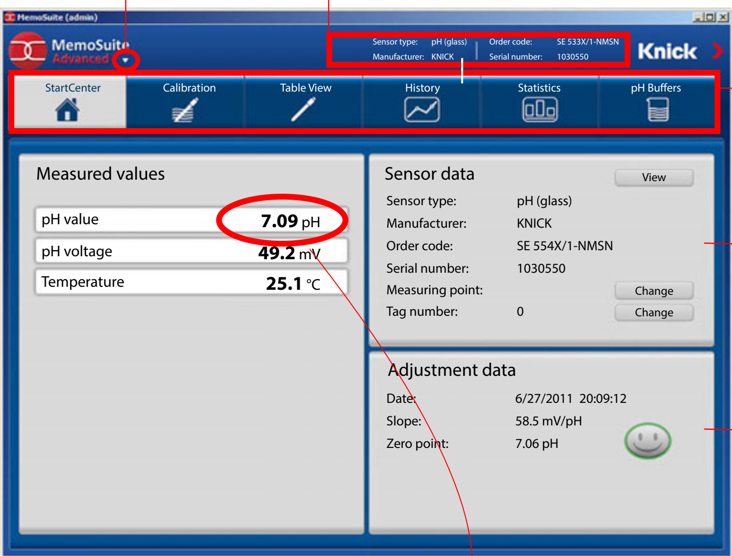
In the “Service” menu you can select another measuring function at any time.

Calibration and Maintenance in the Lab

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

Settings and Specifications

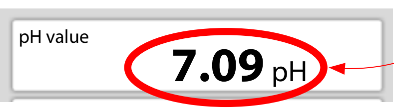
Connected sensor: Sensor type, manufacturer, order code and serial number



Function selection: The selected function is highlighted.

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

Last adjustment

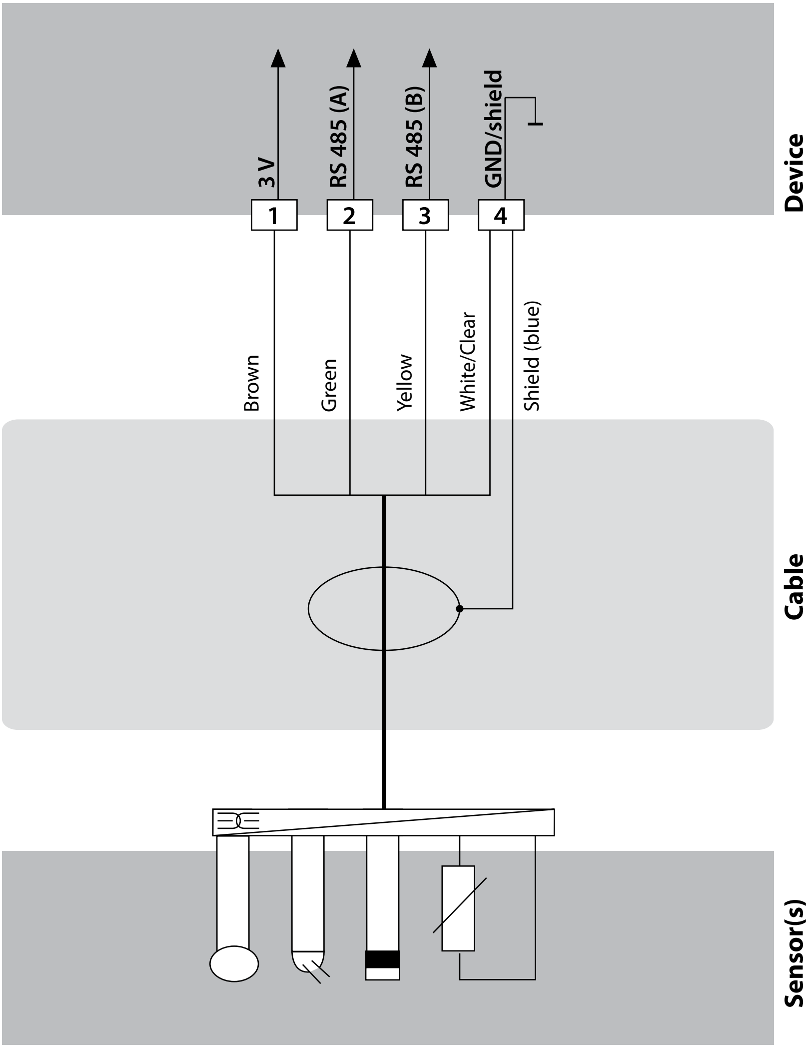


You can magnify a measured-value display at a click of the mouse.

Example 1

Measuring task: pH/ORP, temp, glass impedance, ref. impedance
Sensors (example): SE 554N/1-AMSN, Memosens
Cable (example): CA/MS-003NAA

NOTICE! Remove the measuring module!



