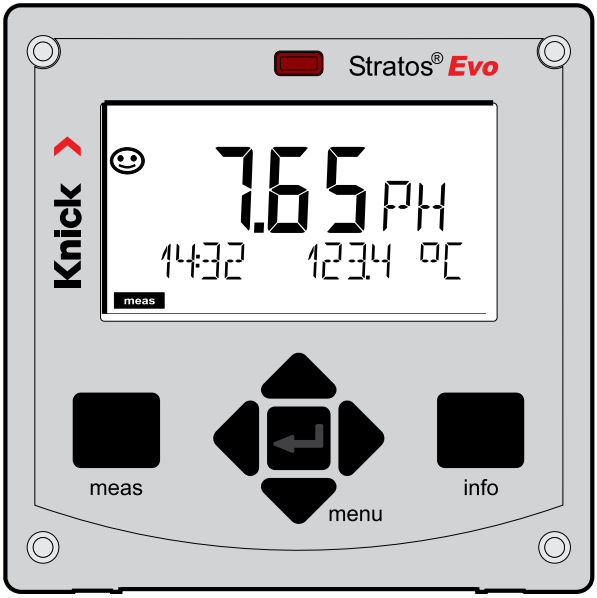
The Art of Measuring. Knick

User Manual
English

Stratos Evo A402
pH Measurement



Latest Product Information: www.knick.de

Table of Contents

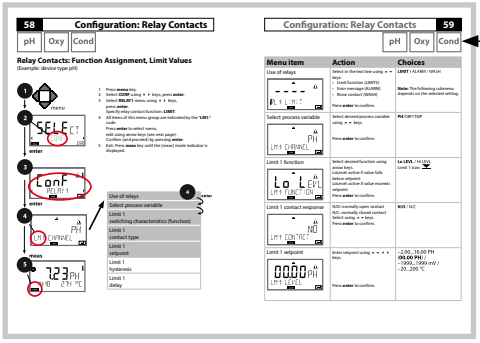
Subject to change without notice

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

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

About This Manual:
This manual is intended as a reference guide to your device –
You don't have to read the book from front to back.
Take a look at the ***Table of Contents*** or the ***Index*** to find the function you are interested in. Each topic is explained on a double-page spread with step-by-step instructions on how to configure the desired function. Clearly legible page numbers and headlines help you to quickly find the information:

Left page:
How do I get to the function



Parameter concerned

Right page:
Which settings are provided for this function

8 Documents Supplied

Safety Instructions
In official EU languages and others

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

Specific Test Report

Electronic Documentation
Manuals + Software

Ex Devices:

Control Drawings

EU Declarations of Conformity

Up-to date documentation available on our website:

www.knick.de

Stratos Evo is a 4-wire analyzer for process analysis applications.
The analyzer comes as basic device for measurement with digital sensors (Memosens, optical oxygen measurement, inductive conductivity measurement). All measuring functions are stored in an internal memory. You select a measuring function to configure the analyzer for a specific measuring task. Additional measuring modules can be connected to allow measurement with analog sensors.
The Model A402B allows applications in hazardous-area Zone 2.
Current is provided through a universal power supply 80 ... 230 V AC, 45 ... 65 Hz / 24 ... 60 V DC. The analyzer provides two 0 (4) .... 20 mA current outputs for transmission of measured value and temperature, for example. Four floating relay contacts are available for free configuration. A PID controller and a time-controlled cleaning function can be configured. Two parameter sets are provided. You can externally switch between them via the Control input, for example. The HOLD input allows setting the HOLD mode from the outside. The analyzer also provides power supply and allows signal processing for additional transmitters, e.g., for flow monitoring.

You can select one of the following measuring functions:
- pH
- ORP
- Oxygen
- Oxygen, optical
- Conductivity measurement (conductive/inductive)
- Dual conductivity measurement using two analog sensors
- Dual measurement of pH/pH and pH/Oxy using two Memosens sensors

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

Connection of sensors, cable glands
For connecting the cables, the enclosure provides
- 3 knockouts for cable glands M20x1.5
- 2 knockouts for NPT 1/2" or rigid metallic conduit

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 (e.g., alarm: red, HOLD mode: orange).

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

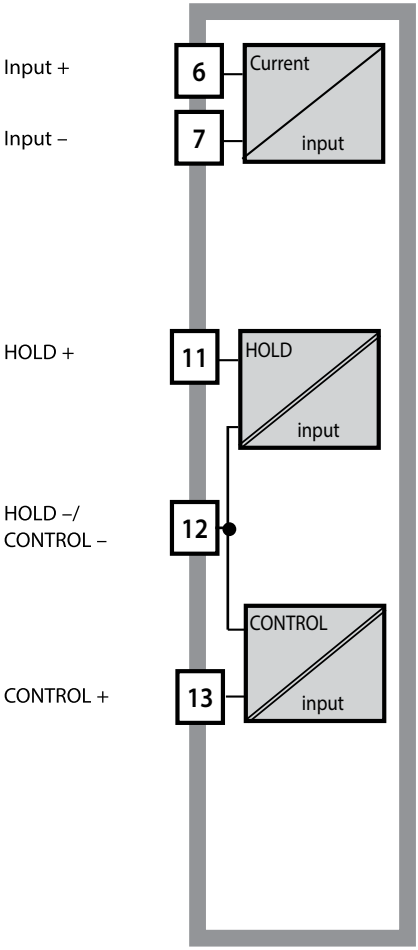
Data logger
The internal logbook (additional function, TAN SW-A002) can handle up to 100 entries – up to 200 with AuditTrail (additional function, TAN SW-A003).

2 parameter sets A/B
The device provides two parameter sets which can be switched manually or via a control input for different process adaptations or different process conditions.
For an overview of parameter sets (original for copy), refer to the CD or www.knick.de.

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.

Control inputs



I input
The analog (0) 4 ... 20 mA current input can be used for external pressure or temperature compensation (TAN required).

HOLD
(floating digital control input)
The HOLD input can be used for external activation of the HOLD mode.

CONTROL
(floating digital control input)
The CONTROL input can be used either for parameter set selection (A/B) or for flow monitoring.
The "Wash" contact can be used for indicating the active parameter set.

Power supply

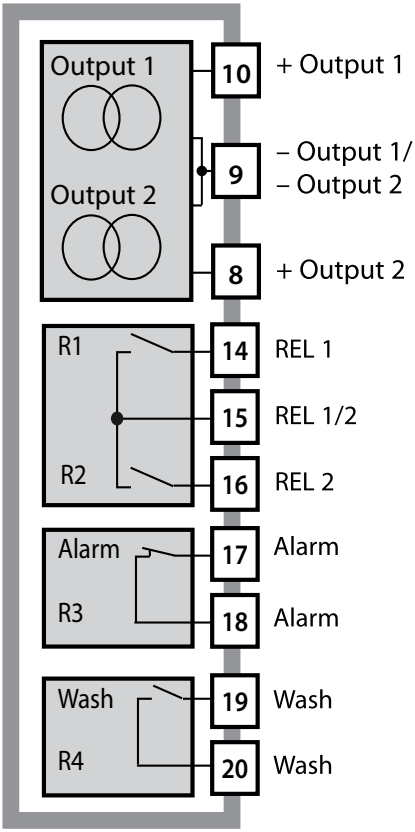
Current is provided through a universal power supply 80 ... 230 V AC, 45 ... 65 Hz / 24 ... 60 V DC.

Options

Additional functions can be activated by entering a TAN.

Signal outputs
The analyzer provides two 0 (4) .... 20 mA current outputs for transmission of measured value and temperature, for example.

Relay contacts
Four floating relay contacts are available.



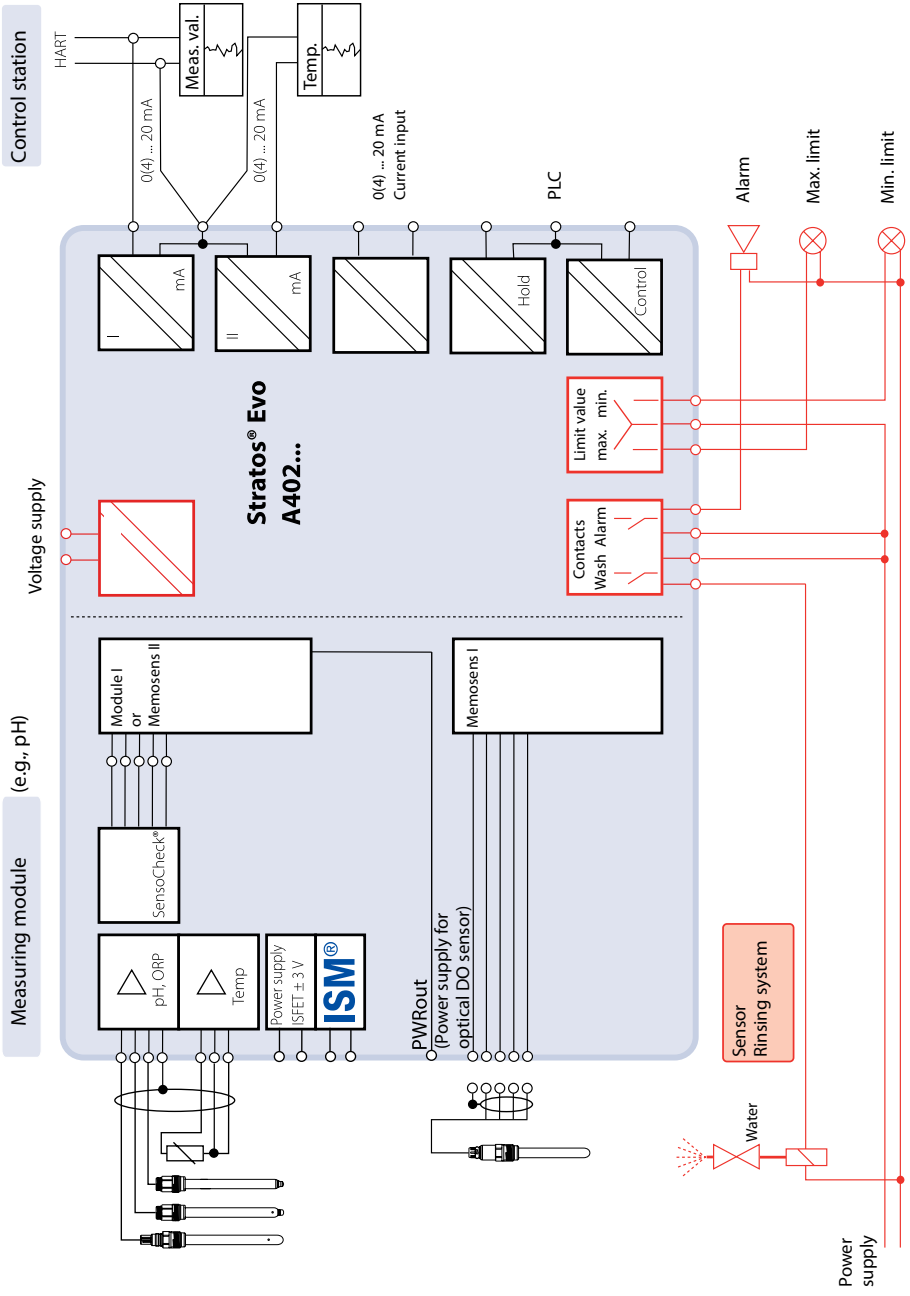
Current outputs
The floating current outputs (0) 4 ... 20 mA are used for transmitting measured values. An output filter can be programmed, the fault current value can be specified.

Relay contacts
2 relay contacts for limit values. Adjustable for the selected process variable: hysteresis, switching behavior (MIN/MAX limit), contact type (N/O, N/C) and delay.

Alarm
An alarm can be generated by Sensocheck, flow monitoring or current failure.

Wash (cleaning function)
This contact can be used for controlling a rinsing probe or for indicating the active parameter set.

PID controller
Configurable as pulse length or pulse frequency controller.


Control station
HART
Meas. val.
Temp.
0(4) ... 20 mA
0(4) ... 20 mA
0(4) ... 20 mA
Current input
PLC
Alarm
Max. limit
Min. limit
I
mA
II
mA
Hold
Control
Stratos® Evo
A402...
Limit value
max. min.
Contacts
Wash Alarm
Voltage supply
Module I
or
Memosens II
Memosens I
SensoCheck®
pH, ORP
Temp
Power supply
ISFET ± 3 V
ISM®
PWRout
(Power supply for
optical DO sensor)
Measuring module
(e.g., pH)
Sensor
Rinsing system
Water
Power
supply

Package Contents

Check the shipment for transport damage and completeness.

The package should contain:

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

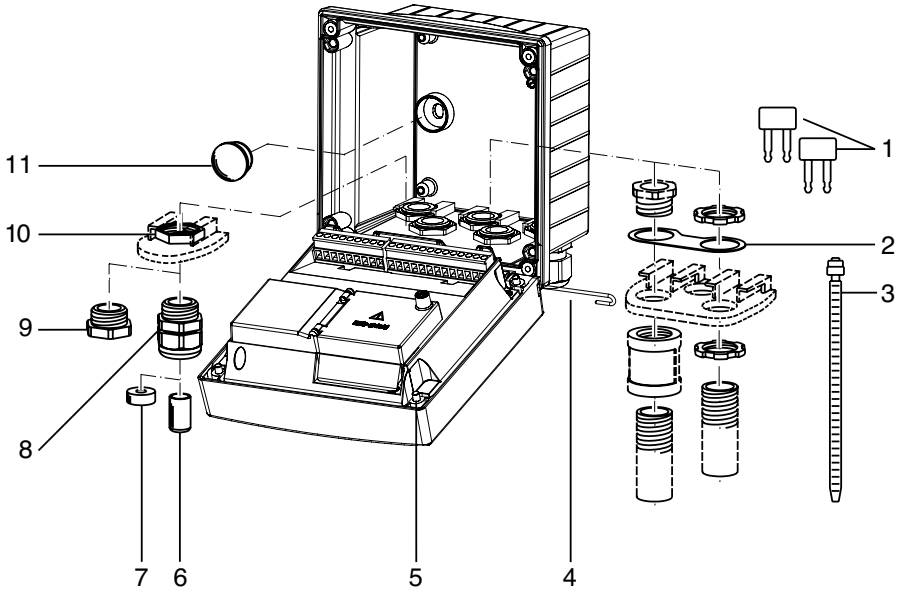
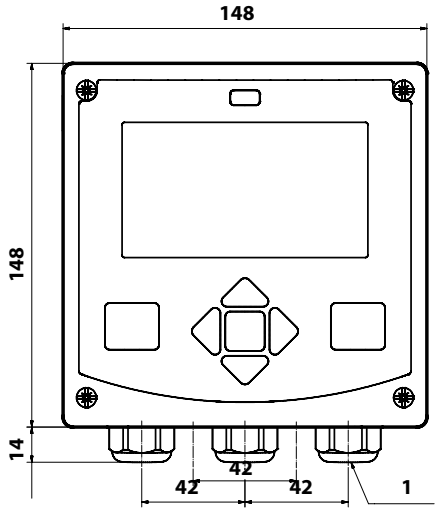
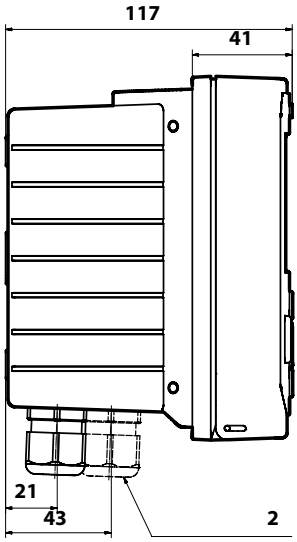


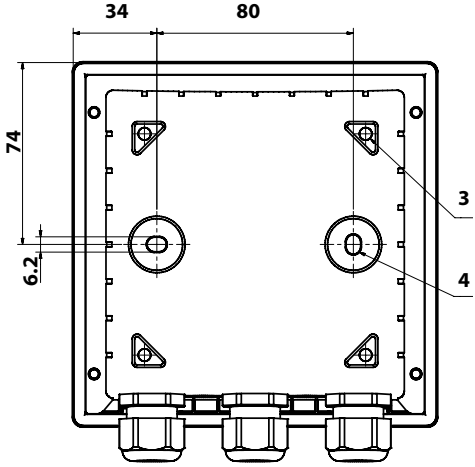
Fig.: Assembling the enclosure

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

Mounting Plan, Dimensions







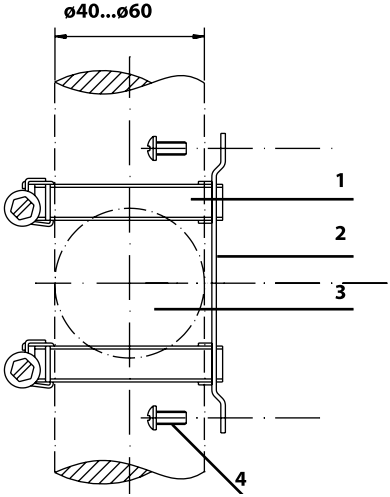
1) Cable gland (3 x)
2) Knockouts for cable gland or ½" conduit, dia. 21.5 mm (2 knockouts). Conduit couplings not included!
3) Knockout for pipe mounting (4 x)
4) Knockout for wall mounting (2 x)

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

Pipe Mounting, Protective Hood



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

Fig.: Pipe-mount kit, accessory ZU 0274

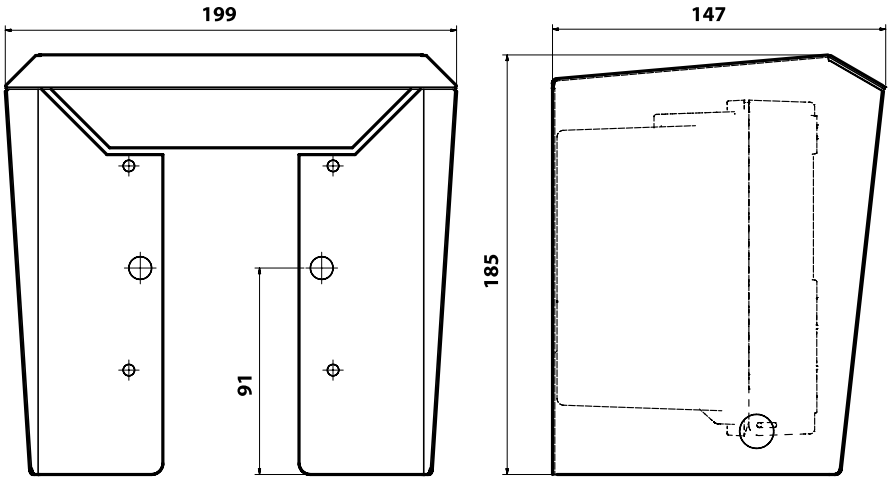
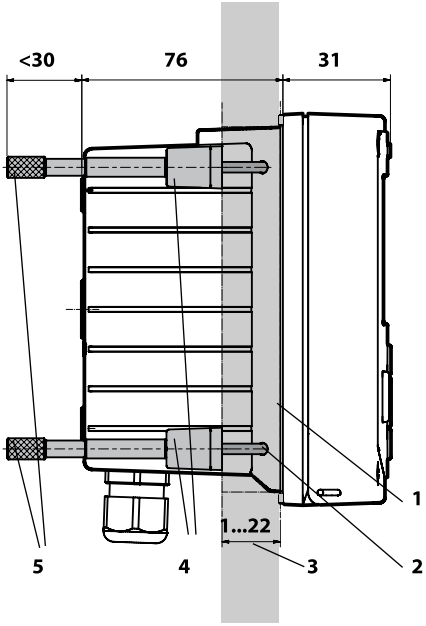


Fig.: Protective hood for wall and pipe mounting, accessory ZU 0737

Panel Mounting



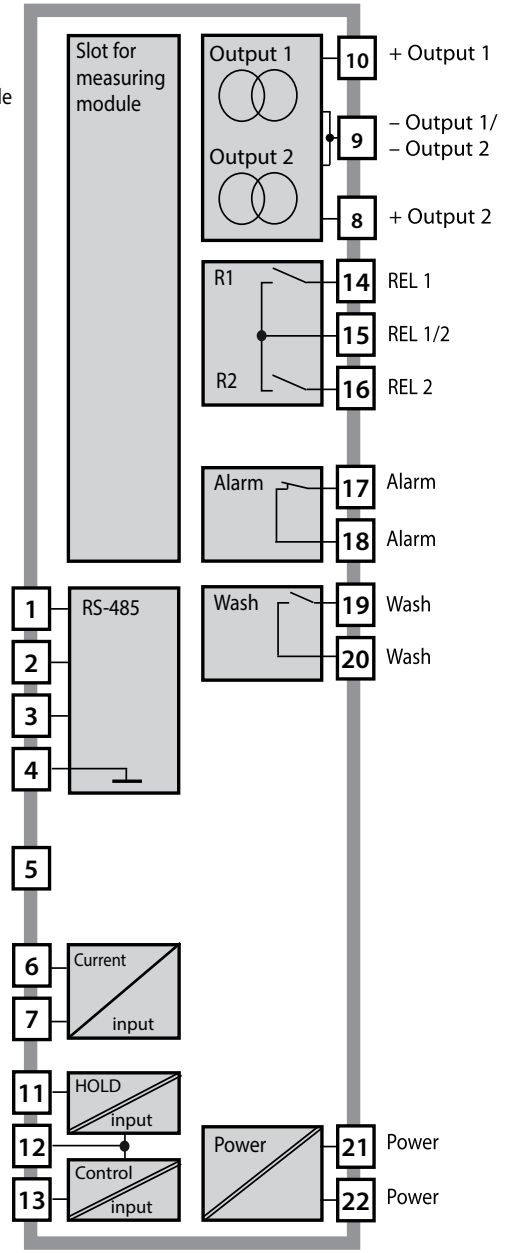
1) Circumferential sealing (1 x)
2) Screws (4 x)
3) Position of control panel
4) Span piece (4 x)
5) Threaded sleeve (4 x)

Cutout
138 x 138 mm (DIN 43700)

Fig.: Panel-mount kit, accessory ZU 0738

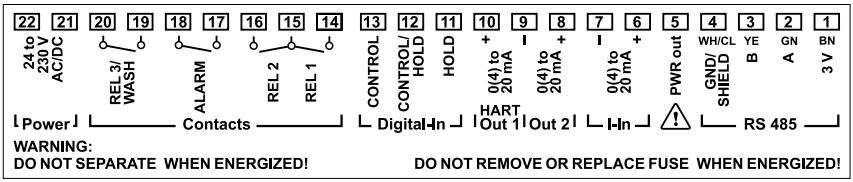
All dimensions in mm

For connection of analog sensors:
Insert interchangeable module
(measuring module)

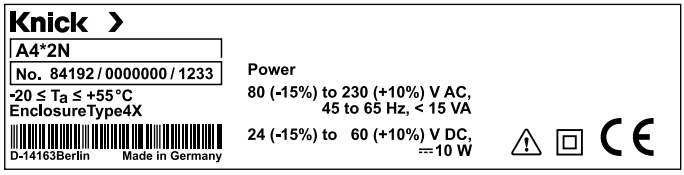


Terminal Assignments

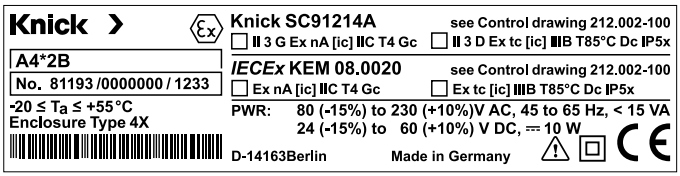
The terminals are suitable for single or stranded wires up to 2.5 mm² (AWG 14).



A402N Rating Plate



A402B Rating Plate



20 Power Supply, Signal Assignments

Power Supply

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

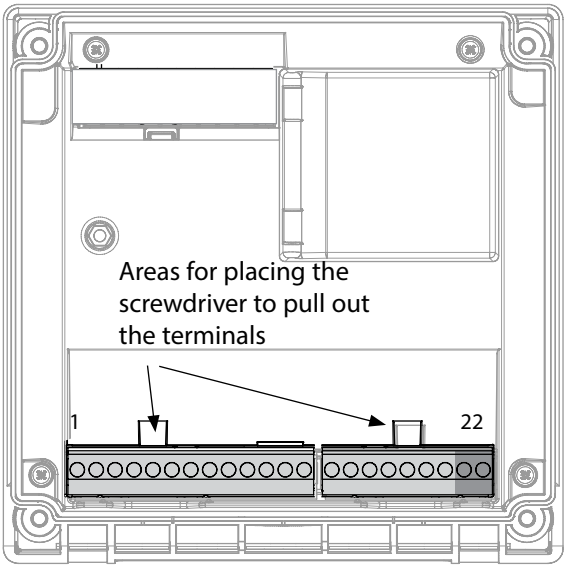


Figure:
Terminals, device opened,
back of front unit

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 select the sensor in the Configuration menu, the calibration data are read from the sensor. They can later be modified by calibration.

Terminal assignments		
Memosens connection		
1 (BN)	+3 V	Brown
2 (GN)	RS 485 A	Green
3 (YE)	RS 485 B	Yellow
4 (WH)	GND/shield	White / Shield
5	Power Out	
6	+ input	
7	– input	
Current outputs OUT1, OUT2		
8	+ Out 2	
9	– Out 2 / – Out 1 / HART	
10	+ Out 1 / HART	
11	HOLD	
12	HOLD / Control	
13	Control	
Relay contacts REL1, REL2		
14	REL 1	
15	REL 1/2	
16	REL 2	
17	alarm	
18	alarm	
19	wash	
20	wash	
Power supply		
21	power	
22	power	

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!
- Before connecting the device to the power supply, make sure that its voltage lies within the range 80 to 230 V AC/DC or 24 to 60 V DC.
- A signal current supplied to the current input must be galvanically isolated. If not, connect an isolator module.
- All parameters must be set by a system administrator prior to commissioning.

Terminals

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

Application in Hazardous Locations

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

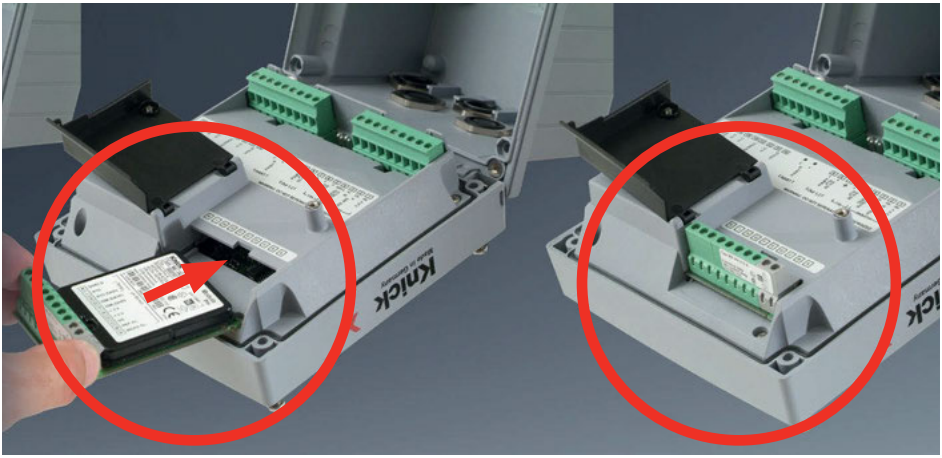
Start-Up

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.

This does not apply to the multi-channel module for dual conductivity measurement and to the connection of Memosens sensors. Here, you will be prompted to select the desired measuring function upon first start-up.

Changing the Measuring Function

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



Measuring modules for connection of analog pH sensors:

The measuring module for the connection of analog pH sensors is simply inserted into the module slot. Upon initial start-up, the analyzer automatically recognizes the module and adjusts the software correspondingly. When you replace the measuring module, you must select the corresponding measuring function in the “Service” menu.

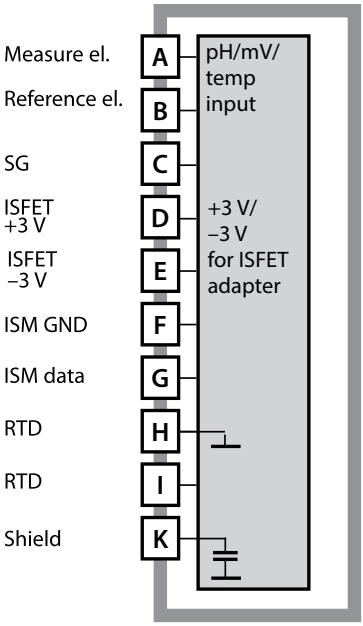
Measuring module for 2nd Memosens channel

If you want to measure two process variables using Memosens sensors, you must insert a Memosens module for the second channel. The operating mode for multi-channel measurement (“device type”) must be selected in the configuration menu.

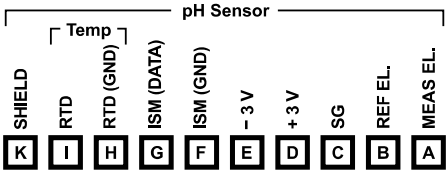
The following combinations are possible:

Memosens pH + Memosens pH

Memosens pH + Memosens Oxy

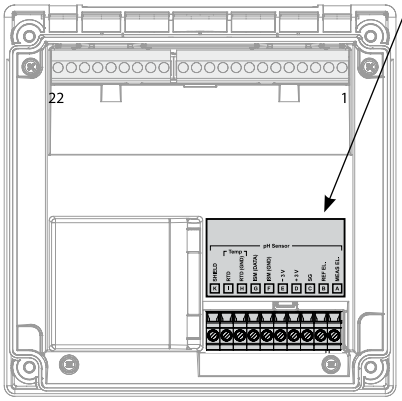


Module for pH measurement
Order code MK-PH015...
See the following pages for wiring examples.



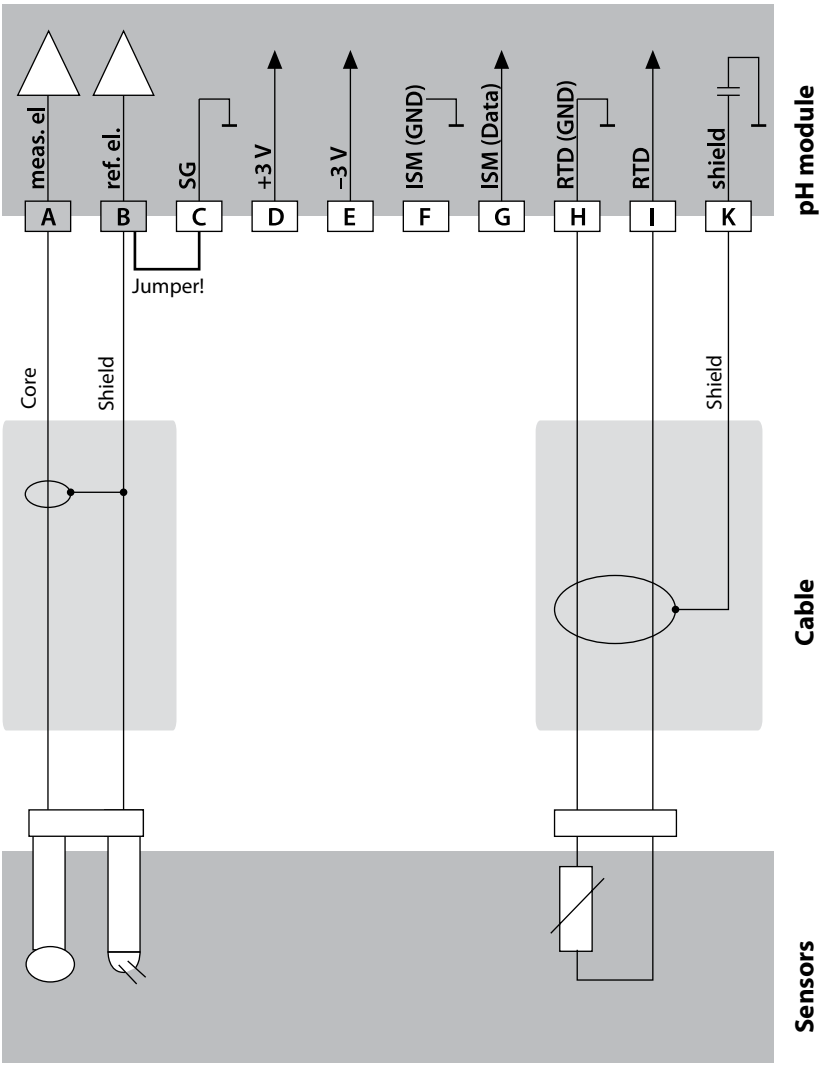
Terminal plate of pH module
The terminals are suitable for single or stranded wires up to 2.5 mm² (AWG 14).

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".



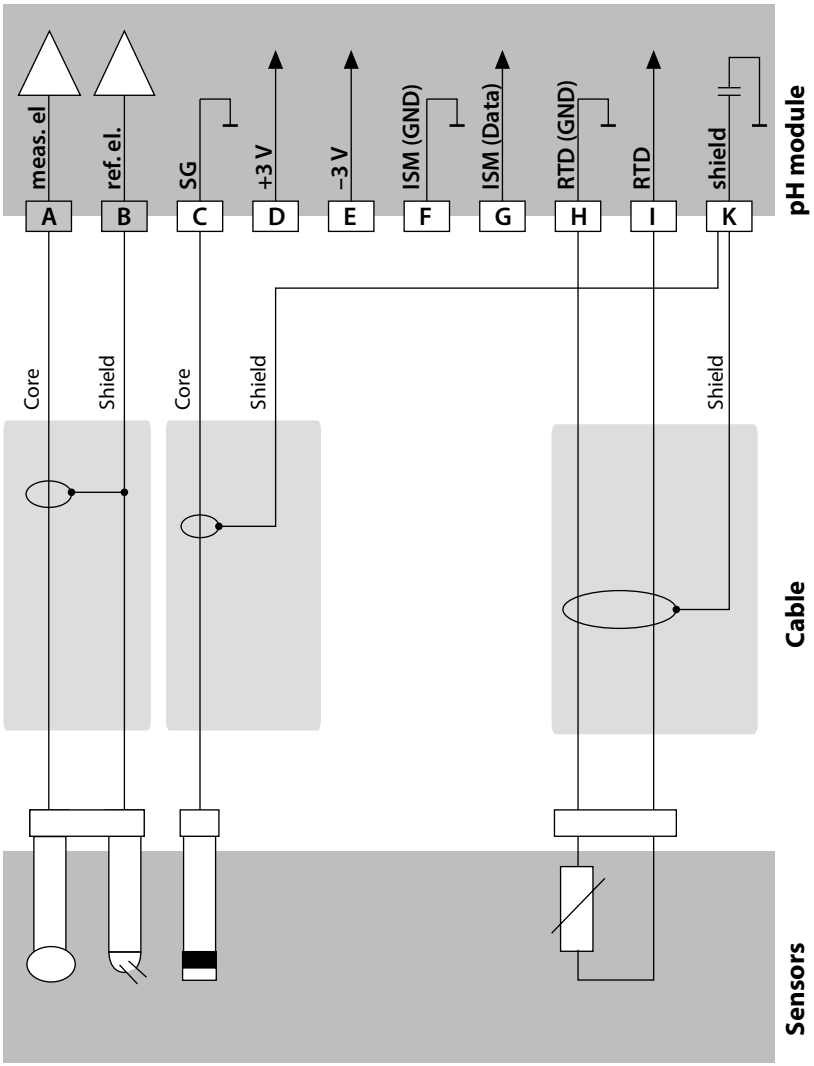
Example 1:

Measuring task:	pH, temperature, glass impedance
Sensors (example):	SE 555X/1-NS8N
Cable (example):	ZU 0318



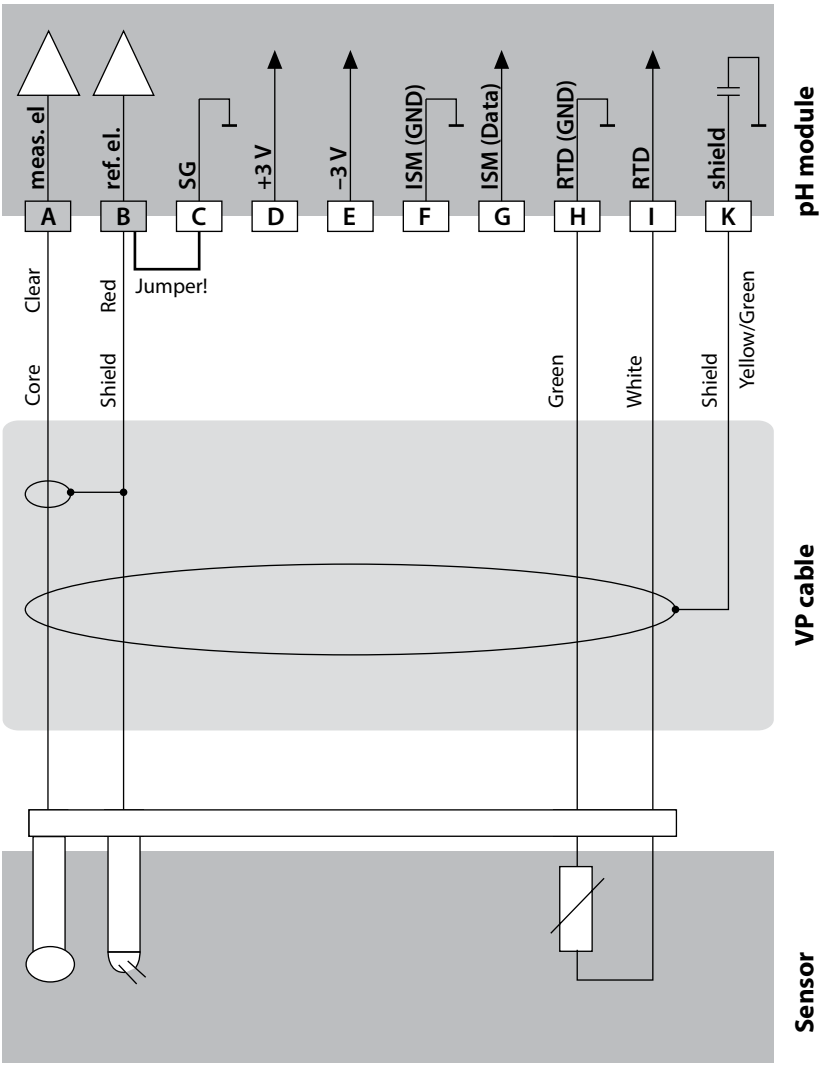
Example 2:

Measuring task:	pH/ORP, temp, glass impedance, ref. impedance
Sensors (example):	SE555X/1-NS8N, equipotential bonding: ZU 0073 Temperature: e.g., Pt1000
Cable (example):	2x ZU 0318



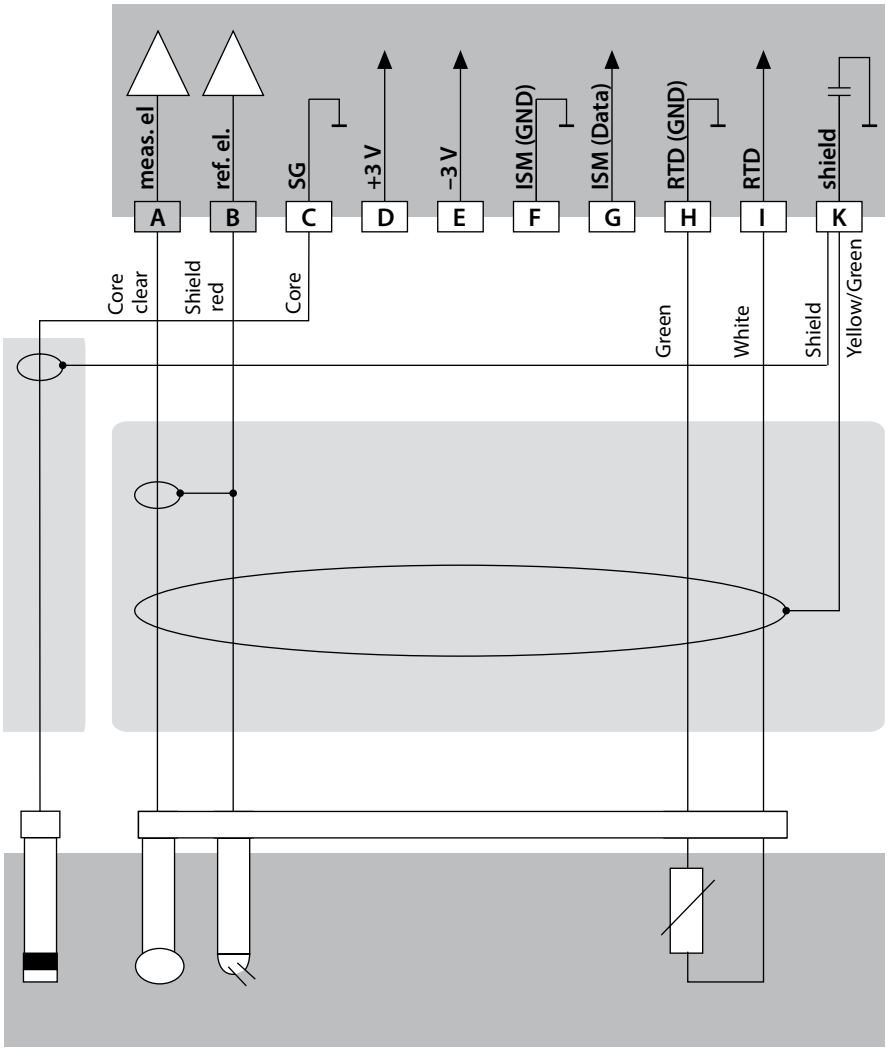
Example 3:

Measuring task:	pH, temp, glass impedance
Sensor:	pH sensor, e.g., SE 554X/1-NVPN, cable CA/VP6ST-003A
Temperature detector:	Integrated



Example 4:

Measuring task:	pH/ORP, temp, glass impedance, ref. impedance
Sensors (example):	pH sensor, e.g., SE 555X/1-NVPN, cable CA/VP6ST-003A
Temperature detector:	Integrated
Equipotential bonding electrode:	ZU 0073, cable: ZU 0318