pH

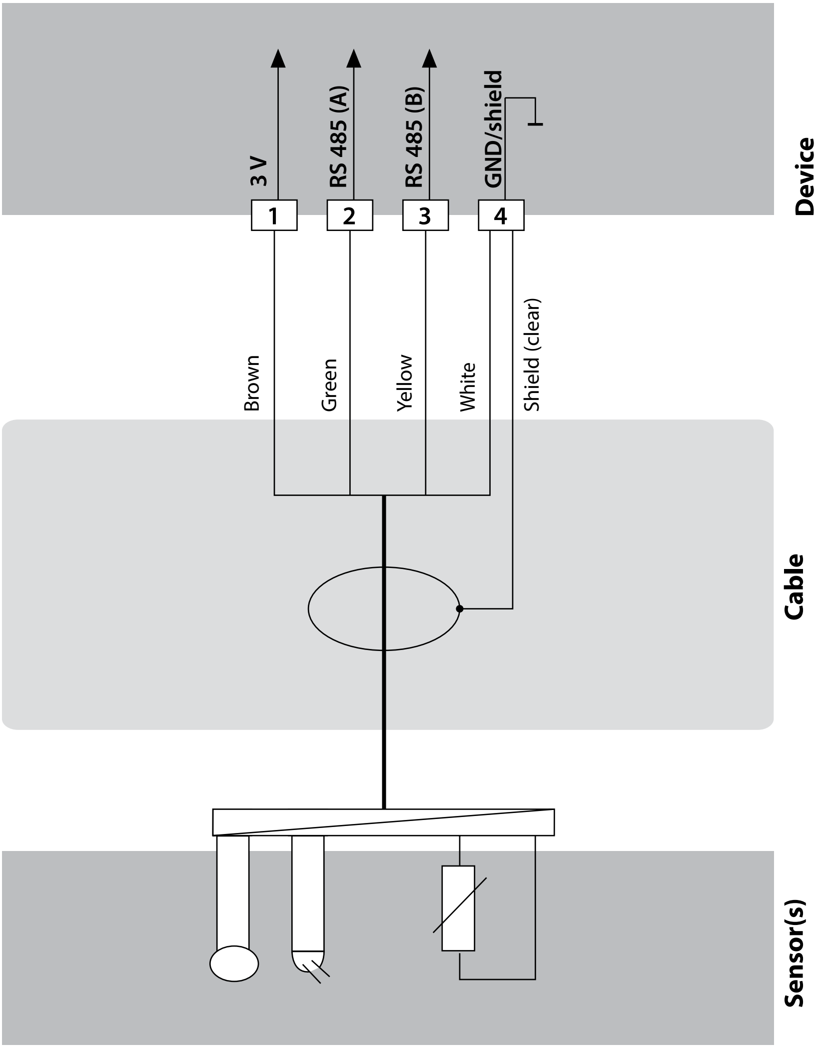
Example 2

Measuring task: pH, temp, glass impedance

Sensors (example): SE 555X/1-NMSN Memosens

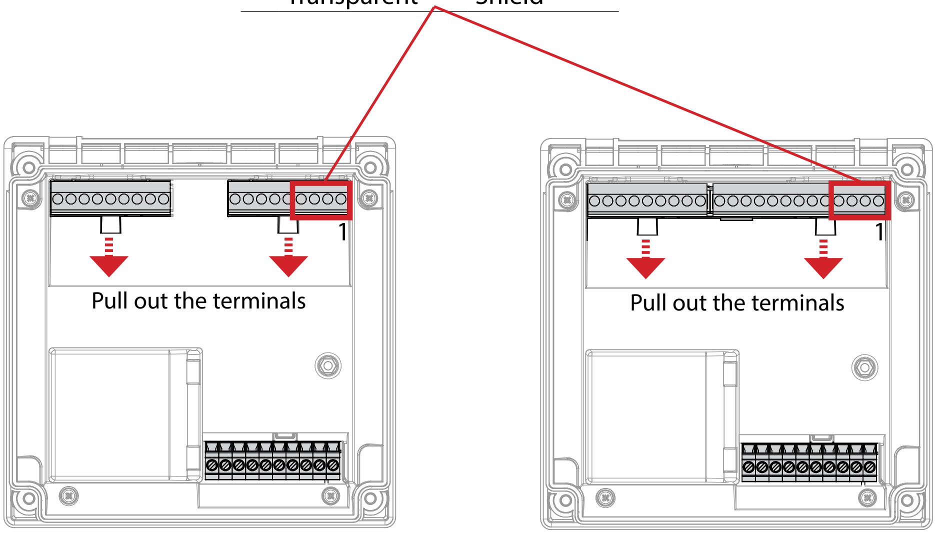
Cable (example): CA/MS-003XAA

NOTICE! Remove the measuring module!



Terminals for Memosens

1	Brown	+3V
2	Green	RS 485 A
3	Yellow	RS 485 B
4	White	GND
	Transparent	Shield



Stratos Pro A221N / A221X

Stratos Evo A451N

NOTICE! Remove the measuring module!

Stratos Pro A221N / A221X

BUS communication	PROFIBUS PA (DP-V1)	
Physical interface	To EN 61158-2 (IEC 61158-2), MBP-IS	
Operating mode	Bus-powered with constant current consumption	
Supply voltage	FISCO	≤ 17.5 V (trapezoidal or rectangular characteristic)
	Linear characteristic	≤ 26 V
	Non-Ex	≤ 32 V
Current consumption	< 20 mA	
Max. current in case of fault*	20.4 mA	
Explosion protection (A221X)	See Control Drawing or www.knick.de	
Rated operating conditions		
Climatic class	3K5 according to EN 60721-3-3	
Location class	C1 according to EN 60654-1	
Ambient temperature	–20 … 65 °C / –4 … 149 °F for hazardous area, T4: –20 … 65 °C / –4 … 149 °F for hazardous area, T6: –20 … 50 °C / –4 … 122 °F	
Relative humidity	5 … 95 %	
Transport and storage		
Transport/Storage temperature	–30 … 70 °C / –22 … 158 °F	
Bus connection	3 pluggable terminals PA connection	
CONTROL input	Galvanically separated (optocoupler)	
Function	Flow measurement (FLOW)	
FLOW	Pulse input for flow measurement 0 ... 100 pulses/s Display 00.0 … 99.9 l/h	
RoHS conformity	According to EU directive 2011/65/EU	

* including current increase due to the integrated Fault Disconnection Electronic (FDE)

Stratos Evo A451N

BUS communication	PROFIBUS DP (DP-V1)
Physical interface	RS-485
Baud rate	9.6 kbits/s … 1.5 Mbits/s
Power supply	80 V (-15%) … 230 (+10%) V AC, approx. 15 VA, 45 … 65 Hz 24 V (-15%) … 60 (+10%) V DC, 10 W Overvoltage category II, protection class II
Electrical safety	Protection against electric shock by protective separation of all extra-low-voltage circuits against mains according to EN 61010-1
Rated operating conditions	
Climatic class	3K5 according to EN 60721-3-3
Location class	C1 according to EN 60654-1
Ambient temperature	–20 … 65 °C / –4 … 149 °F
Relative humidity	5 … 95 %
Transport and storage	
Transport/Storage temperature	–30 … 70 °C / –22 … 158 °F
Bus connection	6 terminals DP connection
REL1/REL2	Relay1 and Relay2 contacts, floating
Contact ratings	AC < 250 V /< 3 A / < 750 VA DC < 30 V /< 3 A / < 90 W
Contact response	The relays can be controlled locally or via PROFIBUS. PROFIBUS: Control via function blocks DO1 and DO2
Power Out	Software-adjustable voltage for supplying the sensor (SE 740)
Voltages	3.1 V / 12 V / 15 V / 24 V
Power	Max. 1 W
CONTROL input	Galvanically separated (optocoupler)
Function	Flow measurement (FLOW)
FLOW	Pulse input for flow measurement 0 ... 100 pulses/s Display 00.0 … 99.9 l/h

General Data

Real-time clock	Different time and date formats selectable
Power reserve	> 5 days
Adjustable via bus	
Display	Display LC display, 7-segment with icons
Primary display	Character height approx. 22 mm, unit symbols approx. 14 mm
Secondary display	Character height approx. 10 mm
Backlighting	Multi-color, may be switched off for temperature code T6
Text line	14 characters, 14 segments
Sensoface	3 status indicators (friendly, neutral, sad face)
Mode indicators	meas, cal, conf, diag Further icons for configuration and messages
Alarm indication	Red backlighting in case of alarm
Keypad	Keys: meas, info, 4 cursor keys, enter Material: EPDM
FDA 21 CFR Part 11	Access control by editable passcodes Logbook entry in the case of configuration changes Message and logbook entry when enclosure is opened
Diagnostic functions	
Calibration data	Calibration date, zero, slope, response time
Device self-test	Automatic memory test (RAM, FLASH, EEPROM)
Display test	Display of all segments
Logbook	Audit Trail: 100 events with date and time
Service functions	
Sensor monitor	Display of direct sensor signals
Device type	Specifying the device type
Data retention	Parameters and calibration data > 10 years (EEPROM)
Housing	Molded enclosure, glass fiber reinforced Front unit material: PBT Rear unit material: PC
Mounting	Wall, pipe/post or panel mounting
Color	Gray, RAL 7001
Ingress protection	IP66/IP67/TYPE 4X outdoor (with pressure compensation) when the device is closed
Flammability	UL 94 V-0
Dimensions	148 mm x 148 mm
Control panel cutout	138 mm x 138 mm to DIN 43700