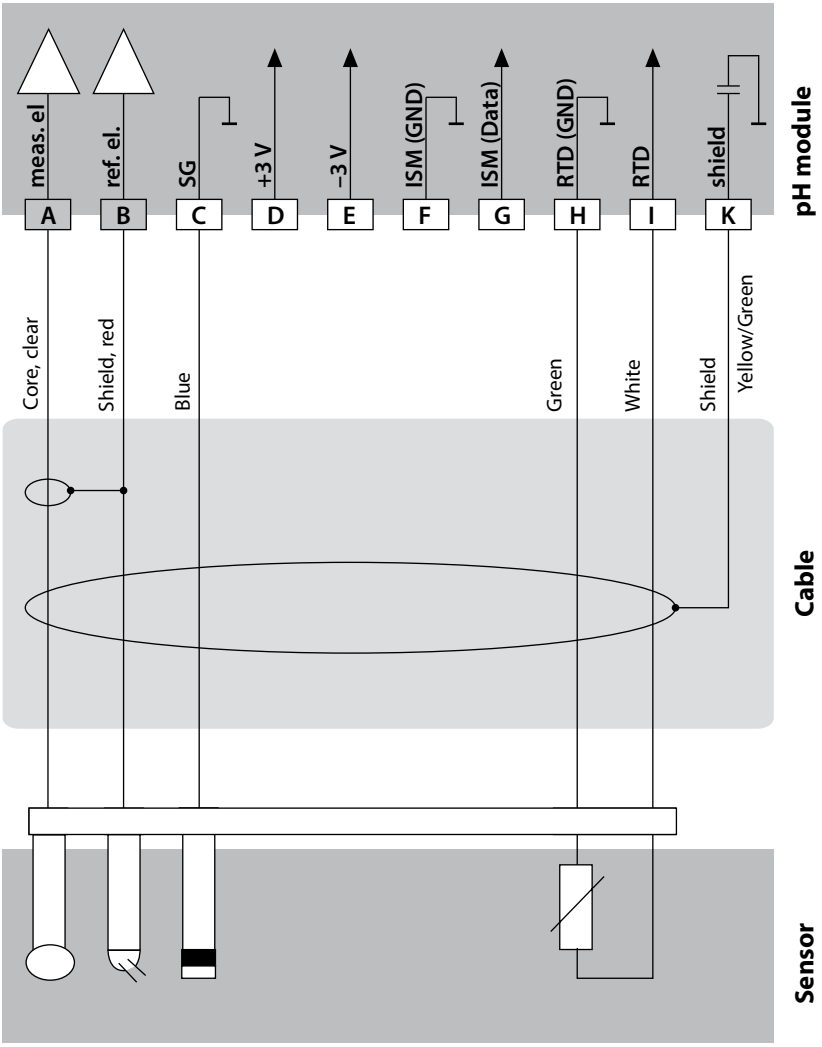


Example 5:

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

Sensors (example): PL PETR-120VP (pH/ORP combo sensor, SI Analytics)

Cable (example): CA/VP6ST-003A

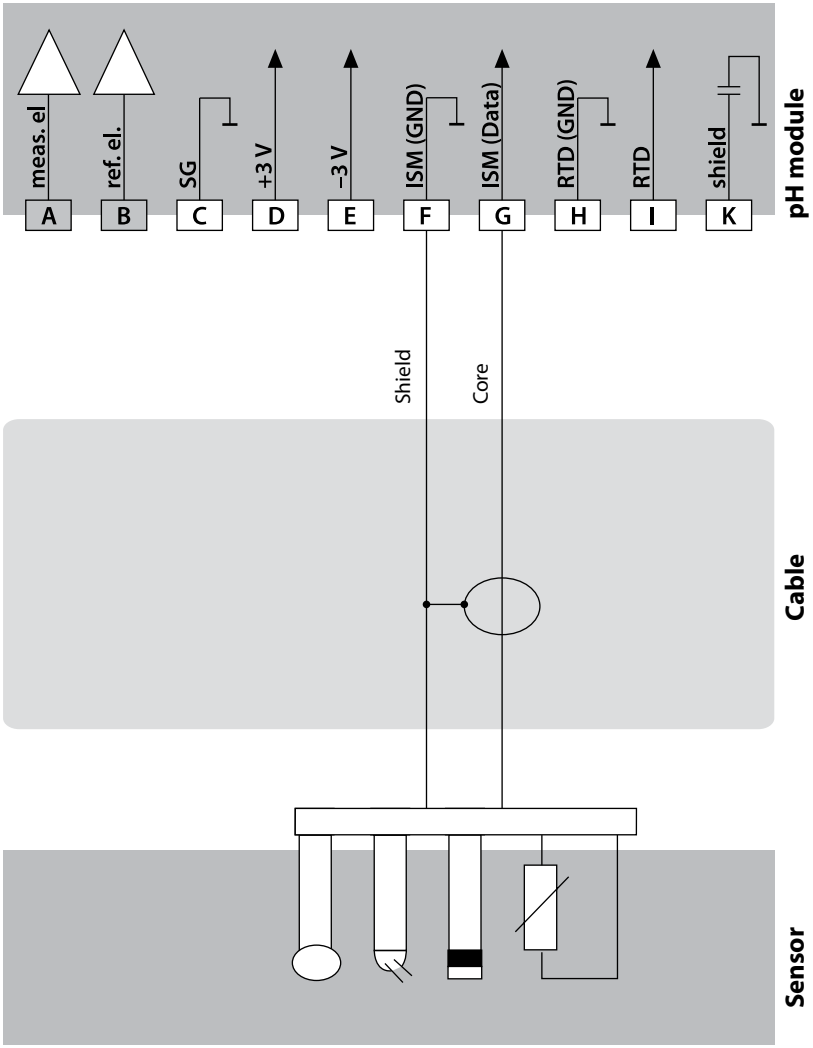


Example 7:

NOTICE!

Do not connect an additional analog sensor!

Measuring task:	pH/ORP, temp, glass impedance, ref. impedance
Sensors (example):	InPro 4260i (ISM sensor, Mettler-Toledo)
Cable (example):	AK9 (Mettler-Toledo)

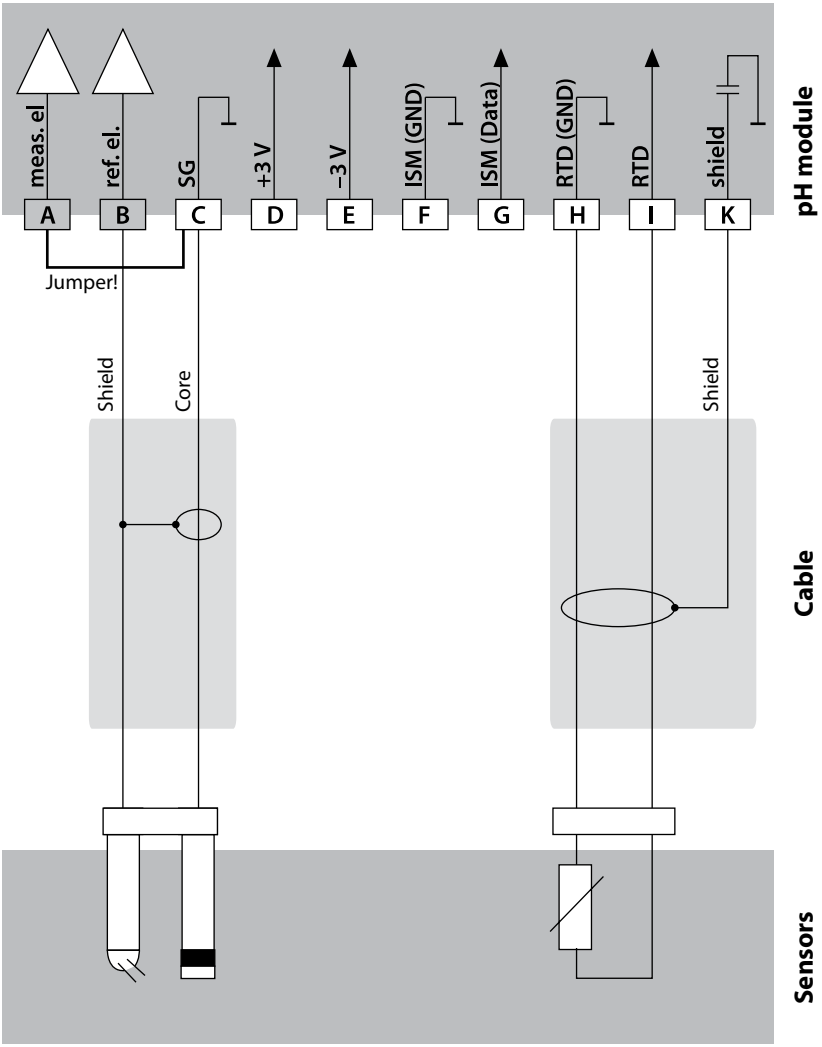


Example 8 - Note: Switch off Sensocheck!

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

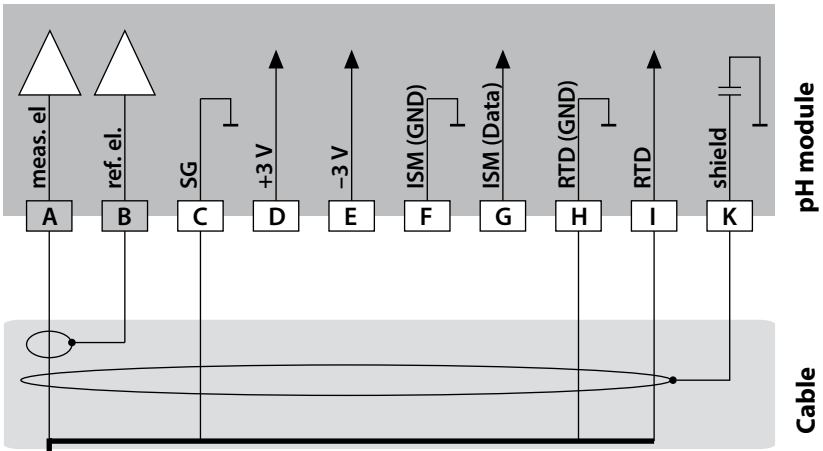
Sensors (example): ORP: SE 564X/1-NS8N

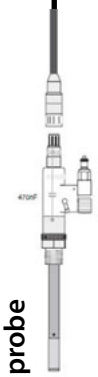
Cable (example): ZU 0318



Example 9:

Connecting a Pfaudler probe (requires TAN SW-A007):





Pfaudler probe

Module		pH Reiner with equip.bond., VP screw cap	Differential Models 18/40 with equip.bond.	Models 03/04 with equip. bond.	Models 03/04 without equip. bond.
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

Start-Up

When you start up the analyzer for the first time, you will be prompted to select the desired measurement procedure (a connected Memosens sensor will not be identified automatically).

Changing the Measuring Function

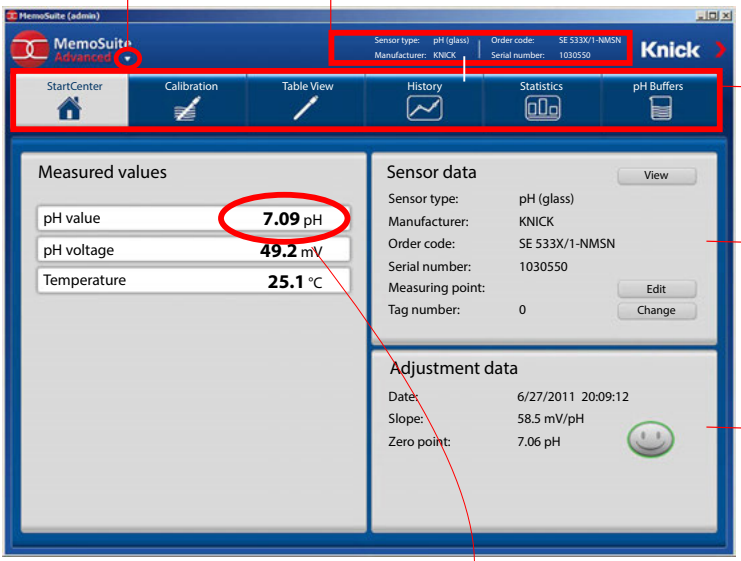
In the "Service" menu you can select another measuring function at any time.

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



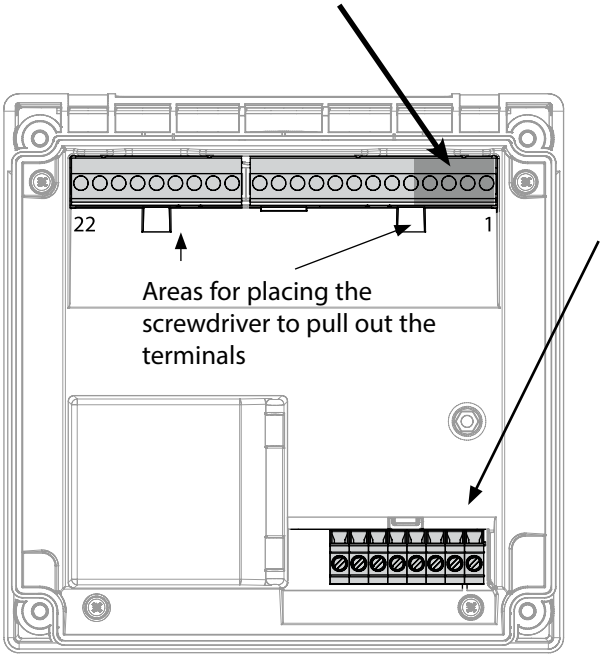
Function selection: The selected function is highlighted.

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

Last adjustment

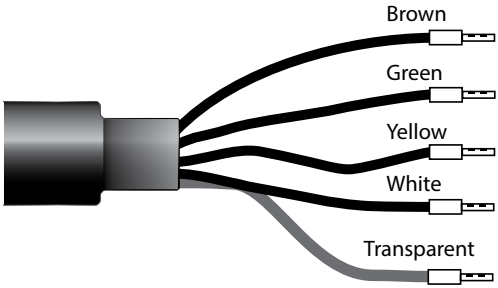
You can magnify a measured-value display at a click of the mouse.

Standard connection (sensor A)		
1	Brown	+3 V
2	Green	RS 485 A
3	Yellow	RS 485 B
4	White/Transp.	GND/shield



For dual devices (2 measuring channels): (MK-MS095 module) Connection of sensor B		
A	Brown	+3 V
B	Green	RS 485 A
C	Yellow	RS 485 B
D	White	GND
E	Transp.	SHIELD

Memosens Cable



+3 V

RS485 (A)

RS485 (B)

GND

Shield

Memosens Cable CA/MS-...

Connecting cable for non-contact inductive digital transmission of measured signals (Memosens).
By providing perfect galvanic isolation between sensor and analyzer/transmitter, the Memosens cable prevents measurement interferences. Any effects of humidity and corrosion are prevented.

Specifications

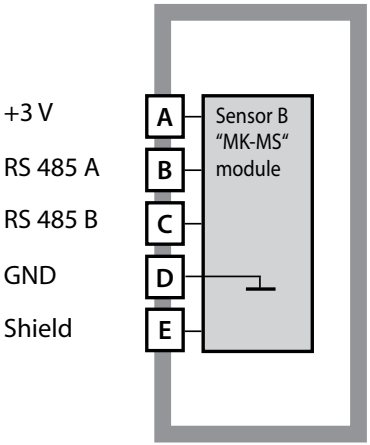
Material	TPE
Cable diameter	6.3 mm
Length	up to 100 m
Process temperature	–20 °C … +135 °C / –4 … +275 °F
Ingress protection	IP 68

Order Codes

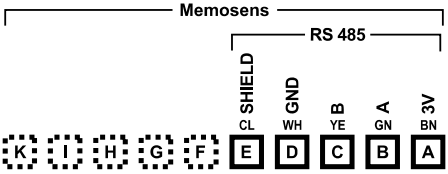
	Cable type	Cable length	Order code
Memosens	Ferrules	3 m	CA/MS-003NAA
		5 m	CA/MS-005NAA
		10 m	CA/MS-010NAA
		20 m	CA/MS-020NAA
	M12 plug, 8-pin	3 m	CA/MS-003NCA
		5 m	CA/MS-005NCA
Memosens Ex*	Ferrules	3 m	CA/MS-003XAA
		5 m	CA/MS-005XAA
		10 m	CA/MS-010XAA
		20 m	CA/MS-020XAA
	M12 plug, 8-pin	3 m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

Other cable lengths or cable types are available on request.

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

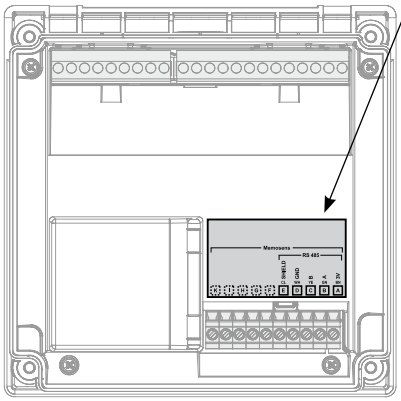


Module for 2nd Memosens channel
Order code MK-MS095...
See the following pages for wiring examples.



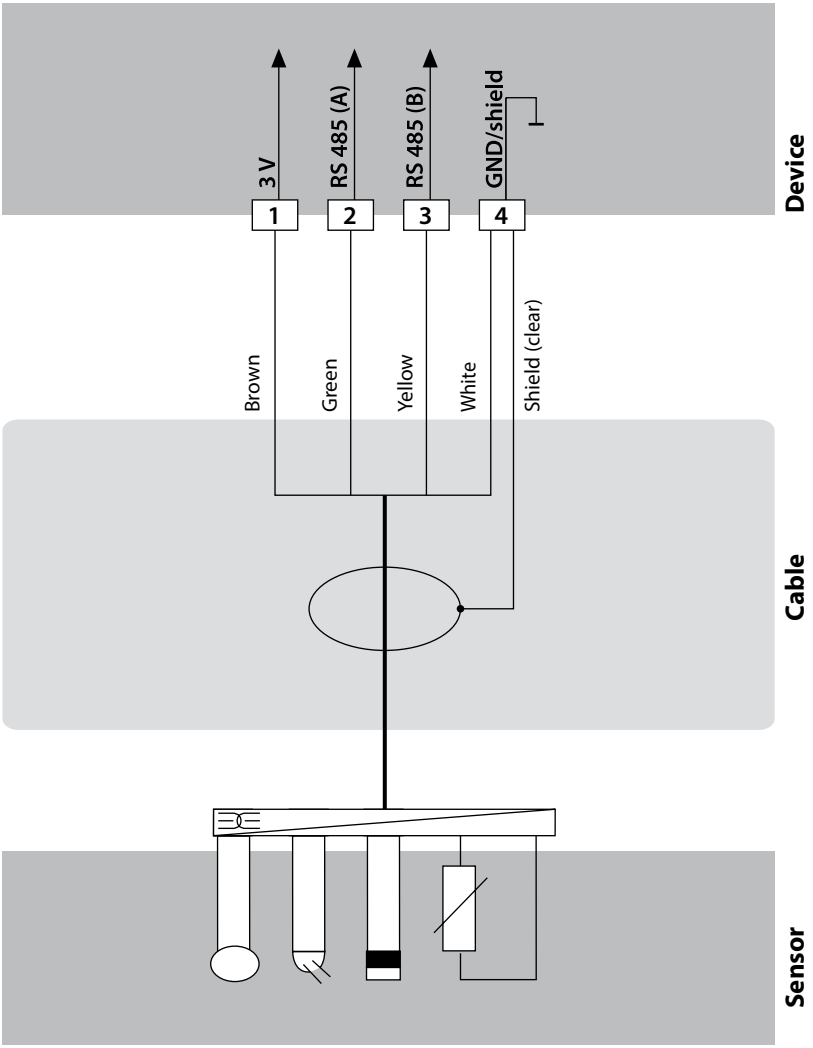
Terminal plate of module for 2nd Memosens channel
The terminals are suitable for single or stranded wires up to 2.5 mm² (AWG 14).

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".



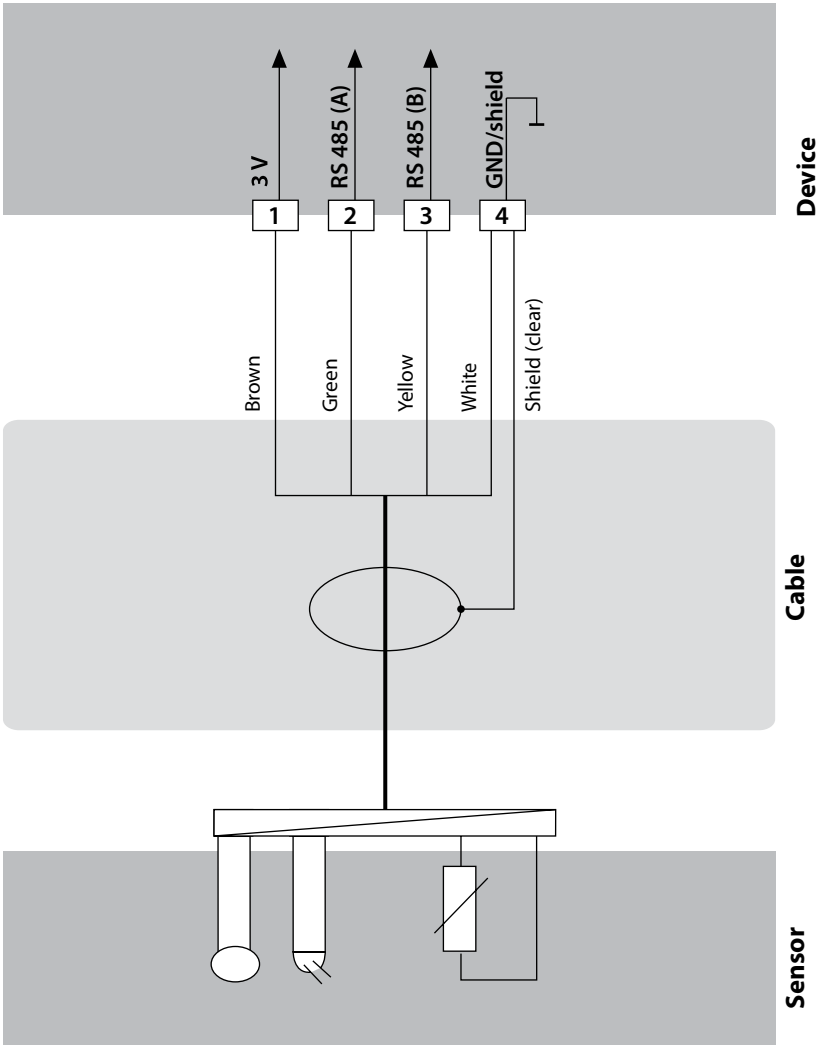
Example 1:

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



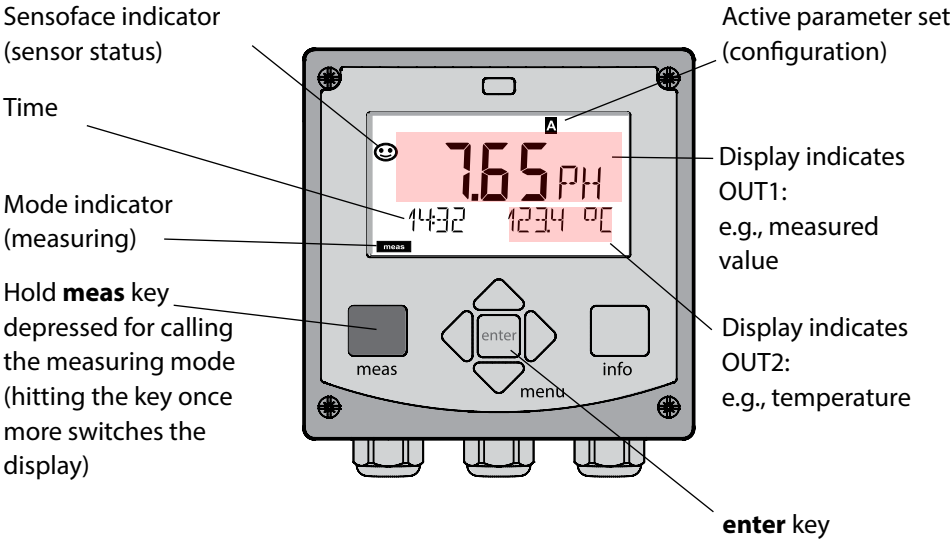
Example 2:

Measuring task:	pH, temp, glass impedance
Sensors (example):	SE 555X/1-NMSN
Cable (example):	CA/MS-003NAA



Measuring Mode

Prerequisite: A Memosens sensor is connected or a measuring module is installed with a corresponding analog 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).



Depending on the configuration, you can set various displays as standard display for the measuring mode (see page 43).

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

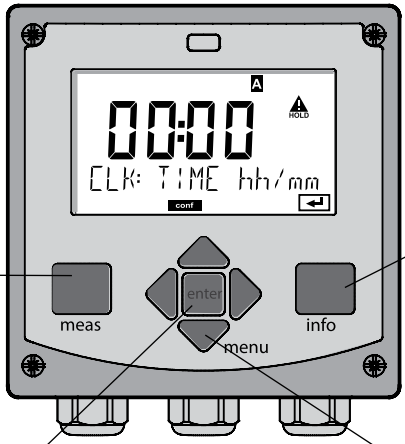
NOTICE:
You must configure the analyzer for the respective measurement task.

Up / Down arrows

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

Left / Right arrows

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



meas

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

info

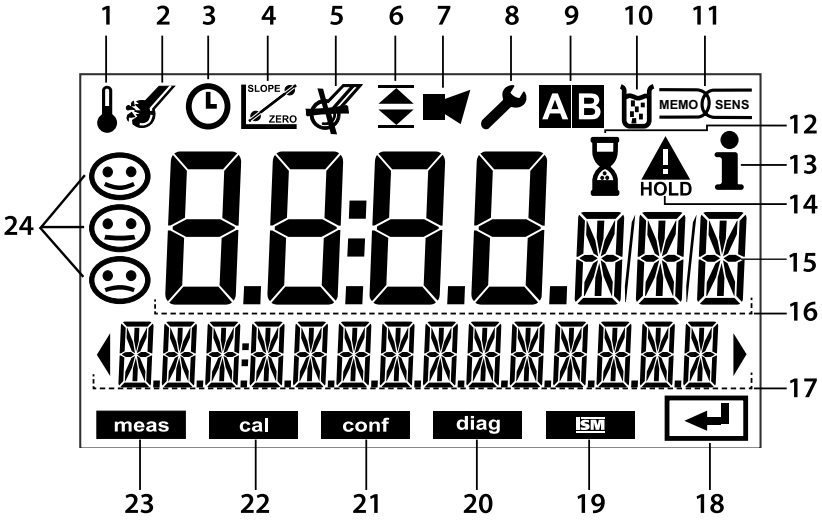
- Retrieve information
- Show error messages

enter

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

menu

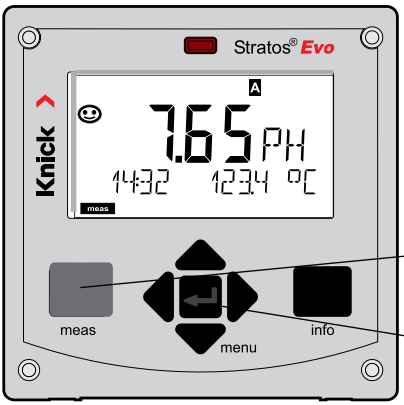
- Measuring mode: Call menu



1 Temperature
2 Sensocheck
3 Interval/response time
4 Sensor data
5 Sensocheck
6 Limit message:
Limit 1 ▼ or Limit 2 ▲
7 Alarm
8 Service
9 Parameter set
10 Calibration
11 Memosens sensor
12 Waiting time running
13 Info available
14 HOLD mode active
15 Unit symbols
16 Primary process value
17 Secondary display
18 Proceed using enter
19 ISM sensor
20 Diagnostics
21 Configuration mode
22 Calibration mode
23 Measuring mode
24 Sensoface

Signal Colors (Display Backlighting)

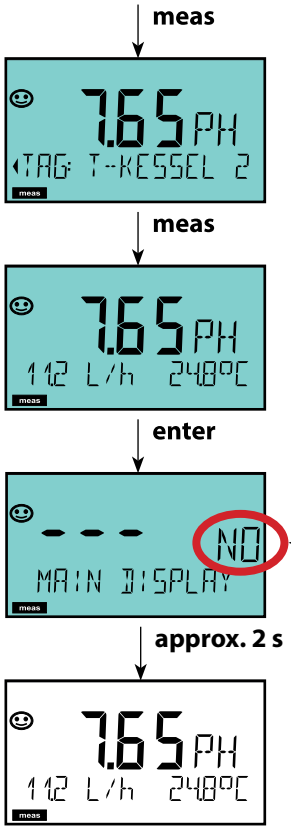
Red	Alarm (in case of fault: display values blink)
Red blinking	Input error: illegal value or wrong passcode
Orange	HOLD mode (Calibration, Configuration, Service)
Turquoise	Diagnostics
Green	Info
Magenta	Sensoface message (pre-alarm)



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

meas key

enter key



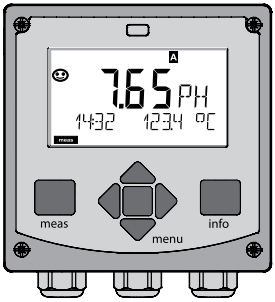
By pressing **meas** briefly you can step through further displays such as tag number (TAG) or flow (L/h).
These displays are turquoise. After 60 sec they switch back to the main display.

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

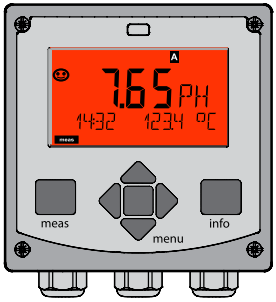
The secondary display shows "MAIN DISPLAY – NO".
Use the **UP** / **DOWN** arrows to select "MAIN DISPLAY – YES"
and confirm by pressing **enter**.
The display color changes to white.
This display is now shown in measuring mode.

Color-Coded User Interface

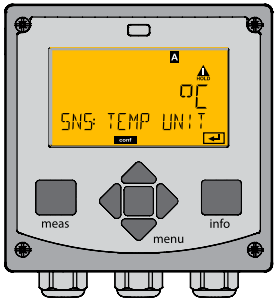
The color-coded user interface guarantees increased operating safety.
Operating modes are clearly signaled.
The normal measuring mode is white. Information text appears on a green screen and the diagnostic menu appears on turquoise. The orange HOLD mode (e.g., during calibration) is quickly visible as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



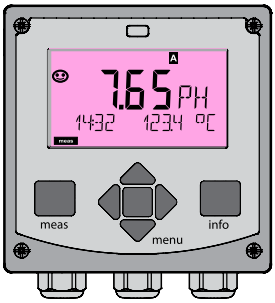
White:
Measuring mode



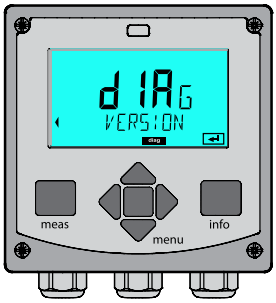
Red blinking:
Alarm, error



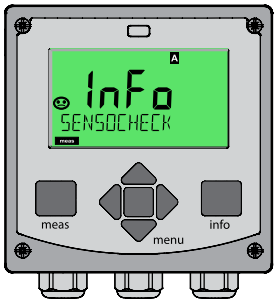
Orange:
HOLD mode



Magenta:
Maintenance request



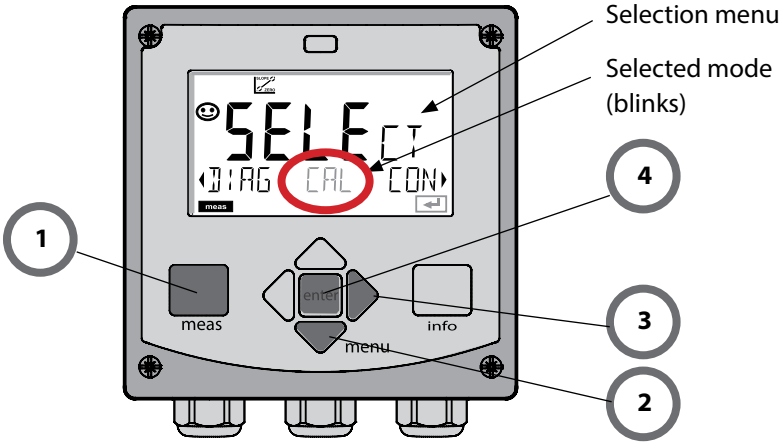
Turquoise:
Diagnostics



Green:
Info texts

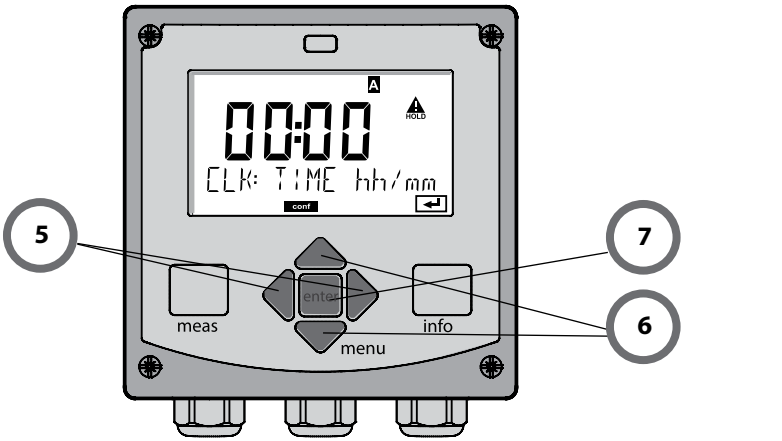
To select the operating mode:

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



To enter a value:

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



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

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

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

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

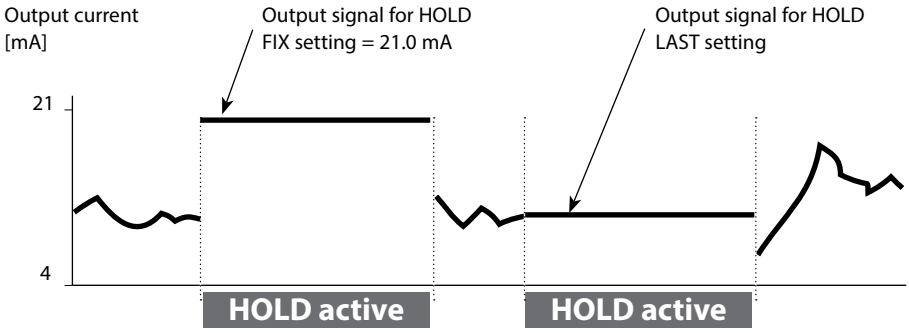
Service
Maintenance functions (current source, relay test, controller test), passcode assignment, device type selection, reset to factory settings, enabling of options (TAN).

The HOLD mode is a safety state during configuration and calibration.
Output current is frozen (LAST) or set to a fixed value (FIX).
Alarm and limit contacts are disabled.
The display backlighting turns orange, display icon: HOLD

Output signal response

- **LAST:** The output current is frozen at its last value. Recommended for short configuration procedures. The process should not change decisively during configuration. Changes are not noticed with this setting!
- **Fix:** The output current is set to a value that is noticeably different from the process value to signal the control system that the device is being worked at.

Output signal during HOLD:



Terminating the HOLD mode

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

External activation of HOLD

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

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

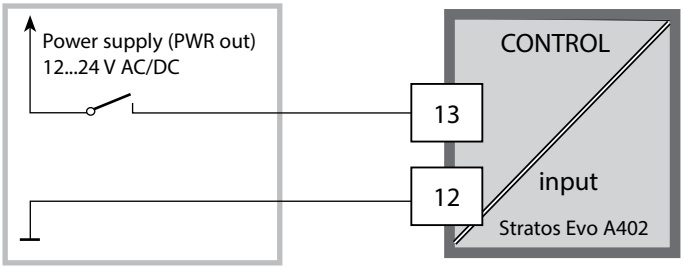
Alarm

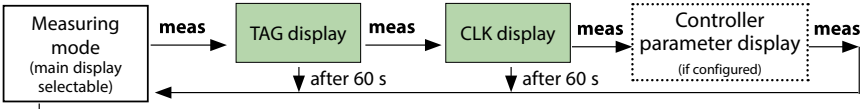
When an error has occurred, **Err xx** is displayed immediately.
Only after expiry of a user-defined delay time will the alarm be registered and entered in the logbook.
During an alarm the display blinks, the display backlighting turns **red**.
Error messages can also be signaled by a 22 mA output current (when configured correspondingly).
The alarm contact is activated by alarm or power failure. 2 sec after the failure event is corrected, the alarm status will be deleted.
The 22-mA signal can also be triggered by Sensoface messages (configurable).

Generating a message via the CONTROL input
(min. flow / max. flow)

The CONTROL input can be used for parameter set selection or for flow measurement (pulse principle), depending on its assignment in the "Configuration" menu.
First, the flow transmitter must be calibrated in the CONTROL menu: ADJUST FLOW

When preset to flow measurement
CONF/CNTR_IN/CONTROL = FLOW
an alarm can be generated when the measured flow exceeds a specified range:
CONF/ALA/FLOW CNTR = ON
CONF/ALA/FLOW min (specify value, default: 5 liters/h)
CONF/ALA/FLOW max (specify value, default: 25 liters/h)





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

DIAG	CALDATA	Display of calibration data
	SENSOR	Display of sensor data
	SELFTEST	Self test: RAM, ROM, EEPROM, module
	LOGBOOK	100 events with date and time
	MONITOR	Display of direct sensor values
	VERSION	Display of software version, model designation, serial no.
HOLD		Manual activation of HOLD mode, e.g., for sensor replacement. The signal outputs behave as configured (e.g., last measured value, 21 mA)
CAL	pH	pH adjustment / ORP adjustment / product calibration
	Oxy	Adjustment (WTR/AIR) / zero adjustment / prod. cal.
	COND(I)	Adjustment with solution / cell factor input / prod. cal.
	CAL_RTD	Adjustment of temperature probe
CONF	PARSET A	For configuring parameter set A / B see "Overview of Configuration" on next page.
	PARSET B	
SERVICE (Access via code, factory setting: 5555)	MONITOR	Display of measured values for validation (simulators)
	SENSOR	Sensor (resetting diagnostics messages)
	POWER OUT	Selecting the output voltage (3.1 V / 12 V / 15 V / 24 V)
	OUT1	Current source, output 1
	OUT2	Current source, output 2
	RELAIS	Relay test
	CONTROL	Controller: manual specification of controller output
	CODES	Specifying access codes for operating modes
	DEVICE TYPE	Selecting the device type
	DEFAULT	Reset to factory setting
	OPTION	Enabling an option via TAN

The configuration steps are assigned to different menu groups. Using the left/right arrow keys, you can jump between the individual menu groups. Each menu group contains menu items for setting the parameters. Pressing **enter** opens a menu item. Use the arrow keys to edit a value. Press **enter** to confirm/save the settings.
Return to measurement: Hold **meas** key depressed (> 2 s).

Select menu group	Menu group	Code	Display	Select menu item
	Sensor selection (multi-channel device: select sensor A / sensor B)	SNS: (S_A / S_B)		enter
		Menu item 1		enter
		⋮		enter
		Menu item ...		enter
	Current output 1	OT1:		
	Current output 2	OT2:		
	Compensation	COR:		
	Control input (parameter set or flow measurement)	IN:		
	Alarm mode	ALA:		
	Relay outputs	REL:		
	Cleaning	WSH:		
	Setting the clock	CLK:		
	Tag number	TAG:		

Note: With MSPH-MSPH or MSPH-MSOXY dual devices, the two parameter sets are replaced by the two sensors A and B.

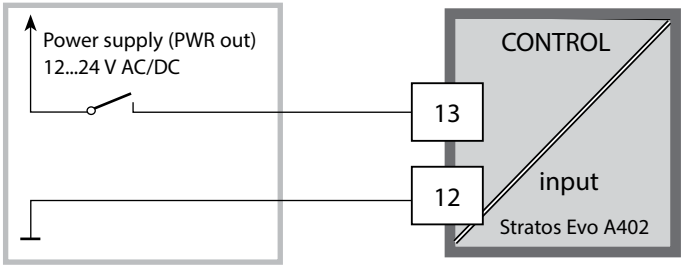
Parameter Set A/B: Configurable Menu Groups

The device provides 2 parameter sets "A" and "B". By switching between the parameter sets you can adapt the device to different measurement situations, for example. Parameter set "B" only permits setting of process-related parameters.

Menu group	Parameter set A	Parameter set B
SENSOR	Sensor selection	---
OUT1	Current output 1	Current output 1
OUT2	Current output 2	Current output 2
CORRECTION	Compensation	Compensation
CNTR_IN	Control input	---
ALARM	Alarm mode	Alarm mode
REL 1/REL 2	Relay outputs	Relay outputs
WASH	Cleaning	---
PARSET	Parameter set selection (not for dual devices)	---
CLOCK	Setting the clock	---
TAG	TAG of measuring point	---
GROUP	GROUP of measuring points	---

External switchover of parameter sets A/B

You can switch between parameter sets A and B by applying a signal to the CONTROL input (setting: CNTR-IN – PARSET).

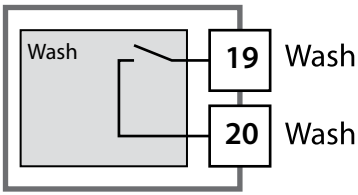


Parameter set A active	0...2 V AC/DC
Parameter set B active	10...30 V AC/DC

Parameter Set A/B: Manual Switchover

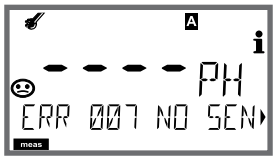
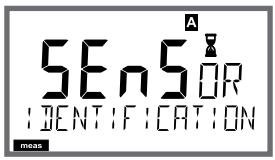
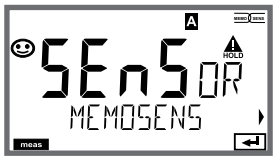
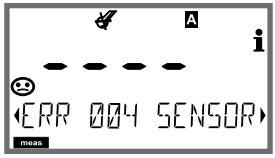
Display	Action	Remark
	To switch between parameter sets: Press **meas**	Manual selection of parameter sets must have been preset in CONFIG mode. Default setting is a fixed parameter set A. Wrong settings change the measurement properties!
	PARSET blinks in the lower line. Select parameter set using ◂ and ▸ keys.	
	Select PARSET A / PARSET B	The currently active parameter set is read on the display: 
	Press **enter** to confirm. Cancel by pressing **meas**	

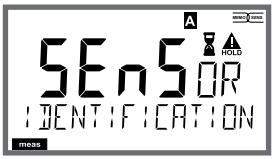
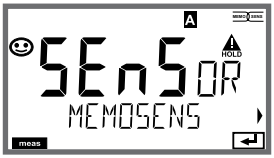
Parameter Set A/B: Signaling via WASH Contact



The active parameter set can be signaled using the WASH contact:

If configured correspondingly, the WASH contact signals:
Parameter set A: Contact open
Parameter set B: Contact closed

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 defective. Replace sensor		When this error message appears, the sensor cannot be used. Sensoface is sad.

Step	Action/Display	Remark
Select HOLD mode A sensor should only be replaced during HOLD mode to prevent unintended reactions of the outputs or contacts.	Press **menu** key to call the selection menu, select HOLD using the ◀ ▶ keys, press **enter** to confirm.	Now the device is in HOLD mode. The HOLD mode can also be activated externally via the HOLD input. During HOLD the output current is frozen at its last value or set to a fixed value.
Disconnect and remove old sensor		
Install and connect new sensor.		Temporary messages which are activated during the replacement are indicated but not output to the alarm contact and not entered in the logbook.
Wait until the sensor data are displayed.		
Check sensor data	 View sensor information using ◀ ▶ keys, confirm using **enter**.	You can view the sensor manufacturer and type, serial number and last calibration date.
Check measured values		
Exit HOLD	Hit **meas** key: Return to the selection menu. Hold **meas** key depressed: Device switches to measuring mode.	