Weight	1.2 kg (1.6 kg incl. accessories and packaging)
Cable glands	5 knockouts for M20 x 1.5 cable glands 2 of 5 knockouts for NPT ½" or rigid metallic conduit
Connections	Terminals, tightening torque: 0.5 … 0.6 Nm Conductor cross-section rigid/flexible: 0.2 … 2.5 mm^2 Conductor cross-section flexible with ferrule without plastic sleeve: 0.25 … 2.5 mm^2 Conductor cross-section flexible with ferrule with plastic sleeve: 0.2 … 1.5 mm^2
Wiring	
Stripping length	max. 7 mm
Temperature resistance	> 75 °C / 167 °F
EMC	
Emitted interference	Class A (industrial applications) 1)
Immunity to interference	Industrial applications

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

pH

pH/mV input	Input for pH or ORP (redox) sensors or ISFET		
	Input	Glass electrode or ISFET	
	Input	Reference electrode	
	Input	ORP electrode (eg. platinum) or auxiliary electrode for impedance measurement	
Measuring range	-1500 … +1500 mV		
Display range	pH value	-2.00 … +16.00	
	ORP	-1999 … +1999 mV	
Glass electrode input[4)]	Input resistance	> 1 x 10^{12} Ω	
	Input current	< 1 x 10^{-12} A	
	Impedance range	0.5 … 1000 MΩ (±20%)	
Reference electrode input[4)]	Input resistance	> 1 x 10^{10} Ω	
	Input current	< 1 x 10^{-10} A	
	Impedance range	0.5 … 200 kΩ (±20%)	
Measurement error[1,2,3)]	pH value	< 0.02	TC: 0.002 pH/K
	mV value	< 1 mV	TC: 0.1 mV/K

pH sensor standardization *	pH calibration	
Operating modes	AUTO	Calibration with Calimatic automatic buffer recognition
	MAN	Manual calibration with entry of individual buffer values
	DAT	Data entry of pre-measured electrodes
	Product calibration	
Calimatic buffer sets *	-01- Mettler-Toledo	2.00/4.01/7.00/9.21
	-02- Knick CaliMat	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	4.01/7.00/10.01
	-07- WTW techn. buffers	2.00/4.01/7.00/10.00
	-08- Hamilton	2.00/4.01/7.00/10.01/12.00
	-09- Reagecon	2.00/4.00/7.00/9.00/12.00
	-10- DIN 19267	1.09/4.65/6.79/9.23/12.75
	-U1- USER	Specifiable buffer set with 2 buffer solutions
Zero adjustment	±200 mV (ISFET only) (±750 mV with Memosens ISFET)	
Max. calibration range	Asymmetry potential	±60 mV (±750 mV for Memosens ISFET)
	Slope	80 ... 103 % (47.5 ... 61 mV/pH)
	(possibly restricting notes from Sensoface)	

ORP sensor standardization *	ORP calibration (zero adjustment)		
Max. calibration range	-700 ... +700 ΔmV		
Temperature input	Pt100 / Pt1000 / NTC 30 kΩ * 2-wire connection, adjustable		
Measuring range	Pt 100/Pt 1000	-20.0 … +200.0 °C	(-4 … +392 °F)
	NTC 30 kΩ	-20.0 … +150.0 °C	(-4 … +302 °F)
	NTC 8.55 kΩ (Mitsubishi)	-10.0 … +130.0 °C	(+14 … +266 °F)
	Balco 3 kΩ	-20.0 … +130.0 °C	(-4 … +266 °F)
Adjustment range	10 K		
Resolution	0.1 °C (0.1 °F)		
Measurement error[1,2,3)]	< 0.5 K (< 1 K for Pt100; < 1 K for NTC 30 kΩ >100 °C)		
TC of process medium	Linear –19.99 … +19.99 %/K (reference temp. 25 °C) Table: 0 … 95 °C, user-defined in 5-K steps		
ISM input	“One wire“ interface for operation with ISM (digital sensors) (6 V / Ri= approx. 1.2 kΩ)		
Memosens interface	Memosens (terminals 1 … 4)		
Data In/Out	Asynchronous interface, RS 485, 9600/19200 Bd		
Power supply	Terminal 1: +3.08 V/10 mA, Ri < 1 Ω, short-circuit-proof		
Adaptive calibration timer*	Interval 0000 … 9999 h (Pat. DE 101 41 408)		
Diagnostics functions			
Calibration data	Calibration date, zero, slope, response time		
Power output	for operating an ISFET adapter +3 V / 0.5 mA -3 V / 0.5 mA		
Sensocheck	Automatic monitoring of glass and reference electrode (can be switched off)		
Delay	Approx. 30 s		
Sensoface	Provides information on the sensor condition (can be switched off)		
Evaluation of	Zero/slope, calibration interval, Sensocheck, wear		

* user-defined
1) at rated operating conditions
2) ± 1 count
3) plus sensor error
4) at room temperature

Oxy

Standard version	Sensors: SE 706, InPro 6800, Oxyferm	
Input range	Meas. current -600 … +2 nA	Resolution 10 pA
Measurement error[1,2,3]	< 0.5% meas. val. + 0.05 nA + 0.005 nA/K	
Operating modes	GAS	Measurement in gases
	DO	Measurement in liquids
Display ranges	Saturation (-10 ... +80 °C)	0.0 ... 600.0 %
	Concentration (-10 ... +80 °C)	0.00 … 99.99 mg/l
	(Dissolved oxygen)	0.00 ... 99.99 ppm
	Volume concentration in gas	0.00 ... 99.99 %vol
Polarization voltage	-400 ... -1000 mV, default -675 mV (resolution < 5 mV)	
Permissible guard current	≤ 20 µA	
Trace measurement	Sensors: SE 706/707; InPro 6800/6900/6950; Oxyferm/Oxygold	
Input range I [4]	Meas. current -600 … +2 nA	Resolution 10 pA
Measurement error[1,2,3]	< 0.5% meas. val. + 0.05 nA + 0.005 nA/K	
Input range II [4]	Meas. current -10,000 … +2 nA	Resolution 166 pA
Measurement error	< 0.5% meas. val. + 0.8 nA + 0.08 nA/K	
Operating modes	GAS	Measurement in gases
	DO	Measurement in liquids
Measuring ranges with standard sensors "10"		
	Saturation (-10 ... +80 °C)	0.0 ... 600.0 %
	Concentration (-10 ... +80 °C)	0.00 … 99.99 mg/l
	(Dissolved oxygen)	0.00 ... 99.99 ppm
	Volume concentration in gas	0.00 ... 99.99 %vol
Measuring ranges with trace sensors "01"		
	Saturation (-10 ... +80 °C)	0.000 ... 150.0 %
	Concentration (-10 ... +80 °C)	0000 ... 9999 µg/l / 10.00 ... 20.00 mg/l
	(Dissolved oxygen)	0000 ... 9999 ppb / 10.00 ... 20.00 ppm
	Volume concentration in gas	0000 ... 9999 ppb / 1.000 ... 50.00 %vol