Overview of pH Sensor Configuration

pH sensor			Choices	Default
SNS:			STANDARD, ISFET INDUCON, ISM MEMOSENS	STANDARD
	RTD TYPE (omitted for MEMOSENS and ISM)		100 PT, 1000 PT, 30 NTC, 8.55 NTC, Balco 3kOhm	100 PT
	TEMP UNIT		°C / °F	°C
	TEMP MEAS *)		AUTO, MAN, EXT (EXT only with I-input enabled via TAN)	AUTO
		MAN	–20...200 °C (–4...392 °F)	025.0 °C (077.0 °F)
	TEMP CAL		AUTO, MAN, EXT	AUTO
		MAN	–20...200 °C (–4...392 °F)	025.0 °C (077.0 °F)
	NOM ZERO **)		0.00 ... 14.00 PH	07.00 PH
	NOM SLOPE **)		30.0 ... 60.0 mV	059.2 mV
	PH_ISO **)		0.00 ... 14.00 PH	07.00 PH
	CAL MODE		AUTO, MAN, DAT	AUTO
		AUTO BUFFER SET	-01-...-10-, -U1- **Note:** Pressing **info** displays nominal buffer values + manufacturer	-02-
		U1 (For specifiable buffer set, see Appendix: "Buffer Tables")	EDIT BUFFER 1 (NO, YES) Enter values for buffer 1	NO
			EDIT BUFFER 2 (NO, YES) Enter values for buffer 2	NO
	CAL TIMER (omitted for ISM)		OFF, FIX, ADAPT	OFF
	ON	CAL-CYCLE	0...9999 h	0168 h

* The setting: TEMP MEAS: AUTO/MAN/EXT applies to all outputs: OUT1/OUT2/limit values/controller/display; Sensors with deviating zero/slope require the "Pfaudler" option (TAN).
Settings with "Sensor: STANDARD" selected (not required for Memosens Pfaudler sensor).

** only with STANDARD and Pfaudler option (TAN), not with Memosens Pfaudler.

pH

Overview of pH Sensor Configuration

pH sensor			Choices	Default
SNS:	ACT (ISM only)		OFF, AUTO, MAN	OFF
		ACT CYCLES	0000 ... 2000 DAY	0007 DAY
	TTM (ISM only)		OFF, AUTO, MAN	OFF
		TTM CYCLES	0000 ... 2000 DAY	0030 DAY
	CIP COUNT		ON, OFF	OFF
		CIP CYCLES (Memosens and ISM)	0000 ... 9999 CYC	0000 CYC
	SIP COUNT		ON, OFF	OFF
		SIP CYCLES (Memosens and ISM)	0000 ... 9999 CYC	0000 CYC
	AUTOCLAVE		ON, OFF	OFF
		AUTOCLAVE CYCLES (Memosens and ISM)	0000 ... 9999 CYC	OFF
	CHECK TAG (Memosens)		ON, OFF	OFF
	CHECK GROUP (Memosens)		ON, OFF	OFF

Sensor Verification (TAG, GROUP)

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

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

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

This requires an additional function (TAN).
The option is enabled in the SERVICE / OPT: PFAUDLER menu.
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 (default: 07.00 pH)
SNS: NOM SLOPE (default: 59.2 mV)
SNS: PH_ISO (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

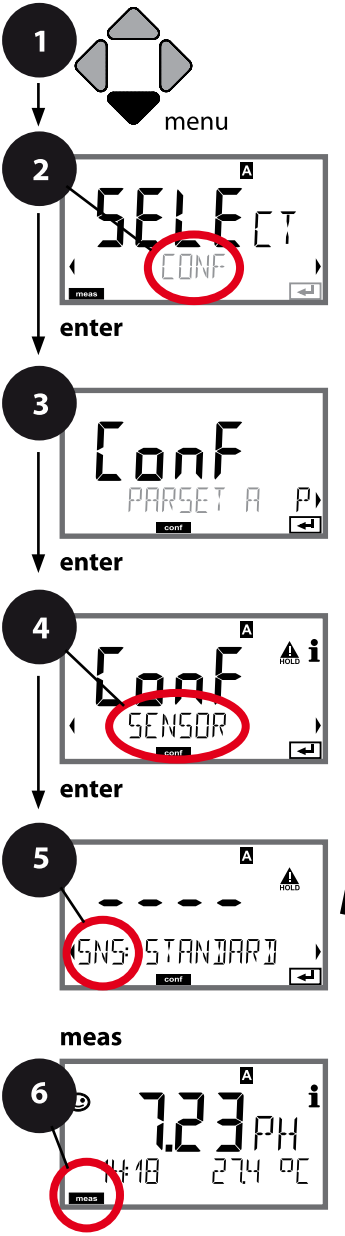
Note:
Please refer to the operating instructions of the respective sensor for more information on functioning, installation, calibration and configuration.

pH

Device Type: pH

Connected modules are automatically recognized. When no module is installed, but a Memosens sensor is connected at initial start-up, it is recognized and the corresponding process variable is automatically selected. In the SERVICE menu you can change the device type. Afterwards, you must select the corresponding calibration mode in the CONF menu.

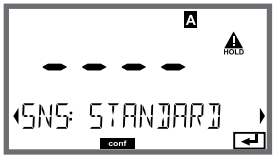
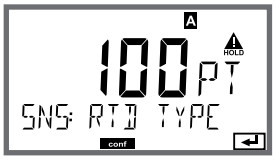
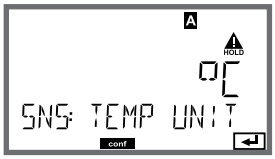
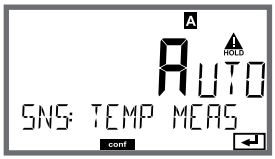
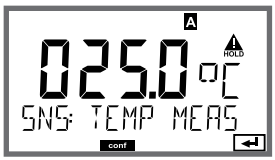
1 Press **menu**.
2 Select **CONF** using ◂ ▸, press **enter**.
3 Select parameter set using ◂ ▸ keys, press **enter**.
4 Select **SENSOR** menu using ◂ ▸ keys, press **enter**.
5 All items of this menu group are indicated by the "SNS:" code.
Press **enter** to select menu,
edit using arrow keys (see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



5 enter

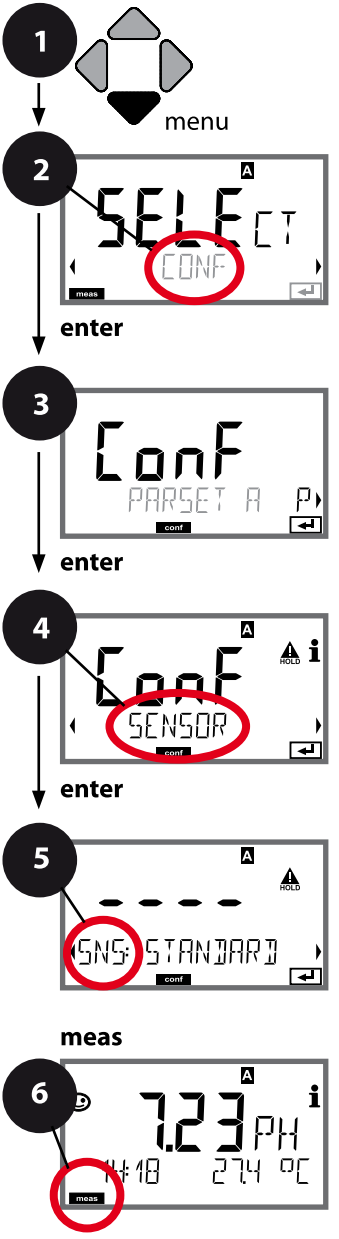
Select sensor type
Select type of temp probe
Temperature unit
Temp detection during measurement
(Manual temperature)
Temp detection during calibration
(Manual temperature)
Calibration mode
Calibration timer
Calibration cycle
CIP/SIP cycles
Autoclaving counter
CHECK TAG
CHECK GROUP

5

Menu item	Action	Choices
Select sensor type 	Select sensor type using ▲ ▼ keys. Press **enter** to confirm.	**STANDARD** ISFET Digital sensors: INDUCON ISM MEMOSENS
Select 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 3 kOhm
Temperature unit 	Select °C or °F using ▲ ▼ keys. Press **enter** to confirm.	**°C** / °F
Temp detection during measurement 	Select mode using ▲ ▼ keys: AUTO: Measured by sensor MAN: direct input of temperature, no measurement (see next step) EXT: Temperature specified via current input (only if enabled via TAN) Press **enter** to confirm.	**AUTO** MAN EXT
(Manual temperature) 	Modify digit using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm.	–20...200 °C (–4...+392 °F)

pH

Sensor, Temp Detection during Calibration, Calibration Mode



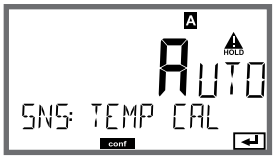
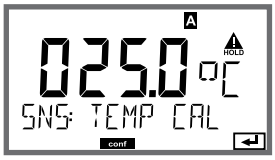
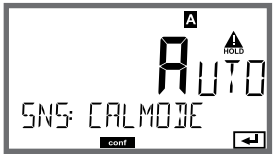
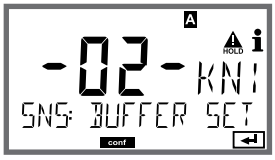
1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select parameter set using ◂ ▸ keys,
press **enter**.
4 Select **SENSOR** menu using ◂ ▸ keys,
press **enter**.
5 All items of this menu group are indicated by the "SNS:" code.
Press **enter** to select menu,
edit using arrow keys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

5

enter

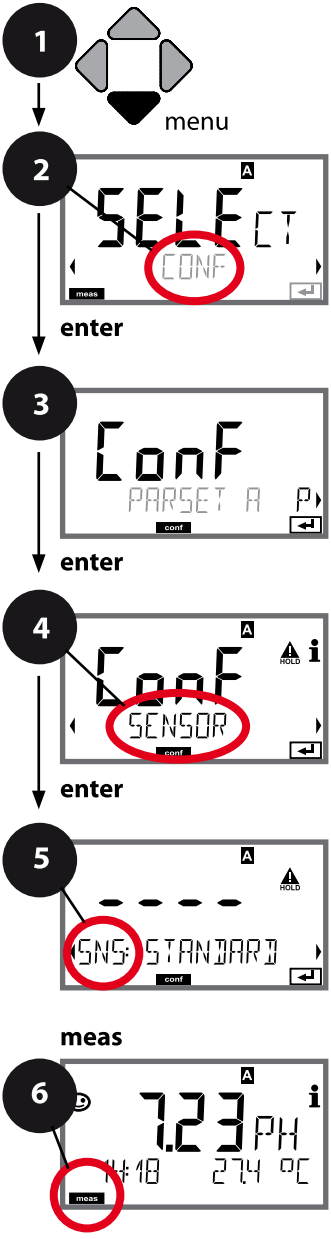
Select sensor type
Select type of temp probe
Temperature unit
Temp detection during measurement
(Manual temperature)
Temp detection during calibration
(Manual temperature)
Calibration mode
(AUTO: Buffer set)
Calibration timer
Calibration cycle
CIP/SIP cycles
Autoclaving counter
CHECK TAG
CHECK GROUP

5

Menu item	Action	Choices
Temp detection during calibration 	Select mode using ▲ ▼ keys: AUTO: Measured by sensor MAN: direct input of temperature, no measurement (see next step) EXT: Temperature specified via current input (only if enabled via TAN) Press **enter** to confirm.	**AUTO** MAN EXT
(Manual temperature) 	Modify digit using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm.	–20...200 °C (–4...+392 °F)
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.	-01-...-10-, -U1- (see Appendix) Pressing the **info** key displays the manufacturer and nominal values in the lower line.

pH

Sensor, Calibration Timer, Calibration Cycle

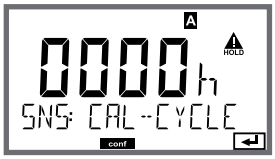


1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select parameter set using ◂ ▸ keys,
press **enter**.
4 Select **SENSOR** menu using ◂ ▸ keys,
press **enter**.
5 All items of this menu group are indicated by the "SNS:" code.
Press **enter** to select menu,
edit using arrow keys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

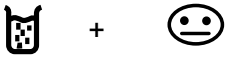
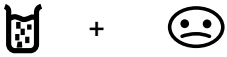
5 **enter**

Select sensor type
Select type of temp probe
Temperature unit
Temp detection during measurement
(Manual temperature)
Temp detection during calibration
(Manual temperature)
Calibration mode
(AUTO: Buffer set)
Calibration timer
Calibration cycle
CIP/SIP cycles
Autoclaving counter
CHECK TAG
CHECK GROUP

5

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

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

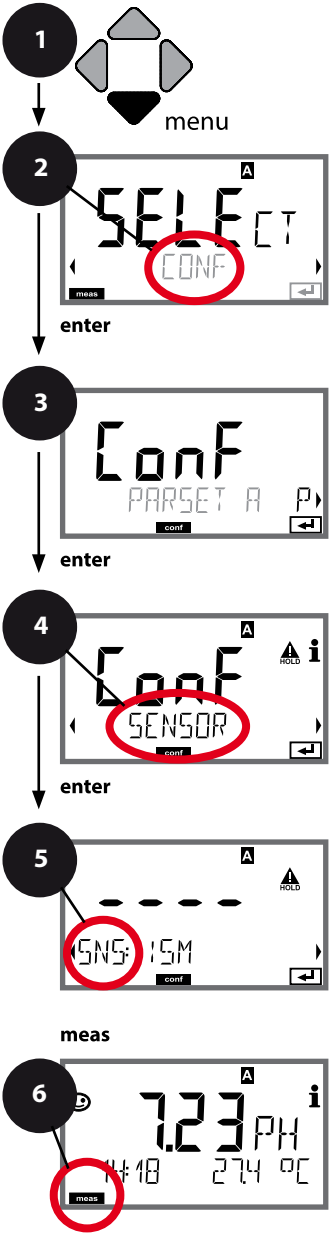
Display	Status
	Over 80 % of the calibration interval has already passed.
	The calibration interval has been exceeded.

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

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

pH

ISM Sensor, Adaptive Cal Timer (ACT)



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

5

Select sensor type
Temperature unit
Temp detection during measurement
(Manual temperature)
Temp detection during calibration
(Manual temperature)
Calibration mode
(AUTO: Buffer set)
ACT - Adaptive calibration timer
TTM - Adaptive maintenance timer
CIP/SIP cycles
Autoclaving counter

enter

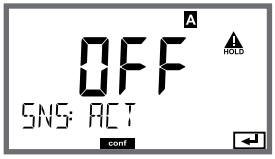
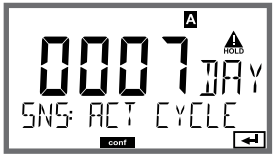
5

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.

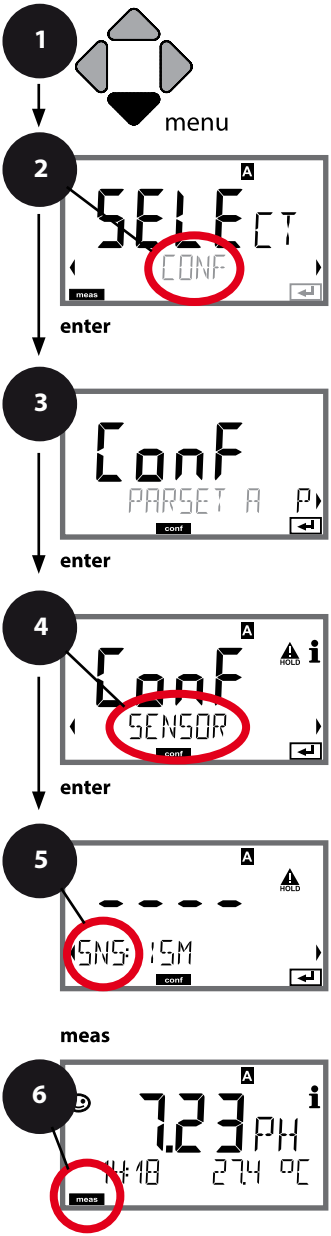
The adaptive cal timer is reset after each calibration.

You can configure the current outputs so that a Sensoface message generates a 22-mA error signal, see page 91.

Menu item	Action	Choices
Adaptive cal timer (ACT)  	Select using ▲ ▼: AUTO: The interval stored in the ISM sensor is used (default) MAN: The interval is specified manually (0 ... 9999 days) Confirm by pressing **enter**	**OFF**/AUTO/MAN

pH

ISM Sensor, Adaptive Maintenance Timer (TTM)



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

5

Select sensor type
Temperature unit
Temp detection during measurement
(Manual temperature)
Temp detection during calibration
(Manual temperature)
Calibration mode
(AUTO: Buffer set)
ACT - Adaptive calibration timer
TTM - Adaptive maintenance timer
CIP/SIP cycles
Autoclaving counter

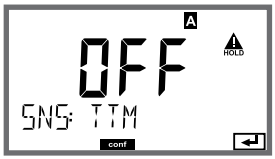
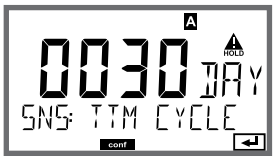
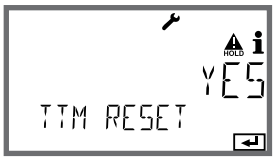
enter

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. 9999 days).

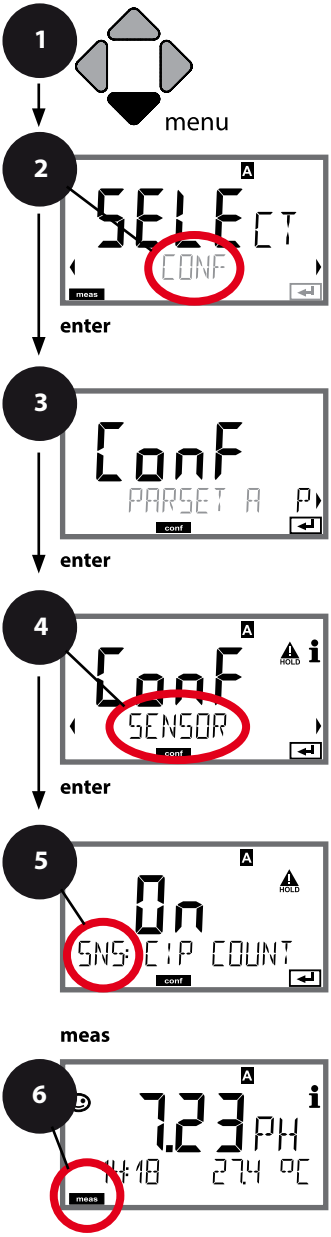
Stressing influences (temperature, measurement in extreme ranges) shorten the timer interval.

You can configure the current outputs so that a Sensoface message generates a 22-mA error signal, see page 91.

Menu item	Action	Choices
Adaptive maintenance timer (TTM)  	Select using ▲ ▼ keys: AUTO: The interval stored in the ISM sensor is used (default) MAN: The interval is specified manually (0 ... 9999 days) Confirm by pressing **enter**	**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

pH

Sensor, CIP Cleaning Cycles, SIP Sterilization Cycles

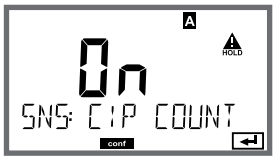
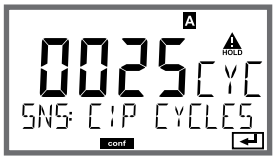
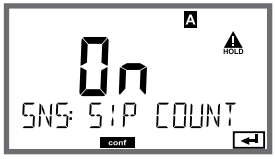


1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select parameter set using ◂ ▸ keys,
press **enter**.
4 Select **SENSOR** menu using ◂ ▸ keys,
press **enter**.
5 All items of this menu group are indicated by the "SNS:" code.
Press **enter** to select menu,
edit using arrow keys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

5

Select sensor type (enter)
Temperature unit
Temp detection during measurement
(Manual temperature)
Temp detection during calibration
(Manual temperature)
Calibration mode
(AUTO: Buffer set)
ACT - Adaptive calibration timer
TTM - Adaptive maintenance timer
Cleaning cycle counter
Cleaning cycles
Sterilization cycle counter
Sterilization cycles
Autoclaving counter
CHECK TAG
CHECK GROUP

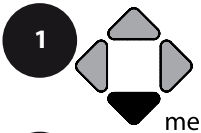
5

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.	**OFF**/ON
CIP cycles 	Only with CIP COUNT ON: Enter max. number of cleaning cycles using ▲ ▼ ◀ ▶ keys Press **enter** to confirm.	0...9999 CYC (**0000 CYC**)
SIP counter 	Adjust SIP counter using ▲ ▼: OFF: No counter ON: Max. sterilization cycles (adjust as for CIP counter) Press **enter** to confirm.	**OFF**/ON

The cleaning and sterilization cycles are counted to measure the load on the sensor. Suitable for biochemical applications (process temperature approx. 0 ... +50 °C / +32 ... +122 °F, CIP temperature > +55 °C / +131 °F, SIP temperature > +115 °C / +239 °F).

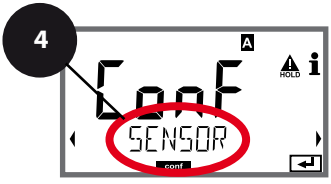
pH

ISM Sensor, Autoclaving Counter

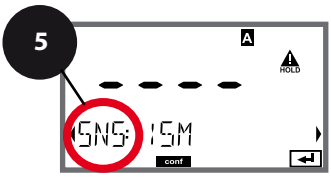


enter

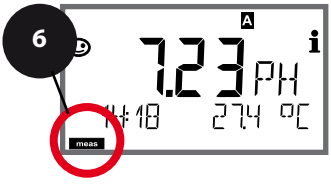
enter



enter



meas



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

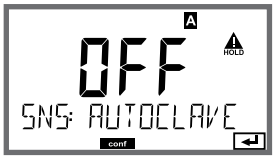
5

Select sensor type	**enter**
Temperature unit	
Temp detection during measurement	
(Manual temperature)	
Temp detection during calibration	
(Manual temperature)	
Calibration mode	
(AUTO: Buffer set)	
ACT - Adaptive calibration timer	
TTM - Adaptive maintenance timer	
CIP/SIP cycles	
Autoclaving counter	
CHECK TAG	
CHECK GROUP	

5

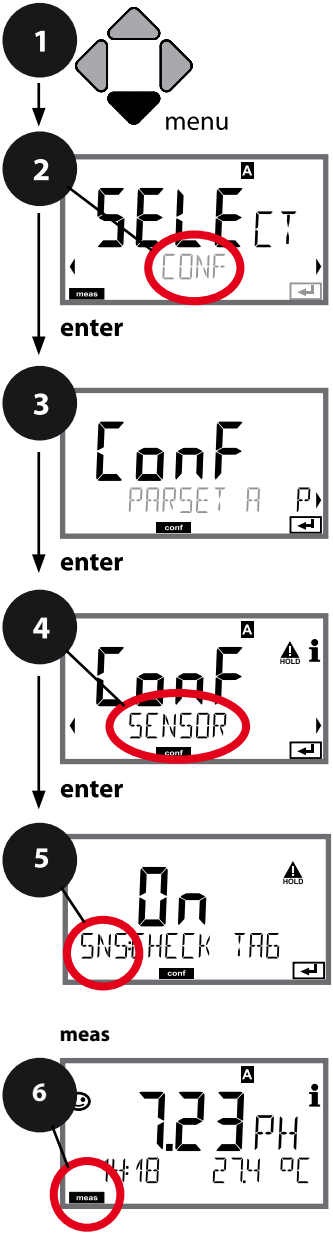
Autoclaving Counter

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. You can configure the current outputs so that a Sensoface message generates a 22-mA error signal, see page 91.

Menu item	Action	Choices
Autoclaving counter  	Select using ▲ ▼: ON: Enter the number of cycles (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

Sensor, Sensor Verification (TAG, GROUP)

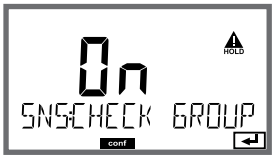


1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select parameter set using ◂ ▸ keys,
press **enter**.
4 Select **SENSOR** menu using ◂ ▸ keys,
press **enter**.
5 All items of this menu group are indicated by the "SNS:" code.
Press **enter** to select menu,
edit using arrow keys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

5 **enter**

Select sensor type
Select type of temp probe
Temperature unit
Temp detection during measurement
Temp detection during calibration
Calibration mode
Calibration timer
Calibration cycle
CIP/SIP cycles
Autoclaving counter
CHECK TAG
CHECK GROUP

5

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

Sensor Verification (TAG, GROUP)

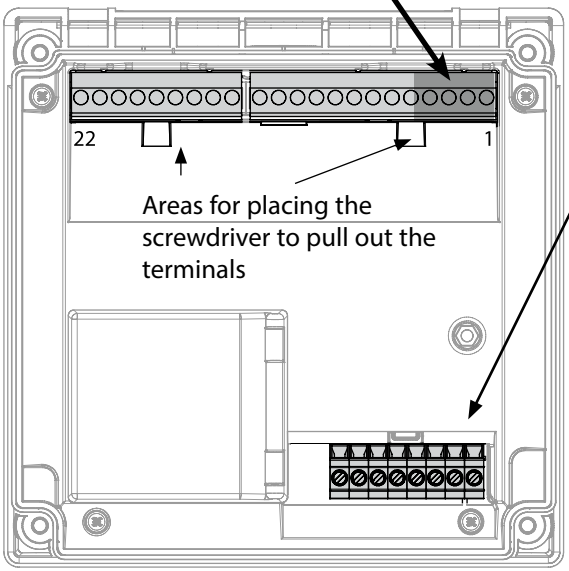
When Memosens sensors are calibrated in the lab, it is often useful and sometimes even mandatory that these sensors will be operated again at the same measuring points or at a defined group of measuring points. To ensure this, you can save the respective measuring point (TAG) or group of measuring points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

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

pH

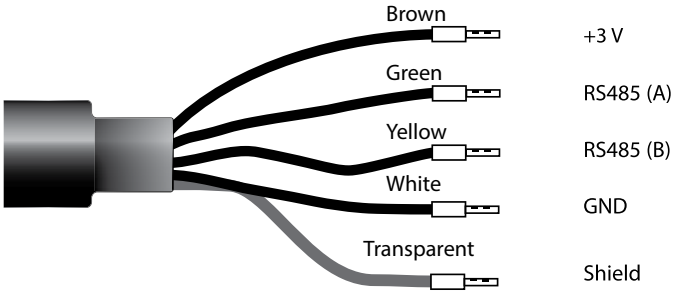
MSPH MSOXY MSPH MSPH

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



Connection of sensor B (2nd channel): (MK-MS095 module)		
A	Brown	+3 V
B	Green	RS 485 A
C	Yellow	RS 485 B
D	White	GND
E	Transp.	SHIELD

Memosens cable

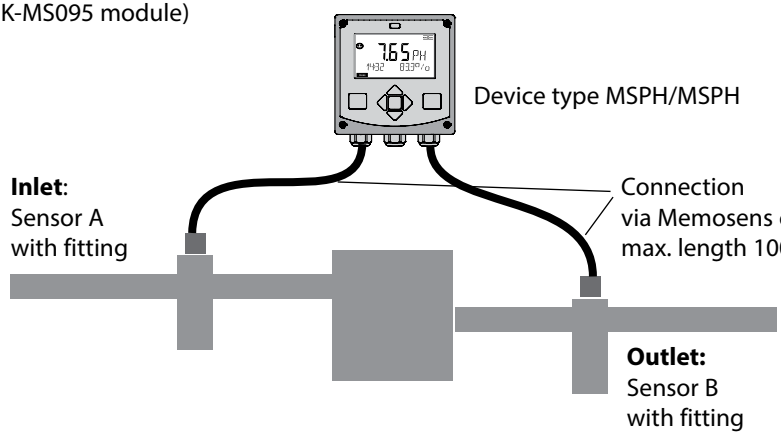


Device Type: MSPH-MSPH

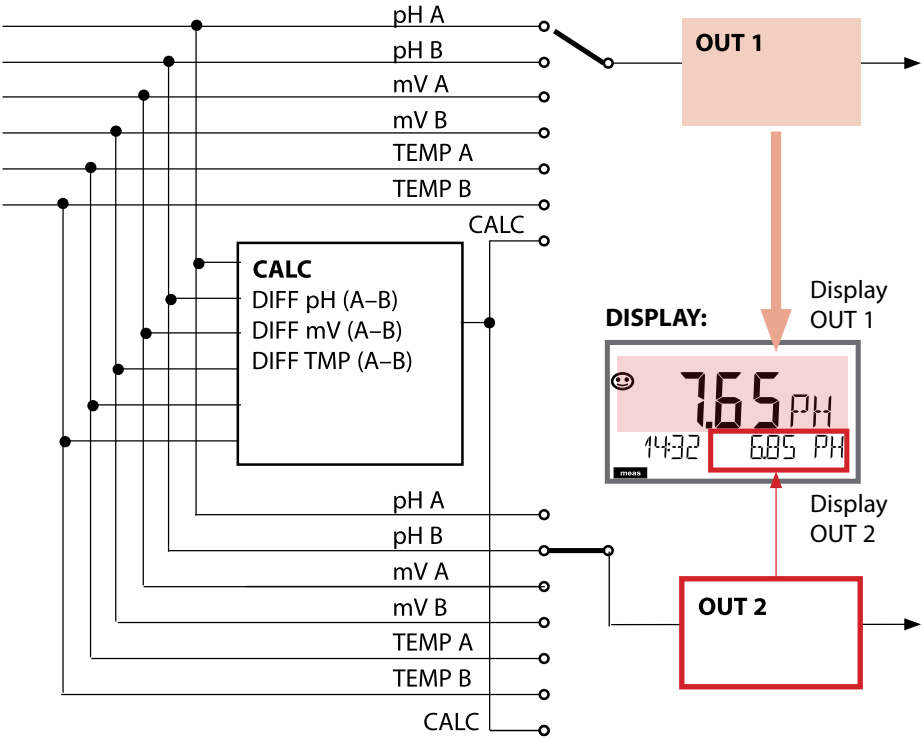
MSPH | MSPH

Sensors A and B – Typical Arrangement

(Connection of Memosens sensors: channel A via terminals on the device, channel B via MK-MS095 module)



Channel selection and display assignment (example)



MSPH MSPH

Configuration			Choices	Default
Sensor A (see page 55 for details)				
S_A:	SENSOR		ON / OFF	ON
	CALMODE		AUTO / MAN / DAT	AUTO
	AUTO	BUFFER SET	-01- ... -10-, -U1-	-02-
		Note: Pressing **info** displays nominal values and type of buffer set		
		U1 (For specifiable buffer set, see Appendix: "Buffer Tables")	EDIT BUFFER 1 (NO, YES) Enter values for buffer 1	NO
			EDIT BUFFER 2 (NO, YES) Enter values for buffer 2	NO
	CAL TIMER		OFF, FIX, ADAPT	OFF
	ON	CAL-CYCLE	0...9999 h	0168 h
	CIP COUNT		ON/OFF	OFF
	SIP COUNT		ON/OFF	OFF
	AUTOCLAVE		ON/OFF	OFF
	CHECK TAG		ON/OFF	OFF
	CHECK GROUP		ON/OFF	OFF
Sensor B (see page 55 for details)				
S_B:	SENSOR		ON / OFF	OFF
	CALMODE		AUTO / MAN / DAT	AUTO
	AUTO	BUFFER SET	-01- ... -10-, -U1-	-02-
		Note: Pressing **info** displays nominal values and type of buffer set		
		U1 (For specifiable buffer set, see Appendix: "Buffer Tables")	EDIT BUFFER 1 (NO, YES) Enter values for buffer 1	NO
			EDIT BUFFER 2 (NO, YES) Enter values for buffer 2	NO
	CAL TIMER		OFF, FIX, ADAPT	OFF
	ON	CAL-CYCLE	0...9999 h	0168 h
	CIP COUNT		ON/OFF	OFF
	SIP COUNT		ON/OFF	OFF
	AUTOCLAVE		ON/OFF	OFF
	CHECK TAG		ON/OFF	OFF
	CHECK GROUP		ON/OFF	OFF

Device Type: MSPH-MSPH

MSPH MSPH

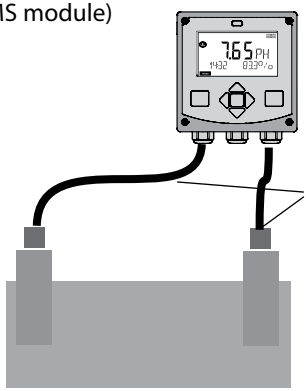
Configuration			Choices	Default
MEAS_MODE				
MES:	TEMP UNIT		°C / °F	°C
	CALCULATION		ON/OFF	OFF
	ON	(Selected in text line)	-C1- Difference PH -C2- Difference mV -C3- Difference TMP	-C1- Difference PH

Calculations (CALC)

CONF	Calculation	Formula	Display
-C1-	pH difference	pH A – pH B	dPH
-C2-	mV difference	mV A – mV B	dmV
-C3-	Temp difference	TMP A – TMP B	d°C (d°F)

MSPH MSOXY

pH and Oxy measuring point (example)
(Connection of Memosens sensors: channel A (PH) via terminals on the device, channel B (OXY) via MK-MS module)



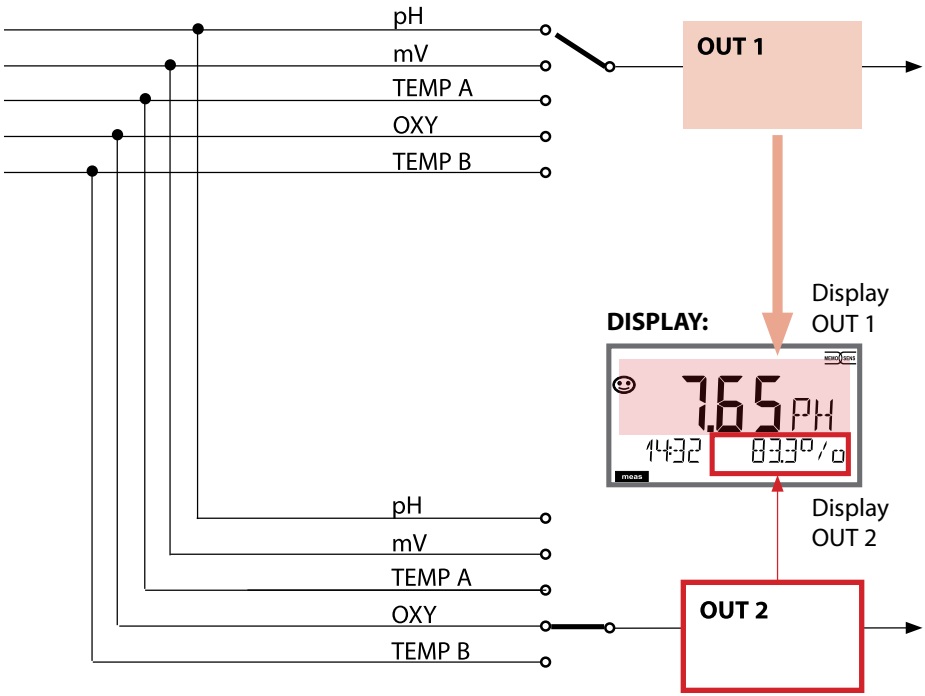
Device type MSPH/MSOXY

Connection
via Memosens cable
Length max. 100 m

pH measurement:
pH sensor
with fitting

Oxy measurement:
Oxy sensor
with fitting

Channel selection and display assignment (example)



Device Type: MSPH-MSOXY

MSPH MSOXY

Configuration (default in bold print)				
Sensor (see page 55/56 for details)			**pH**	**Oxy**
SNS:	CALMODE		**AUTO** MAN DAT	
	AUTO	BUFFER SET	-01- MT **-02- KNC** ... -U1- USR ("info" shows nominal buffer values)	
	MEAS MODE*			**dO %** dO mg/l dO ppm GAS %
	U-POL MEAS			-xxxx mV
	U-POL CAL			-xxxx mV
	MEMBRANE COMP.			xx.xx
	TEMP UNIT		**°C** / °F	
Sensor			**pH**	**Oxy**
SNS:	CALTIMER		**OFF** / ON	
	ON	CAL-CYCLE	0 ... 9999 h (**168 h**)	
	ACT		**OFF** / AUTO / MAN	
	MAN	ACT CYCLE	0 ... 2000 DAY (**0030 DAY**)	
	TTM		**OFF** / AUTO / MAN	
	MAN	TTM CYCLE	0 ... 2000 DAY (**0365 DAY**)	
	CIP COUNT		**OFF** / ON	
	ON	CIP CYCLES	**0** ... 9999	
	SIP COUNT		**OFF** / ON	
	ON	SIP CYCLES	**0** ... 9999	
	AUTOCLAVE		**OFF** / ON	
	ON	AC CYCLES	**0** ... 9999	
	CHECK TAG		**OFF** / ON	
	CHECK GROUP		**OFF** / ON	

* When the channel is disabled, MEAS_MODE = OFF, the sensor values will be set in such a way that no error message is generated.

MSPH MSOXY

Device Type: Oxy					
Oxy sensor				**Choices**	**Default**
SNS:	SENSOR TYPE			Memosens, LDO	Memosens
	MEAS MODE			dO %, dO mg/l dO ppm, GAS %	dO %
	U-POL			-400...–1000 mV (0000...–1000 mV for traces)	-675 mV
	U-POL CAL				
	MEMBR. COMP.			00.50...03.00	01.00
	RTD TYPE			22 NTC 30 NTC	22 NTC
	TEMP UNIT			°C / °F	°C
	CAL MODE			CAL AIR CAL WTR	CAL AIR
	CAL TIMER			ON/OFF	OFF
	ON	CAL-CYCLE		0...9999 h	0168 h
	Memosens LDO ISM	ACT (Adaptive Calibration Timer) (for ISM only)		OFF / AUTO / MAN	OFF
		MAN	ACT CYCLE	0...9999 DAY	0007 DAY
		TTM (Time To Maintenance) (for ISM only)		OFF / AUTO / MAN	OFF
		MAN	TTM CYCLE	0...9999 DAY	0030 DAY
		CIP COUNT		ON/OFF	OFF
		ON	CIP CYCLES	0...9999 CYC	0025 CYC
		SIP COUNT		ON/OFF	OFF
		ON	SIP CYCLES	0...9999 CYC	0025 CYC
		AUTOCLAVE		ON/OFF	OFF
		ON	AC CYCLES	0...9999 CYC	0000 CYC
		CHECK TAG		ON/OFF	OFF
		CHECK GROUP		ON/OFF	OFF

Oxy

Configuration (default in bold print)			
Current output 1			**e.g., Oxy (if assigned as measured variable)**
OT1:	RANGE		**4 ... 20 mA** /0 ... 20 mA
	CHANNEL		**OXY** / TMP
	OXY dO %	BEGIN 4 mA (0 mA)	**000.0** ... 600.0 **%**
		END 20 mA	000.0 ... **600.0 %**
	OXY dO mg/l	BEGIN 4 mA (0 mA)	0000 µg/l ... 99.99 mg/l
		END 20 mA	0000 µg/l ... 99.99 mg/l
	OXY dO ppm	BEGIN 4 mA (0 mA)	0000 ppb ... 99.99 ppm
		END 20 mA	0000 ppb ... 99.99 ppm
	OXY GAS %	BEGIN 4 mA (0 mA)	0000 ppm ... 99.99 %
		END 20 mA	0000 ppm ... 99.99 %
	TMP °C	BEGIN 4 mA (0 mA)	– 20 ... 150 °C / **000.0 °C**
		END 20 mA	– 20 ... 150 °C / **100.0 °C**
	TMP °F	BEGIN 4 mA (0 mA)	– 4 ... 302 °C / **032.0 °F**
		END 20 mA	– 4 ... 302 °C / **212.0 °F**
	FILTERTIME		0...120 SEC / **120 SEC**
	FAIL 22 mA		ON / **OFF**
	FACE 22 mA		ON / **OFF**
	HOLD MODE		**LAST** / FIX
	FIX HOLD-FIX		4 ... 22 mA / **021.0 mA**

Correction			Oxy
COR:	SALINITY		00.00 ... 45.00 ppt (**00.00 ppt**)
	PRESSURE UNIT		**BAR** / KPA / PSI
	PRESSURE		MAN / EXT. (with SW-A005 "External current input" option only)
	BAR	PRESSURE	0.000 ... 9.999 BAR (**1.013 BAR**)
	KPA	PRESSURE	000.0 ... 999.9 KPA (**100 KPA**)
	PSI	PRESSURE	000.0 ... 145.0 PSI (**14.5 PSI**)

Configuration (default in bold print)			
Current output 2			**e.g., pH (if assigned as measured variable)**
OT2:	RANGE		**4 ... 20 mA** 0 ... 20 mA
	CHANNEL		**PH** ORP TEMP rH
	PH	BEGIN (0)4 mA	– 2.00 ... 16.00 pH / **00.00 pH**
		END 20 mA	– 2.00 ... 16.00 pH / **14.00 pH**
	ORP (Redox-Sensor)	BEGIN (0)4 mA	– 1999 ... 1999 mV / **– 1000 mV**
		END 20 mA	– 1999 ... 1999 mV / **1000 mV**
	TMP °C	BEGIN (0)4 mA	– 20 ... 300 °C / **000.0 °C**
		END 20 mA	– 20 ... 300 °C / **100.0 °C**
	TMP °F	BEGIN (0)4 mA	– 4 ... 572 °C / **032.0 °F**
		END 20 mA	– 4 ... 572 °C / **212.0 °F**
	rH	BEGIN (0)4 mA	**000.0** ... 200.0 rH
		END 20 mA	000.0 ... **200.0** rH
	FILTERTIME		**0** ... 120 SEC
	FAIL 22 mA		ON / **OFF**
	FACE 22 mA		ON / **OFF**
	HOLD MODE	**LAST** / FIX	Last measured value is maintained
		FIX	0 ... 22 mA **(021.0 mA)**

Correction			pH
COR:	TC SELECT		**OFF** LIN PURE WTR
	LIN	TC LIQUID	– 19.99 ... 19.99 %/K **00.00 %/K**

Configuration (default in bold print)			
CNTR_IN input			
IN	CONTROL		**PARSET** / FLOW
	FLOW	FLOW ADJUST	0 ... 20000 pulses/liter (**12000 pulses/liter**)

Alarm			
ALA	DELAYTIME		0 ... 600 s (**0010 SEC**)
	SENSOCHECK		ON / **OFF**
	FLOW CNTR		ON / **OFF**
	ON	FLOW MIN	0 ... 99.9 Liter/h (**005.0 Liter/h**)
		FLOW MAX	0 ... 99.9 Liter/h (**025.0 Liter/h**)

Relay contacts REL1, REL2			
REL	**LIMITS** CONTROLLER	The following submenu depends on the selected setting.	
RL1	CHANNEL	**PH** / ORP / TMP	**OXY** / TMP / FLOW
	FUNCTION	**Lo LEVL** / Hi LEVL	
	CONTACT	**N/O** / N/C	
	LEVEL	**00.00 pH** –2.00 ... 16.00 pH (–1999 ... 1999 mV) (–20 ... 200 °C)	**000.0 %** 000.0 ... 600.0 % 0000 µg/l ... 99.99 mg/l 0000 ppb ... 99.99 ppm 0000 ppm ... 99.99 % (–20 ... 150 °C)
	HYSTERESIS	**00.50 pH** 0.00 ... 10.00 pH (0 ... 2000 mV) (0 ... 100 °C / 0 ... 180 °F)	**000.0 %** 0 ... 50 % full scale
	DELAYTIME	**0010 SEC** 0000 ... 9999 s	
RL2	See RL1 for configuration; default setting: CHANNEL = TMP		