Measuring ranges with "001" trace sensors (not supported by Memsosens sensors)		
	Saturation (-10 ... +80 °C)	0.000 ... 150.0 %
	Concentration (-10 ... +80 °C)	000.0 ... 9999 µg/l / 10.00 ... 20.00 mg/l
	(Dissolved oxygen)	000.0 ... 9999 ppb / 10.00 ... 20.00 ppm
	Volume concentration in gas	000.0 ... 9999 ppb / 1.000 ... 50.00 %vol
Polarization voltage	0 ... –1000 mV, default –675 mV (resolution < 5 mV)	
Permissible guard current	≤ 20 µA	
Measurement using SE 740 (optical sensor)		**(Stratos Evo A451N only)**
Measuring range	0 … 300 % air saturation	
Detection limit	0.01 %vol	
Response t_{98}	< 30 s (at 25 °C, from air to nitrogen)	
Temperature measurement	-10 … +130 °C (Above 85 °C the sensor delivers no measured value)	
Input correction	Pressure correction *	0.000 ... 9.999 bar / 999.9 kPa / 145.0 PSI
		manually or through BUS AO Block
	Salinity correction	0.0 … 45.0 g/kg
Sensor standardization *		
Operating modes *	CAL_AIR Automatic calibration in air	
	CAL_WTR Automatic calibration in air-saturated water	
	P_CAL Product calibration	
	CAL_ZERO Zero calibration	
Calibration range	Zero point	±2 nA
Standard sensor "10"	Slope	25 ... 130 nA (at 25°C, 1013 mbar)
Calibration range	Zero point	±2 nA
Trace sensor "01"	Slope	200 ... 550 nA (at 25°C, 1013 mbar)
Calibration range	Zero point	±3 nA
Trace sensor "001"	Slope	2000 ... 9000 nA (at 25°C, 1013 mbar)
Calibration timer *	Interval 0000 … 9999 h	
Pressure correction *	Manually 0.000 ... 9.999 bar / 999.9 kPa / 145.0 PSI	
Memosens interface	Memosens (terminals 1 … 4)	
Data In/Out	Asynchronous interface, RS 485, 9600/19200 Bd	
Power supply	Terminal 1: +3.08 V/10 mA, Ri < 1 Ω, short-circuit-proof	

* user-defined
1) at rated operating conditions
2) ± 1 count
3) plus sensor error
4) automatic range selection

Cond

Cond input	Input for 2-/4-electrode sensors or Memosens		
Measuring ranges	2-EL sensors: 0.2 µS • c … 200 mS • c 4-EL sensors: 0.2 µS • c … 1000 mS • c (Conductance limited to 3500 mS)		
Measuring ranges	Conductivity	0.000 ... 9.999 µS/cm	
		00.00 ... 99.99 µS/cm	
		000.0 ... 999.9 µS/cm	
		0000 ... 9999 µS/cm	
		0.000 ... 9.999 mS/cm	
		00.00 ... 99.99 mS/cm	
		000.0 ... 999.9 mS/cm	
		0.000 ... 9.999 S/m	
		00.00 ... 99.99 S/m	
	Resistivity	00.00 … 99.99 MΩ · cm	
	Concentration	0.00 ... 100 %	
	Temperature	-20.0 … 150.0 °C (-4.0 … 302.0 °F)	
	Salinity	0.0 ... 45.0 ‰	(0 … 35 °C / 32 … 95 °F)
	TDS	0.0 … 9999.9 mg/l	(10 … 40 °C / 50 … 104 °F)
	Response (T_{90})	Approx. 1 s	
Measurement error[1,2,3]	< 1 % meas. val. + 0.4 µS • c		
Temp compensation *	OFF	Without	
(Reference temp user defined)	LIN	Linear characteristic 00.00…19.99 %/K	
(Reference temp 25 °C)	nLF	Natural waters to EN 27888	
	nACL	NaCl from 0 (ultrapure water) to 26 wt% (0…120 °C)	
	HCL	Ultrapure water with HCl traces (0…120 °C)	
	nH3	Ultrapure water with NH_3 traces (0…120 °C)	
	nAOH	Ultrapure water with NaOH traces (0…120 °C)	
Concentration determination	-01- NaCl	0 – 26 wt% (0 °C)	… 0 – 28 wt% (100 °C)
	-02- HCl	0 – 18 wt% (-20 °C)	… 0 – 18 wt% (50 °C)
	-03- NaOH	0 – 13 wt% (0 °C)	… 0 – 24 wt% (100 °C)
	-04- H_2SO_4	0 – 26 wt% (-17 °C)	… 0 – 37 wt% (110 °C)
	-05- HNO3	0 – 30 wt% (-20 °C)	… 0 – 30 wt% (50 °C)
	-06- H_2SO_4	94 – 99 wt% (-17 °C)	… 89 – 99 wt% (115 °C)
	-07- HCl	22 – 39 wt% (-20 °C)	… 22 – 39 wt% (50 °C)
	-08- HNO_3	35 – 96 wt% (-20 °C)	… 35 – 96 wt% (50 °C)
	-09- H_2SO_4	28 – 88 wt% (-17 °C)	… 39 – 88 wt% (115 °C)
	-10- NaOH	15 – 50 wt% (0 °C)	… 35 – 50 wt% (100 °C)
	-U1-	Specifiable concentration table	

Sensor standardization	Input of cell factor with simultaneous display of selected process variable and temperature
	Entry of conductivity of calibration solution with simultaneous display of cell factor and temperature
	Product calibration for conductivity
	Temperature probe adjustment (10 K)
Permissible cell factor	00.0050...19.9999 cm^{-1}
Memosens interface	Memosens (terminals 1 … 4)
Data In/Out	Asynchronous interface, RS 485, 9600/19200 Bd
Power supply	Terminal 1: +3.08 V/10 mA, Ri < 1 Ω, short-circuit-proof

* user-defined
1) at rated operating conditions
2) ± 1 count
3) plus sensor error

CondI

CondI input	Input for toroidal conductivity sensors: SE 655, SE 656, SE 660, SE 670, SE 680, SE 680(N/X)-C1N4U00M		
Measuring ranges	Conductivity	0.000 ... 1999 mS/cm	
	Concentration	0.00 … 100.0 wt%	
	Salinity	0.0 … 45.0 ‰ (0 … 35 °C/32 … 95 °F)	
Measuring ranges	Conductivity	0.000 … 9.999 mS/cm (not with SE 660)	
		00.00 … 99.99 mS/cm	
		000.0 … 999.9 mS/cm	
		0000 … 1999 mS/cm	
		0.000 … 9.999 S/m	
		00.00 … 99.99 S/m	
	Concentration	0.00 … 9.99 % / 10.0 … 100.0 %	
	Salinity	0.0 … 45.0 ‰	(0 … 35 °C / 32 … 95 °F)
	TDS	0.0 … 9999.9 mg/l	(10 … 40 °C / 50 … 104 °F)
	Response (T_{90})	Approx. 1 s	
Measurement error[1,2,3)]	< 1% meas. val. + 0.005 mS		
Temp compensation *	OFF	Without	
(Reference temp user defined)	LIN	Linear characteristic 00.00…19.99 %/K	
(Reference temp 25 °C)	nLF	Natural waters to EN 27888	
	nACL	Ultrapure water with NaCl traces (0…120 °C)	
	HCL	Ultrapure water with HCl traces (0…120 °C)	
	nH3	Ultrapure water with NH_3 traces (0…120 °C)	
	nAOH	Ultrapure water with NaOH traces (0…120 °C)	
Concentration determination	-01- NaCl	0 – 26 wt% (0 °C)	… 0 – 28 wt% (100 °C)
	-02- HCl	0 – 18 wt% (-20 °C)	… 0 – 18 wt% (50 °C)
	-03- NaOH	0 – 13 wt% (0 °C)	… 0 – 24 wt% (100 °C)
	-04- H_2SO_4	0 – 26 wt% (-17 °C)	… 0 – 37 wt% (110 °C)
	-05- HNO_3	0 – 30 wt% (-20 °C)	… 0 – 30 wt% (50 °C)
	-06- H_2SO_4	94 – 99 wt% (-17 °C)	… 89 – 99 wt% (115 °C)
	-07- HCl	22 – 39 wt% (-20 °C)	… 22 – 39 wt% (50 °C)
	-08- HNO_3	35 – 96 wt% (-20 °C)	… 35 – 96 wt% (50 °C)
	-09- H_2SO_4	28 – 88 wt% (-17 °C)	… 39 – 88 wt% (115 °C)
	-10- NaOH	15 – 50 wt% (0 °C)	… 35 – 50 wt% (100 °C)
	-U1-	Specifiable concentration table	

Sensor standardization	Input of cell factor with simultaneous display of selected process variable and temperature
	Entry of conductivity of calibration solution with simultaneous display of cell factor and temperature
	Product calibration for conductivity
	Zero adjustment
	Temperature probe adjustment (10 K)
Permissible cell factor	00.100...19.9999 cm^{-1}
Permissible transfer ratio	010.0 … 199.9
Permissible offset	± 0.5 mS
Permissible installation factor	0.100 … 5.000
Sensocheck	Monitoring of primary and secondary coils and lines for open circuit and of primary coil and lines for short circuit
Delay	Approx. 30 s
Sensoface	Provides information on the sensor condition (zero point, Sensocheck)
Sensor monitor	Direct display of measured values from sensor for validation (resistance/temperature)
Temperature extrapolation	Extrapolation of the temperature using the TICK method in the case of a significant change (for standard sensors SE 670 / SE 680 only)
Memosens interface	Memosens (terminals 1 … 4)
Data In/Out	Asynchronous interface RS 485, 9600/19200 Bd
Power supply	Terminal 1: +3.08 V/10 mA, Ri < 1 Ω, short-circuit-proof

* user-defined
1) at rated operating conditions
2) ± 1 count
3) plus sensor error

CC

Cond inputs A/B	2 inputs for 2-el. sensors, via MK module only		
Measuring range	0 … 30,000 µS * c		
Display ranges	Conductivity	0.000 … 9.999 µS/cm	
		00.00 … 99.99 µS/cm	
		000.0 … 999.9 µS/cm	
		0000 … 9999 µS/cm	
		00.00 … 99.99 MΩ cm	
	Response (T_{90})	Approx. 1 s	
Measurement error[1,2,3]	< 1 % meas. val. + 0.4 µ · c		
Memosens interface	Memosens (terminals 1 … 4)		
Data In/Out	Asynchronous interface RS 485, 9600/19200 Bd		
Power supply	Terminal 1: +3.08 V/10 mA, Ri < 1 Ω, short-circuit-proof		
Temp compensation * (reference temp 25 °C)	OFF	Without	
	LIN	Linear characteristic 00.00…19.99 %/K	
	nLF	Natural waters to EN 27888	
	nACL	NaCl from 0 (ultrapure water) to 26 wt% (0…120 °C)	
	HCL	Ultrapure water with HCl traces (0…120 °C)	
	nH3	Ultrapure water with NH_3 traces (0…120 °C)	
	nAOH	Ultrapure water with NaOH traces (0…120 °C)	
Sensor standardization			
Channel A/B	Input of cell factor with simultaneous display of conductivity and temperature		
Permissible cell factor	0.0050...1.9999 cm^{-1}		
Calculations (CALC)	-C1- Difference	A-B	[µS/cm]
	-C2- Ratio	A/B	00.00 … 19.99
	-C3- Passage	B/A · 100	000.0 ... 199.9 %
	-C4- Rejection	(A-B)/A · 100	-199.9 ... 199.9 %
	-C5- Deviation	(B-A)/A · 100	-199.9 ... 199.9 %
	-C6- pH value	acc. to VGB regulation	[pH]
	-C7- pH value	variable, specifiable factors	[pH]
	-C8- User spec	(DAC Degassed Acid Conductivity)	[µS/cm]
	-C9- Alkalising	Concentration of the alkalizing agent	
Temperature input A/B *	Pt1000, 2-wire connection		
Measuring range	-50 … 200 °C (-58 ... 392 °F)		
Resolution	0.1 °C (0.1 °F)		
Measurement error[1,2,3]	0.5 K (1 K > 100 °C)		

* user-defined
1) at rated operating conditions
2) ± 1 count
3) plus sensor error

-01- Mettler-Toledo
(corresponds to former "Knick technical buffers")
Rated values at 25 °C: 2.00 / 4.01 / 7.00 / 9.21

°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
25	2.00	4.01	7.00	9.21
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- Knick CaliMat
(Values also apply to Merck-Titrisols, Riedel-de-Haen Fixanals.)
Rated values at 20 °C: 2.00 / 4.00 / 7.00 / 9.00 / 12.00

°C	pH				
0	2.01	4.05	7.09	9.24	12.58
5	2.01	4.04	7.07	9.16	12.39
10	2.01	4.02	7.04	9.11	12.26
15	2.00	4.01	7.02	9.05	12.13
20	2.00	4.00	7.00	9.00	12.00
25	2.00	4.01	6.99	8.95	11.87
30	2.00	4.01	6.98	8.91	11.75
35	2.00	4.01	6.96	8.88	11.64
40	2.00	4.01	6.96	8.85	11.53
50	2.00	4.01	6.96	8.79	11.31
60	2.00	4.00	6.96	8.73	11.09
70	2.00	4.00	6.96	8.70	10.88
80	2.00	4.00	6.98	8.66	10.68
90	2.00	4.00	7.00	8.64	10.48

Knick CaliMat Buffer Solutions

pH value [20 °C]	Quantity	Order No.
2.00 ± 0.02	250 ml	CS-P0200/250
4.00 ± 0.02	250 ml	CS-P0400/250
4.00 ± 0.02	1000 ml	CS-P0400/1000
4.00 ± 0.02	3000 ml	CS-P0400/3000
7.00 ± 0.02	250 ml	CS-P0700/250
7.00 ± 0.02	1000 ml	CS-P0700/1000
7.00 ± 0.02	3000 ml	CS-P0700/3000
9.00 ± 0.02	250 ml	CS-P0900/250
9.00 ± 0.02	1000 ml	CS-P0900/1000
9.00 ± 0.02	3000 ml	CS-P0900/3000
12.00 ± 0.05	250 ml	CS-P1200/250