Configuration (default in bold print)		
PID controller		**pH**
CTR	CHANNEL	**PH** / ORP / TMP
	TYPE	PLC / PFC
	PLC	00001 ... 0600 s (**0010 s**)
	PFC	0001 ... 0180 min $^{-1}$ (**0060 min $^{-1}$**)
	SETPOINT	within measuring range
	DEAD BAND	0 ... 50 % full scale
	P-GAIN	10 ... 999 % (**0100 %**)
	I-TIME	0 ... 9999 s (**0000 s**)
	D-TIME	0 ... 9999 s (**0000 s**)
	HOLD MODE	**Y LAST** / Y OFF

Rinse contact WASH		
WSH	**WASH** / PARSET A/B	Rinse contact / Signaling the active parameter set
	WASH CYCLE	0.0 ... 999.9 h (**000.0 h**)
	WASH TIME	0 ... 1999 s (**0060 s**)
	RELAX TIME	0000 ... 1999 s **(0030 s)**
	CONTACT	**N/O** / N/C

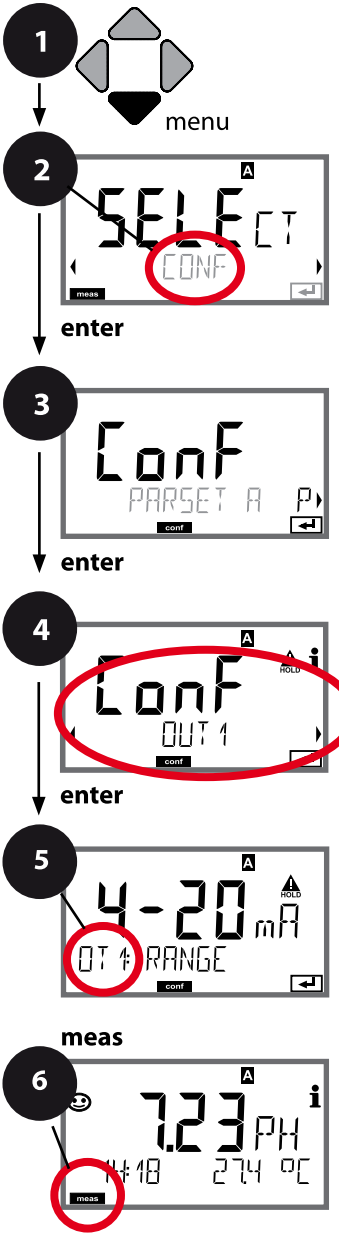
Selecting the parameter set PARSET		
PAR	PARSET FIX A MANUAL CNTR INPUT	(no switchover, parameter set A) (manual selection in the "Configuration" menu) (switchover via CNTR control input)

Time/date		
CLK	FORMAT	**24 h** / 12 h
	24 h	hh:mm
	12 h	hh:mm (AM / PM) 00 ... 12:59 AM / 1 ... 11:59 PM
	DAY / MONTH	dd.mm
	YEAR	2000 ... 2099

Measuring points (TAG / GROUP)		
TAG	The entries are made in the text line.	A...Z, 0...9, – + < > ? / @
GROUP	The entries are made in the text line.	0000...9999

pH

Output Current, Range, Current Start, Current End



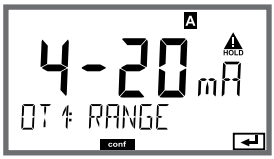
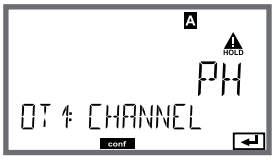
1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select parameter set using ◂ ▸ keys,
press **enter**.
4 Select **OUT1** menu using ◂ ▸ keys,
press **enter**.
5 All items of this menu group are indicated by the "OT1:" code.
Press **enter** to select menu,
edit using arrow keys (see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

5

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

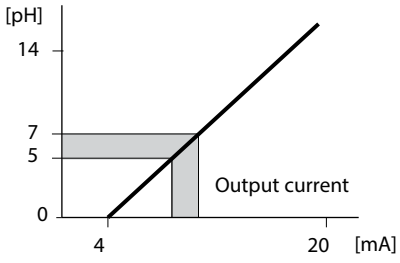
enter

5

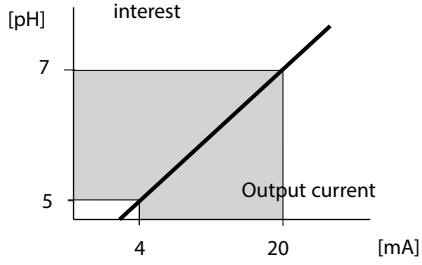
Menu item	Action	Choices
Current range 	Select 4-20 mA or 0-20 mA range using ▲ ▼ keys. Press **enter** to confirm.	**4-20 mA** / 0-20 mA
Process variable 	**Example: current output 1, device type pH** Select using ▲ ▼ keys: PH: pH value ORP: ORP value TMP: Temperature Press **enter** to confirm.	**PH**/ORP/TMP
Current start 	Modify digit using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm.	–2...16 pH (PH) –1999...1999 mV (ORP) –20...300 °C / –4...572 °F (TMP)
Current end 	Enter value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	–2...16 pH (PH) –1999...1999 mV (ORP) –20...300 °C / –4...572 °F (TMP)

Assignment of measured values: Current start and current end

Example 1: Range pH 0...14

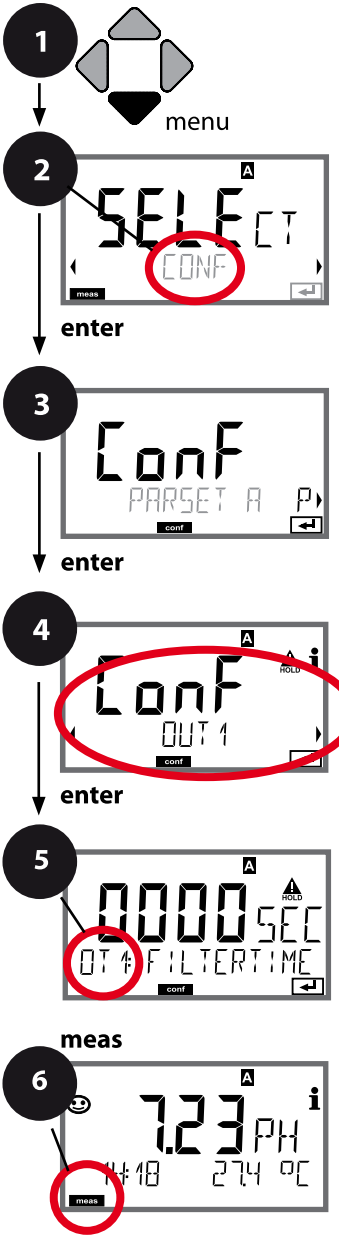


Example 2: Range pH 5...7
Advantage: Higher resolution in range of interest



pH

Output Current, Time Averaging Filter



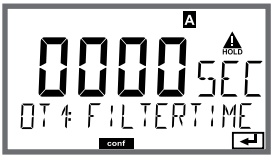
1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select parameter set using ◂ ▸ keys,
press **enter**.
4 Select **OUT1** menu using ◂ ▸ keys,
press **enter**.
5 All items of this menu group are indicated by the "OT1:" code.
Press **enter** to select menu,
edit using arrow keys (see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

5

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

enter

5

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

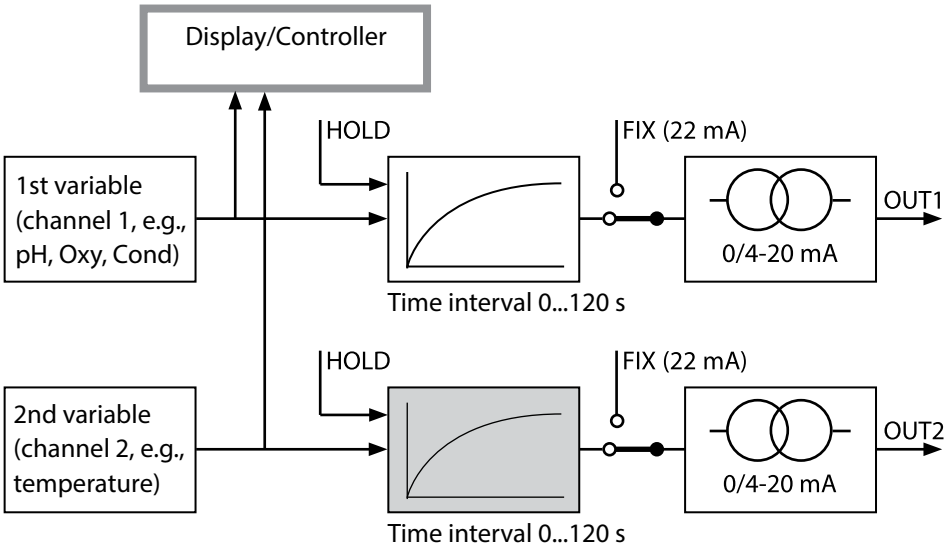
Time averaging filter

To smoothen the current output, a low-pass filter with adjustable filter time constant can be switched on. When there is a jump at the input (100 %), the output level is at 63 % after the time interval has been reached. The time interval can be set from 0 to 120 sec. If the time interval is set to 0 sec, the current output directly follows the input.

Note:

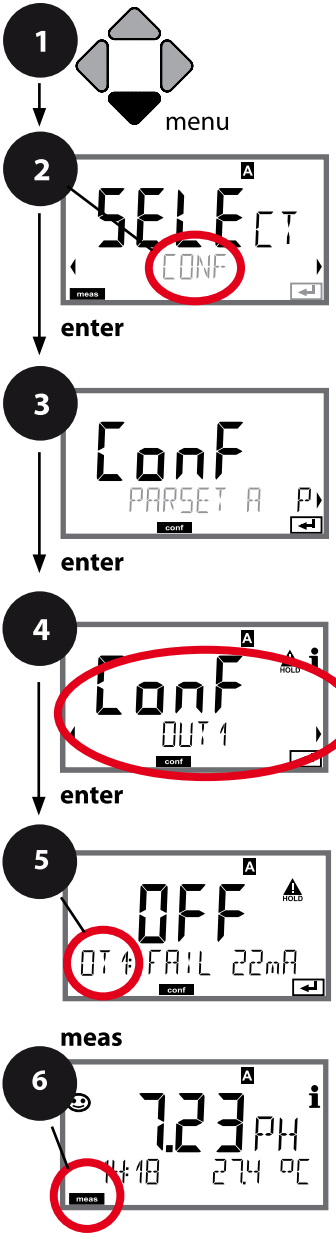
The filter only acts on the current output, not on the display, the limit values, or the controller!

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



pH

Output Current, Error and HOLD



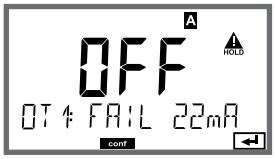
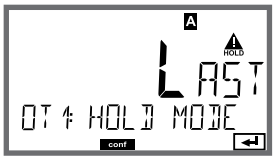
1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select parameter set using ◂ ▸ keys,
press **enter**.
4 Select **OUT1** menu using ◂ ▸ keys,
press **enter**.
5 All items of this menu group are indicated by the "OT1:" code.
Press **enter** to select menu,
edit using arrow keys (see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

5

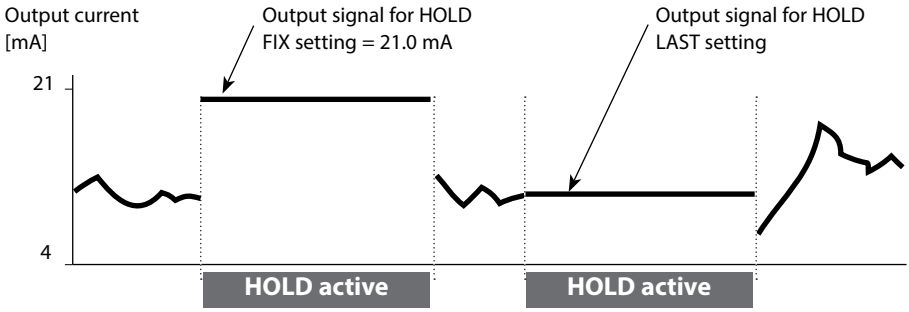
Current range
Process variable
Current start
Current end
Time averaging filter
Output current during error message
Output current for Sensoface message
Output current during HOLD
Output current for HOLD FIX

enter

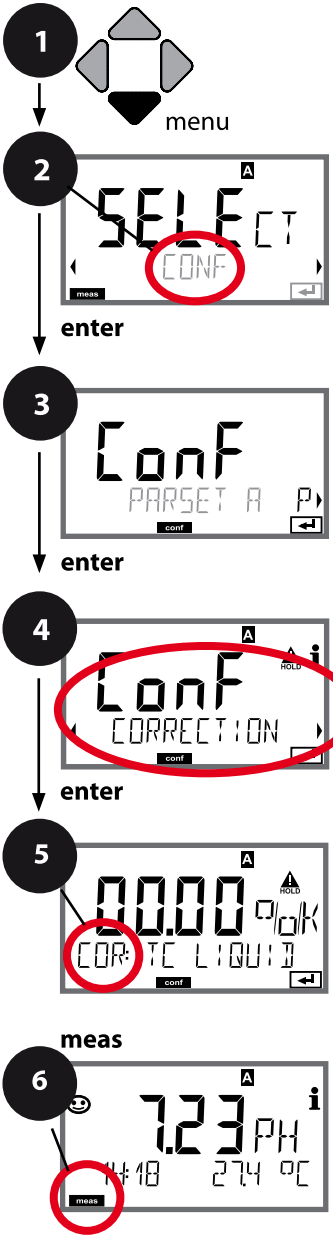
5

Menu item	Action	Choices
Output current during error message 	The output current can be set to 22 mA in the case of error messages. Select ON or OFF using ▲ ▼. Press **enter** to confirm.	**OFF** / ON
Output current during Sensoface messages **OT1: FACE 22 mA**	The output current can be set to 22 mA in the case of Sensoface messages. Select ON or OFF using ▲ ▼. Press **enter** to confirm.	**OFF** / ON
Output current during HOLD 	LAST: During HOLD the last measured value is maintained at the output. FIX: During HOLD a value (to be entered) is maintained at the output. Select using ▲ ▼. Press **enter** to confirm.	**LAST**/FIX
Output current for HOLD FIX 	Only with FIX selected: Enter current which is to flow at the output during HOLD Enter value using ▲ ▼ ◀ ▶. Press **enter** to confirm.	00.00...22.00 mA (**21.00 mA**)

Output signal during HOLD:



Temperature Compensation of Process Medium (pH)

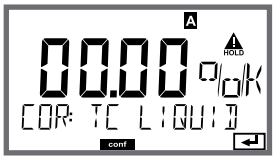


1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select parameter set using ◂ ▸ keys,
press **enter**.
4 Select **CORRECTION** menu using ◂ ▸ keys, press **enter**.
5 All items of this menu group are indicated by the "COR:" code.
Confirm (and proceed) by pressing **enter**.
6 Exit: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

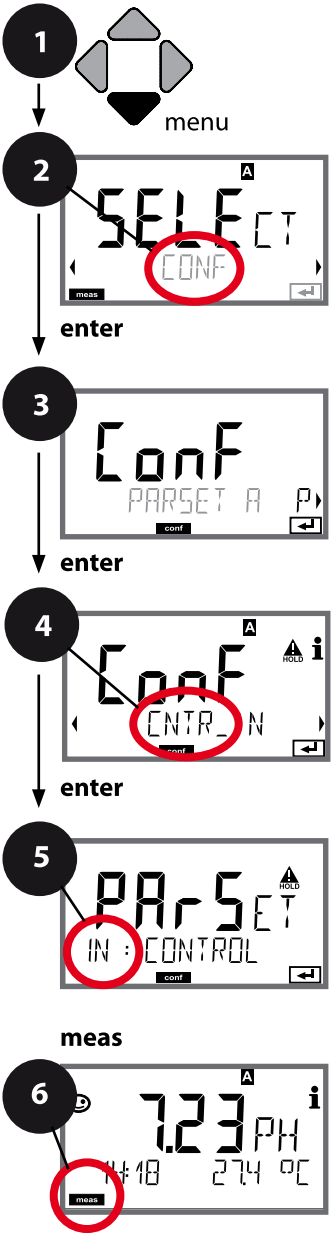
5

pH temp compensation
Process medium (linear)

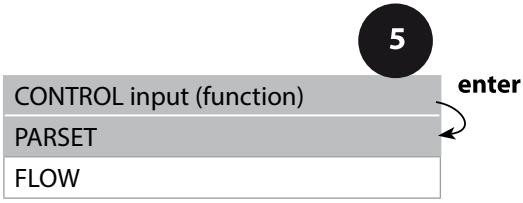
5

Menu item	Action	Choices
Temperature compensation of process medium 	For pH measurement only: Select temperature compensation of the process medium. Linear: LIN Select using ◂ ▸, press **enter** to confirm.	**OFF** / LIN
Temperature compensation, linear 	Enter the linear temperature compensation of the process medium. Enter value using ▲ ▼ ◂ ▸ keys Press **enter** to confirm.	–19.99...+19.99 %/K

Parameter Set Selection (External Signal)*



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



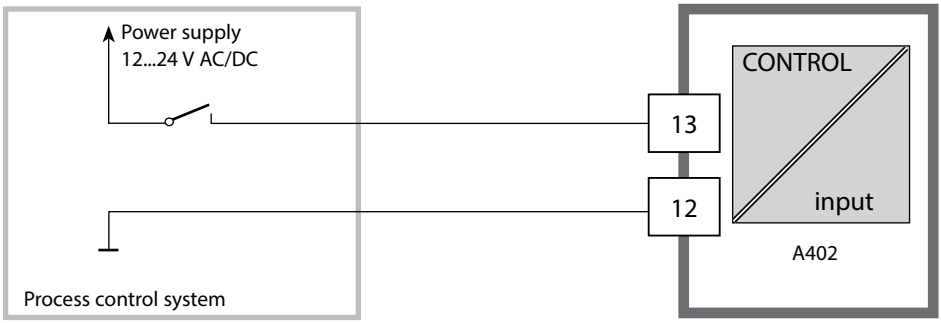
*) not for MSPH/MSPH and MSPH/MSOXY devices

5

Menu item	Action	Choices
Select function of CONTROL input 	Select using ◂ ▸ keys, confirm by pressing **enter**	**PARSET FIX A /** MANUAL / CNTR INPUT (selecting parameter set A/B via signal at CONTROL input)

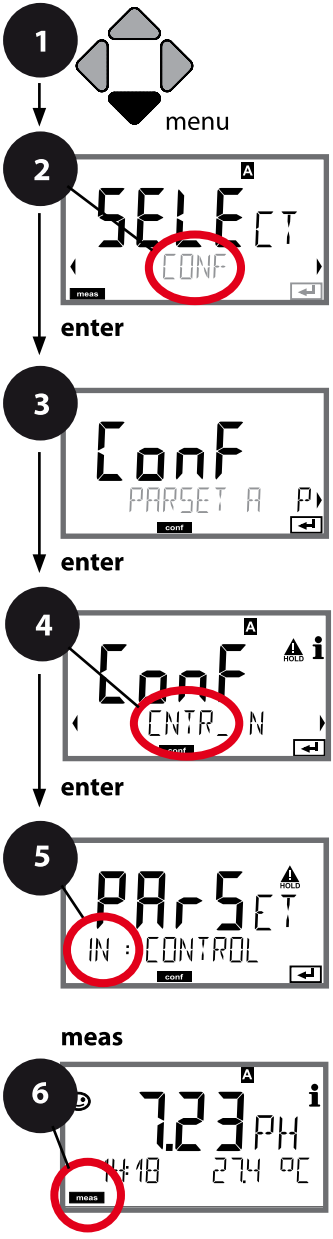
External switchover of parameter sets

The parameter set A/B can be activated from outside by sending a signal to the CONTROL input (e.g., from the process control system).

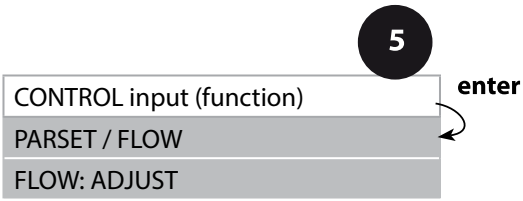


Parameter set A	0...2 V AC/DC
Parameter set B	10...30 V AC/DC

Flow Measurement



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



5

Menu item	Action	Choices
Select function of CONTROL input 	Select using ▲ ▼ keys, confirm by pressing **enter**	**PARSET** (selecting parameter set A/B via signal at CONTROL input)
		Flow (for connecting a pulse-output flow meter)
Adjust to flow meter: 	**With "Flow" selected**, you must adjust the device to the flow meter used. Enter value using arrow keys, confirm by pressing **enter**	**12000 pulses/liter**

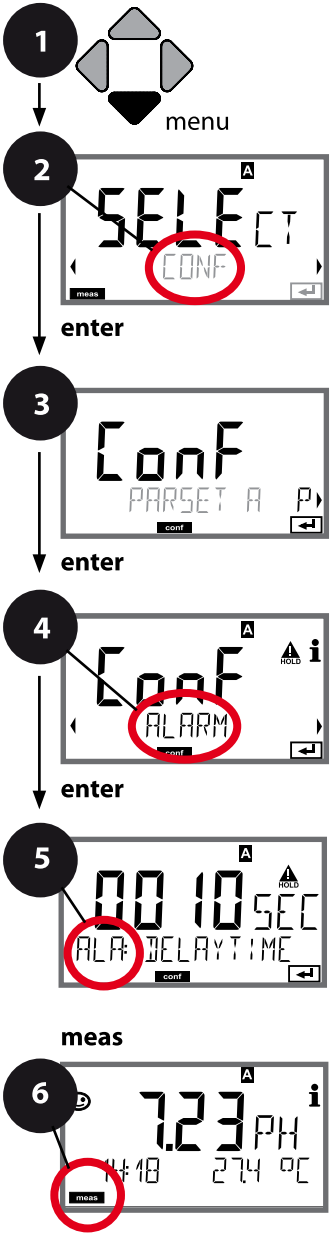
In the alarm menu you can configure flow monitoring.
When you have set CONTROL to FLOW, you can specify 2 additional limit values for maximum and minimum flow. If the measured value lies outside this range, an alarm message and a 22-mA error signal (if configured) will be generated.