-03- Ciba (94) buffers
Rated 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	2.07	4.01	6.95	9.85
40	2.06	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
70	2.07	4.11	6.92	9.57
80	2.02	4.15	6.93	9.52
90	2.04	4.20	6.97	9.43

-04- Technical buffers to NIST
Rated values at 25 °C: 1.68 / 4.00 / 7.00 / 10.01 / 12.46

°C	pH				
0	1.67	4.00	7.12	10.32	13.42
5	1.67	4.00	7.09	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	1.68	4.00	7.02	10.06	12.64
25	1.68	4.01	7.00	10.01	12.46
30	1.68	4.02	6.99	9.97	12.30
35	1.69	4.03	6.98	9.93	12.13
40	1.69	4.03	6.98	9.89	11.99
45	1.70	4.05	6.98	9.86	11.84
50	1.71	4.06	6.97	9.83	11.71
55	1.72	4.08	6.97		11.57
60	1.72	4.09	6.97		11.45
65	1.73	4.10	6.98		
70	1.74	4.13	6.99		
75	1.75	4.14	7.01		
80	1.77	4.16	7.03		
85	1.78	4.18	7.05		
90	1.79	4.21	7.08		
95	1.81	4.23	7.11		

-05- NIST standard buffers
NIST Standard (DIN 19266 : 2001)
Rated values at 25 °C: 1.679 / 4.006 / 6.865 / 9.180

°C	pH			
0	1.666	4.010	6.984	9.464
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
25	1.680	4.008	6.865	9.184
30	1.685	4.015	6.853	9.144
35	1.688	4.021	6.844	9.102
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	8.985
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.

pH

-06- HACH buffers
Rated values at 25 °C: 4.01 / 7.00 / 10.01 (±0.02)

°C	pH		
0	4.00	7.11	10.30
5	4.00	7.08	10.23
10	4.00	7.05	10.17
15	4.00	7.03	10.11
20	4.00	7.01	10.05
25	4.01	7.00	10.01
30	4.01	6.98	9.96
35	4.02	6.97	9.92
40	4.03	6.97	9.88
45	4.05	6.96	9.85
50	4.06	6.96	9.82
55	4.07	6.96	9.79
60	4.09	6.96	9.76

-07- WTW techn. buffers
Rated values at 25 °C: 2.00 / 4.01 / 7.00 / 10.00

°C	pH			
0	2.03	4.00	7.12	10.32
5	2.02	4.00	7.09	10.25
10	2.01	4.00	7.06	10.18
15	2.00	4.00	7.04	10.12
20	2.00	4.00	7.02	10.01
25	2.00	4.01	7.00	10.01
30	1.99	4.02	6.99	9.97
35	1.99	4.03	6.98	9.93
40	1.98	4.03	6.98	9.89
45	1.98	4.05	6.98	9.86
50	1.98	4.06	6.97	9.83
55	1.98	4.08	6.97	
60	1.98	4.09	6.97	
65	1.99	4.10	6.98	
70	2.00	4.13	6.99	
75	2.00	4.14	7.01	
80	2.00	4.16	7.03	
85	2.00	4.18	7.05	
90	2.00	4.21	7.08	
95	2.00	4.23	7.11	

-08- Hamilton Duracal buffers
Rated values at 25 °C:
2.00 ±0.02 / 4.01 ±0.01 / 7.00 ±0.01 / 10.01 ±0.02 / 12.00 ±0.05

°C	pH				
0	1.99	4.01	7.12	10.23	12.58
5	1.99	4.01	7.09	10.19	12.46
10	2.00	4.00	7.06	10.15	12.34
15	2.00	4.00	7.04	10.11	12.23
20	2.00	4.00	7.02	10.06	12.11
25	2.00	4.01	7.00	10.01	12.00
30	1.99	4.01	6.99	9.97	11.90
35	1.98	4.02	6.98	9.92	11.80
40	1.98	4.03	6.97	9.86	11.70
45	1.97	4.04	6.97	9.83	11.60
50	1.97	4.05	6.97	9.79	11.51
55	1.98	4.06	6.98	9.75	11.42
60	1.98	4.08	6.98	9.72	11.33
65	1.98	4.10	6.99	9.69	11.24
70	1.99	4.12	7.00	9.66	11.15
75	1.99	4.14	7.02	9.63	11.06
80	2.00	4.16	7.04	9.59	10.98
85	2.00	4.18	7.06	9.56	10.90
90	2.00	4.21	7.09	9.52	10.82
95	2.00	4.24	7.12	9.48	10.74

-09- Reagecon buffers
Rated values at 25 °C: 2.00 / 4.00 / 7.00 / 9.00 / 12.00

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

pH

-10- DIN 19267 buffers
Rated values at 25 °C: 1.09 / 4.65 / 6.79 / 9.23 / 12.75

°C	pH				
0	1.08	4.67	6.89	9.48	
5	1.08	4.67	6.87	9.43	
10	1.09	4.66	6.84	9.37	13.37
15	1.09	4.66	6.82	9.32	13.16
20	1.09	4.65	6.80	9.27	12.96
25	1.09	4.65	6.79	9.23	12.75
30	1.10	4.65	6.78	9.18	12.61
35	1.10	4.65	6.77	9.13	12.45
40	1.10	4.66	6.76	9.09	12.29
45	1.10	4.67	6.76	9.04	12.09
50	1.11	4.68	6.76	9.00	11.89
55	1.11	4.69	6.76	8.96	11.79
60	1.11	4.70	6.76	8.92	11.69
65	1.11	4.71	6.76	8.90	11.56
70	1.11	4.72	6.76	8.88	11.43
75	1.11	4.73	6.77	8.86	11.31
80	1.12	4.75	6.78	8.85	11.19
85	1.12	4.77	6.79	8.83	11.09
90	1.13	4.79	6.80	8.82	10.99

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:

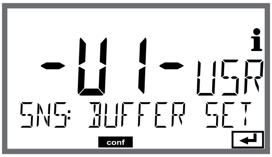
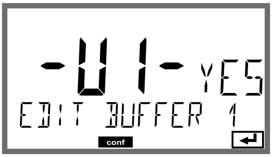
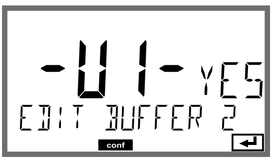
- All values must lie in the range pH 0 ... 14.
- Maximum difference between two adjacent pH values (5 °C step width) of the same buffer solution: pH 0.25
- The values of buffer solution 1 must be lower than those of buffer solution 2: The difference between values for identical temperatures must be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

Note: Use a configuration tool such as the **SIMATIC PDM** from Siemens for convenient data entry.

pH

Step	Action/Display	Remark
Select buffer set -U1- (CONFIG / SNS menu)		
Select buffer solution 1 for editing.	 Select "YES" using up/ down key.	You are prompted for confirmation to prevent accidental changes of the settings.
Editing the values Buffer solution 1	 Edit: using arrow keys, press **enter** to confirm and proceed to next temperature value. 	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.

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		

Cond

Potassium Chloride Solutions

(Conductivity in mS/cm)

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

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

Sodium Chloride Solutions

(Conductivity in mS/cm)

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

[1] Data source: Test solutions calculated according to DIN IEC 746-3

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

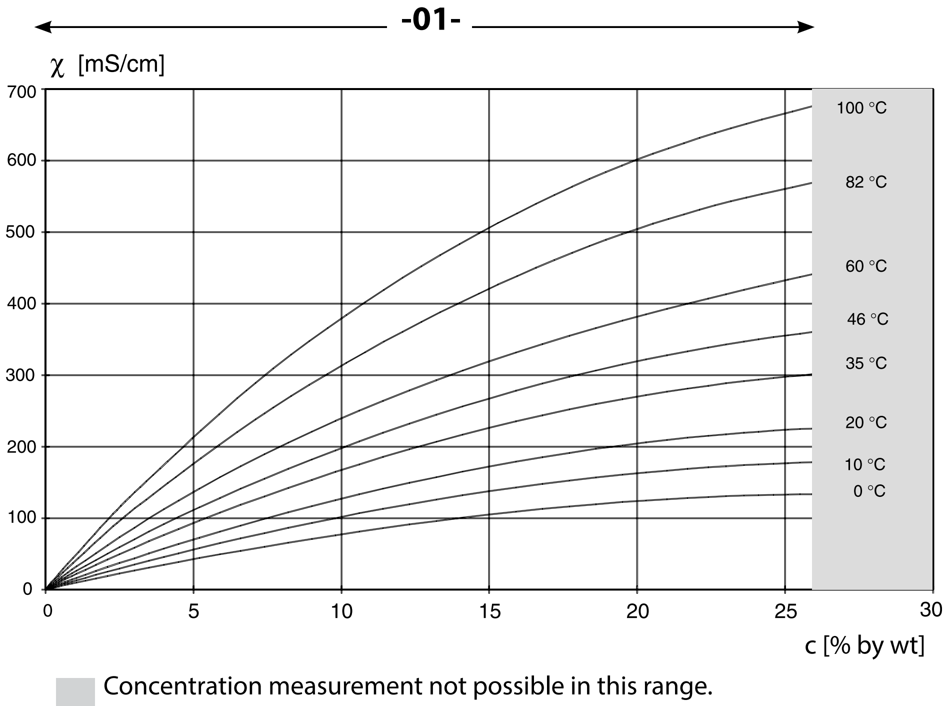
Cond CondI

Measuring Ranges

Substance	Concentration ranges		
NaCl Configuration	0-26% by wt (0 °C) 0-26% by wt (100 °C) **-01-**		
HCl Configuration	0-18% by wt (-20 °C) 0-18% by wt (50 °C) **-02-**	22-39% by wt (-20 °C) 22-39% by wt (50 °C) **-07-**	
NaOH Configuration	0-13% by wt (0 °C) 0-24% by wt (100 °C) **-03-**	15-50 % by wt (0 °C) 35-50% by wt (100 °C) **-10-**	
H_2SO_4 Configuration	0-26% by wt (-17 °C) 0-37% by wt (110 °C) **-04-**	28-77% by wt (-17 °C) 39-88% by wt (115 °C) **-09-**	94-99% by wt (-17 °C) 89-99% by wt (115 °C) **-06-**
HNO_3 Configuration	0-30% by wt (-20 °C) 0-30% by wt (50 °C) **-05-**	35-96% by wt (-20 °C) 35-96% by wt (50 °C) **-08-**	

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

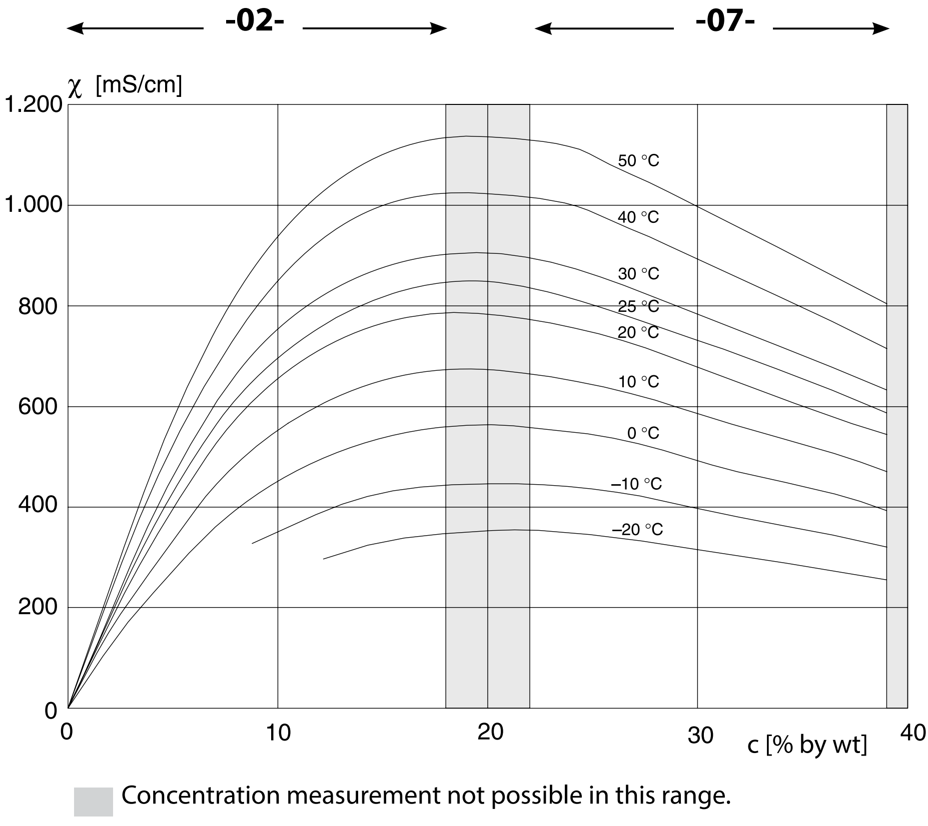
-01- Sodium Chloride Solution NaCl



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

Cond CondI

-02- Hydrochloric Acid HCl
-07-

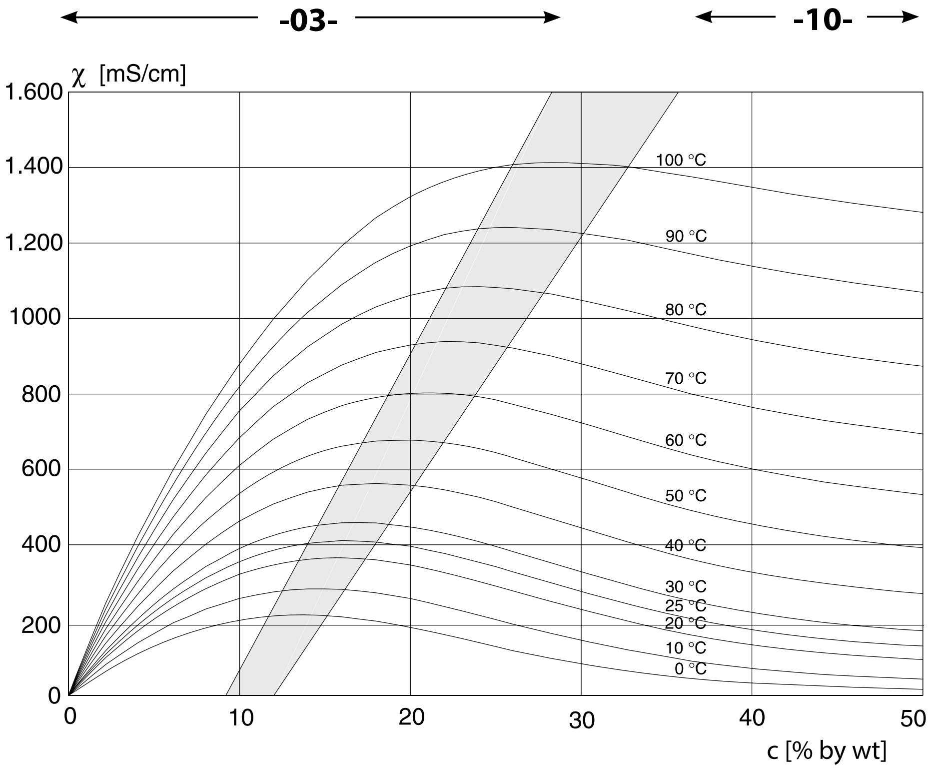


Concentration measurement not possible in this range.

Conductivity versus substance concentration and process temperature for hydrochloric acid (HCl)

Source: Haase/Sauermann/Dücker; Z. phys. Chem. New Edition, Vol. 47 (1965)

-03- Sodium Hydroxide Solution NaOH
-10-

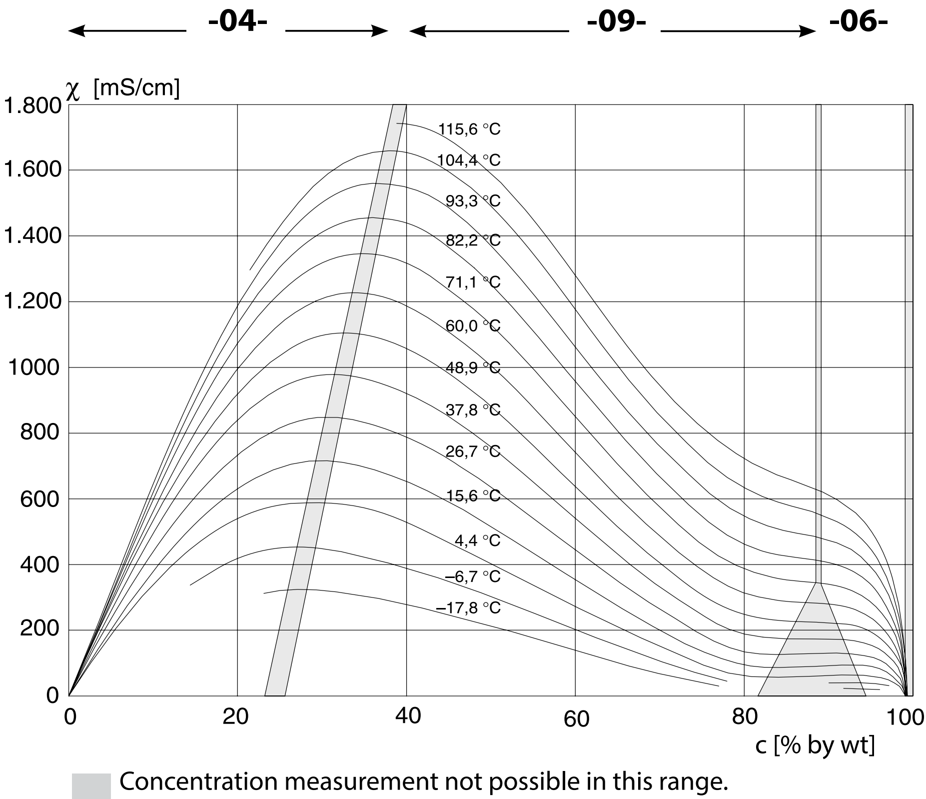


Concentration measurement not possible in this range.

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

Cond CondI

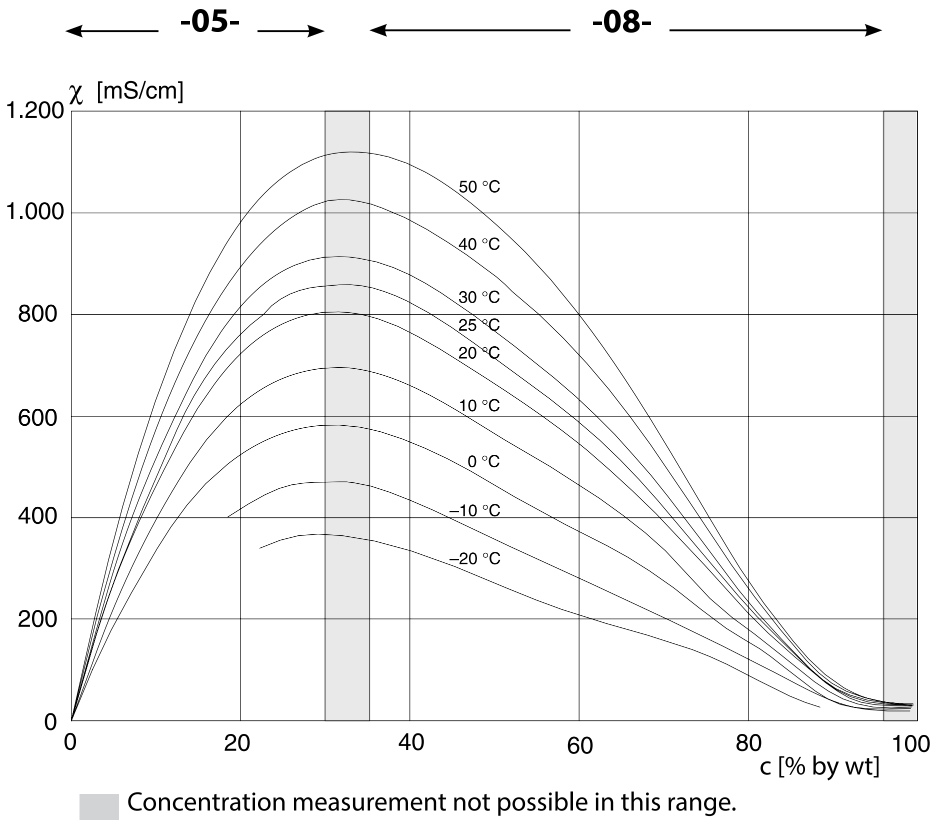
-04- Sulfuric Acid H_2SO_4
-06-
-09-



Conductivity versus substance concentration and process temperature for sulfuric acid (H_2SO_4)

Source: Darling; Journal of Chemical and Engineering Data; Vol.9 No.3, July 1964

-05- Nitric Acid HNO_3
-08-



Conductivity versus substance concentration and process temperature for nitric acid (HNO_3)

Source: Haase/Sauermann/Dücker; Z. phys. Chem. New Edition, Vol. 47 (1965)

C

D

R

S

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Translation of the original instructions

Version: 2 • This document was published on October 17, 2022.
The latest documents are available for download on our website under the corresponding product description.

100149

TA-212.140-KNEN02