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

Display
Flow measurement in measuring mode

Display
Flow measurement (sensor monitor)

Alarm, Alarm Delay, Sensocheck



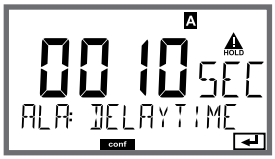
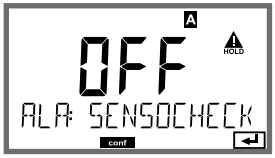
1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select parameter set using ◂ ▸ keys,
press **enter**.
4 Select **ALARM** menu using ◂ ▸ keys,
press **enter**.
5 All items of this menu group are indicated by the "ALA:" code.
Press **enter** to select menu,
edit using arrow keys (see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

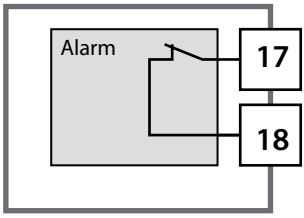
5

Delay
Sensocheck
Alarm: CONTROL input
With flow monitoring: Max. flow alarm
With flow monitoring: Min. flow alarm

enter

5

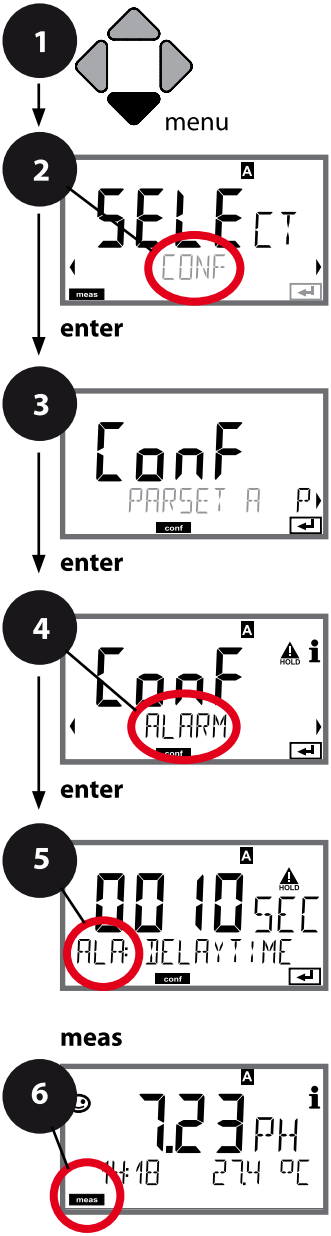
Menu item	Action	Choices
Alarm delay 	Enter alarm delay using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0...600 SEC (**010 SEC**)
Sensocheck 	Select Sensocheck (continuous monitoring of sensor membrane and lines). Select ON or OFF using ▲ ▼ keys. Press **enter** to confirm. (At the same time, Sensoface is activated. With OFF, Sensoface is also switched off.)	ON/**OFF**



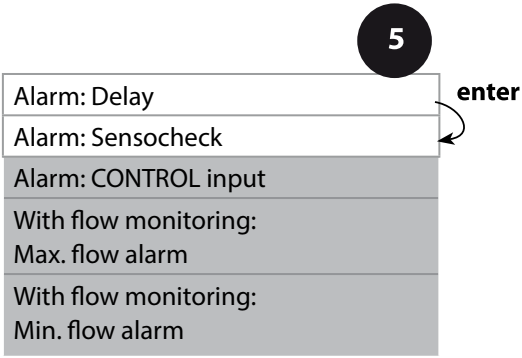
Alarm contact
The alarm contact is closed during normal operation (N/C).
It opens in the case of alarm or power outage. As a result, a failure message is output even in the case of line breakage (fail-safe behavior). For contact ratings, see Specifications.

Error messages can also be signaled by a 22-mA output current (see Error messages and Configuration Output 1/Output 2).
Operating behavior of the alarm contact: see Operating States table.
The alarm delay time delays the color change of the display backlighting to red, the 22-mA signal (if configured), and the alarm contact switching.

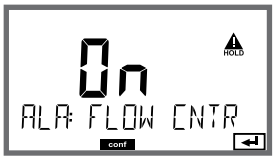
Alarm, CONTROL Input (FLOW MIN, FLOW MAX)



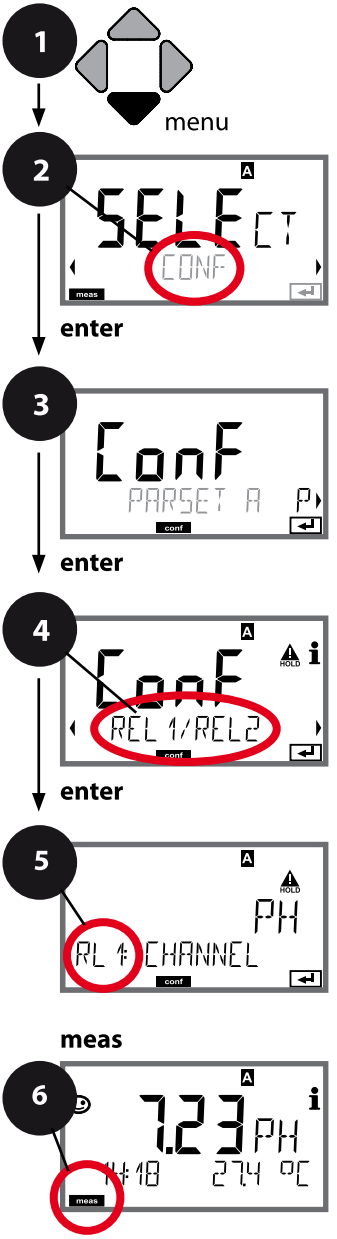
1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select parameter set using ◂ ▸ keys,
press **enter**.
4 Select **ALARM** menu using ◂ ▸ keys,
press **enter**.
5 All items of this menu group are indicated by the "ALA:" code.
Press **enter** to select menu,
edit using arrow keys (see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



5

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

Limit Function, Relay 1

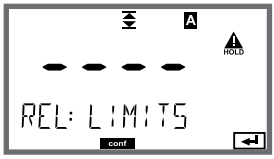
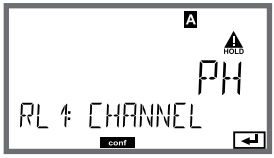
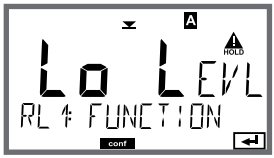
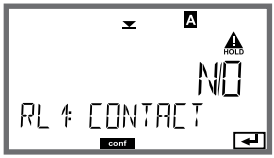


1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select parameter set using ◂ ▸,
press **enter**.
4 Select **REL1/REL2** menu using ◂ ▸ keys, press **enter**.
5 All items of this menu group are indicated by the "RL1:" code.
Press **enter** to select menu,
edit using arrow keys (see next page).
Confirm (and proceed) by pressing **enter**.
6 Exit: Press **meas** key until the [meas] mode indicator is displayed.

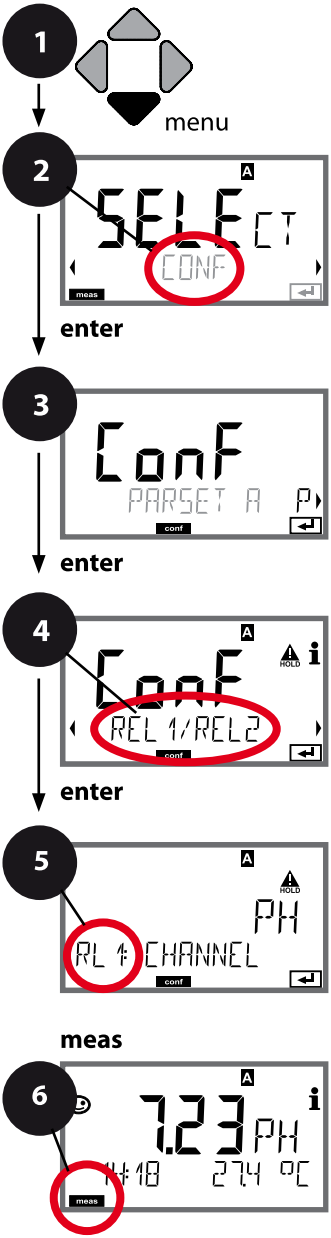
5

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

5

Menu item	Action	Choices
Use of relays 	Select in the text line using ▲ ▼ keys: • Limit function (LIMITS) • Controller (CONTROLLER) Press **enter** to confirm.	**LIMITS** / CONTROLLER **Note:** Selecting CONTROLLER leads to Controller menu group CTR.
Select process variable 	Select desired process variable using ▲ ▼ keys. Press **enter** to confirm.	Depending on module or Memosens sensor
Limit 1 function 	Select desired function using arrow keys. LoLevel: active if value falls below setpoint LoLevel: active if value exceeds setpoint Press **enter** to confirm.	**Lo LEVL** / Hi LEVL Limit 1 icon: ▼
Limit 1 contact response 	N/O: normally open contact N/C: normally closed contact Select using ▲ ▼ keys. Press **enter** to confirm.	**N/O** / N/C
Limit 1 setpoint 	Enter setpoint using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	Depending on module or Memosens sensor

Limit Function, Relay 1



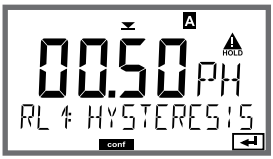
1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select parameter set using ◂ ▸ keys,
press **enter**.
4 Select **REL1/REL2** menu using ◂ ▸ keys, press **enter**.
5 All items of this menu group are indicated by the "RL1:" code.
Press **enter** to select menu,
edit using arrow keys (see next page).
Confirm (and proceed) by pressing **enter**.
6 Exit: Press **meas** key until the [meas] mode indicator is displayed.

5

enter

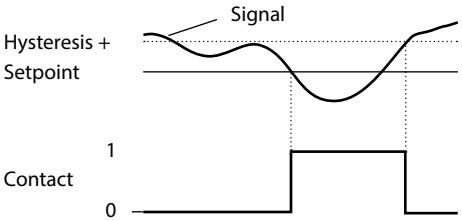
Use of relays
Select process variable
Limit 1 switching characteristics (function)
Limit 1 contact type
Limit 1 setpoint
Limit 1 hysteresis
Limit 1 delay

5

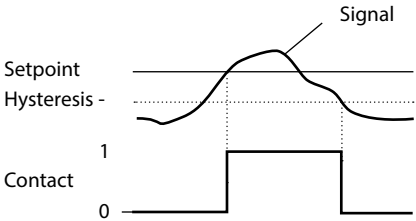
Menu item	Action	Choices
Limit 1 hysteresis 	Select hysteresis using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	Depending on module or Memosens sensor
Limit 1 delay 	The contact is activated with delay (deactivated without delay) Adjust delay using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0...9999 SEC (**0010 SEC**)

Application of Hysteresis:

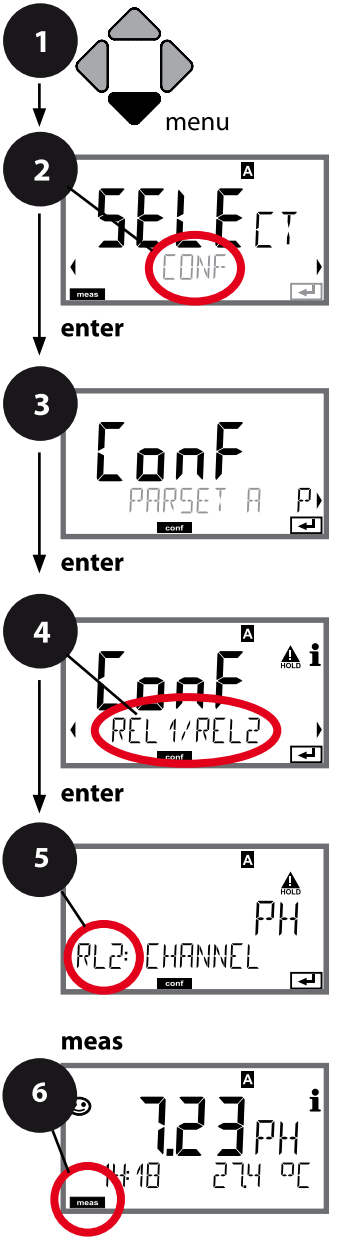
Limit Lo



Limit Hi



Limit Function, Relay 2



1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select parameter set using ◂ ▸ keys,
press **enter**.
4 Select **REL1/REL2** menu using ◂ ▸ keys, press **enter**.
5 All items of this menu group are indicated by the "RL2:" code.
Press **enter** to select menu,
edit using arrow keys (see next page).
Confirm (and proceed) by pressing **enter**.
6 Exit: Press **meas** key until the [meas] mode indicator is displayed.

5

enter

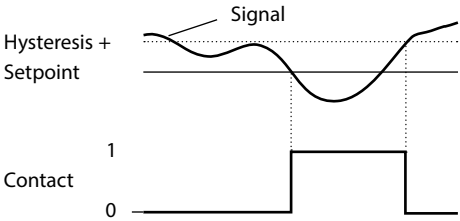
- Use of relays
- Select process variable
- Limit 2 switching characteristics (function)
- Limit 2 contact type
- Limit 2 setpoint
- Limit 2 hysteresis
- Limit 2 delay

5

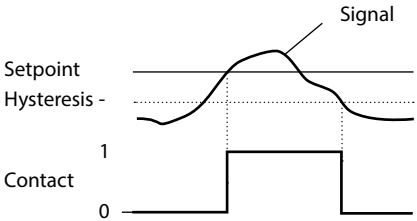
Menu item	Action	Choices
Select process variable (CHANNEL)	Select desired process variable using ▲ ▼ keys. Press **enter** to confirm.	Depending on module or Memosens sensor
Limit 2 function (FUNCTION)	Select desired function using arrow keys. Press **enter** to confirm.	Lo LEVL / **Hi LEVL** Limit 2 icon: ▲
Limit 2 contact type (CONTACT)	N/O: normally open contact N/C: normally closed contact Select using ▲ ▼ keys. Press **enter** to confirm.	**N/O** / N/C
Limit 2 setpoint (LEVEL)	Enter setpoint using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	Depending on module or Memosens sensor
Limit 2 hysteresis (HYSTERESIS)	Select hysteresis using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	Depending on module or Memosens sensor
Limit 2 delay (DELAYTIME)	The contact is activated with delay (deactivated without delay) Adjust delay using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0...9999 SEC (**0010 SEC**)

Application of Hysteresis:

Limit Lo

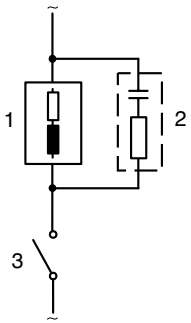


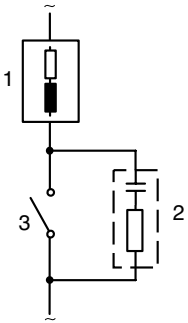
Limit Hi



Protective Wiring of Relay Contacts

Relay contacts are subject to electrical erosion. Especially with inductive and capacitive loads, the service life of the contacts will be reduced. For suppression of sparks and arcing, components such as RC combinations, nonlinear resistors, series resistors and diodes should be used.

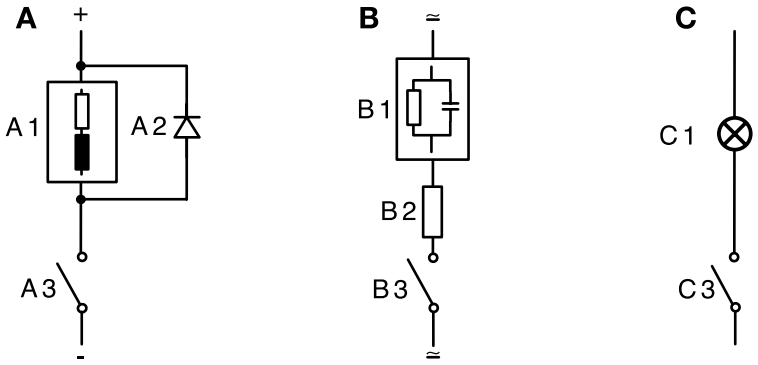




Typical AC applications with inductive load

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

Typical Protective Wiring Measures



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

A1 Inductive load
A2 Free-wheeling diode, e.g., 1N4007 (Observe polarity)
A3 Contact
B1 Capacitive load
B1 Resistor, e.g., 8 Ω / 1 W at 24 V / 0.3 A
B3 Contact
C1 Incandescent lamp, max. 60 W / 230 V, 30 W / 115 V
C3 Contact

WARNING!

Make sure that the maximum ratings of the relay contacts are not exceeded even during switching!

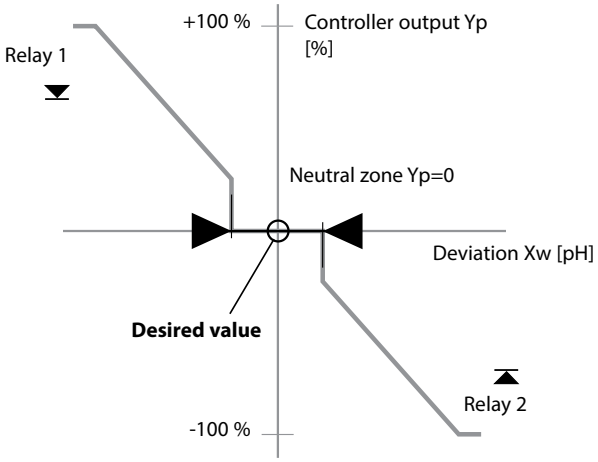
Typical Applications

P controller
Application for integrating control systems (e.g., closed tank, batch processes).

PI controller
Application for non-integrating control systems (e.g., drains).

PID controller
The additional derivative action compensates for measurement peaks.

Controller Characteristic



Controller Equations

$$\text{Controller output } Y = \underbrace{Y_P}_{\text{P action}} + \underbrace{\frac{1}{T_R}\int Y_P dt}_{\text{I action}} + \underbrace{T_D \frac{dY_P}{dt}}_{\text{D action}}$$

with:

Y_P	Proportional action
T_N	Reset time [s]
T_D	Rate time [s]
K_C	Controller gain [%]
Constant	5 (for pH) 500 mV (for ORP)

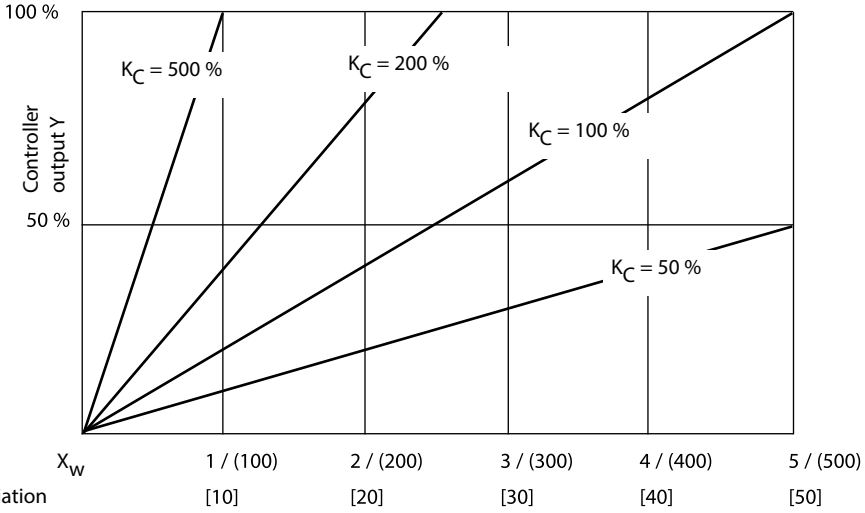
Proportional action Y_P

$$Y_P = \frac{\text{Setpoint - Meas. value}}{\text{Constant}} * K_C$$

Neutral Zone

Tolerated deviation from desired value.
With the setting "1 pH", for example, a deviation of ± 0.5 pH from the desired value is tolerated.

Proportional Action (Gradient K_C [%])



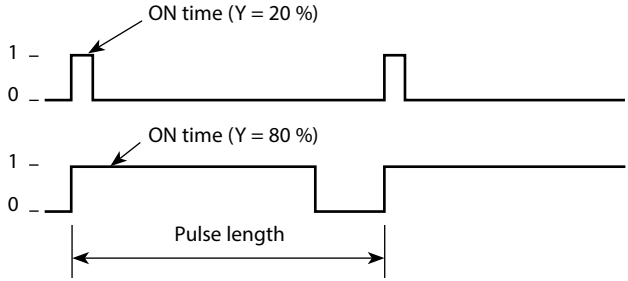
Process variables: pH/ (mV),
underneath: temp [K]

Pulse Length / Pulse Frequency Controller

Pulse Length Controller (PLC)

The pulse length controller is used to operate a valve as an actuator. It switches the contact on for a time that depends on the controller output. The period is constant. A minimum ON time of 0.5 sec is maintained even if the controller output takes corresponding values.

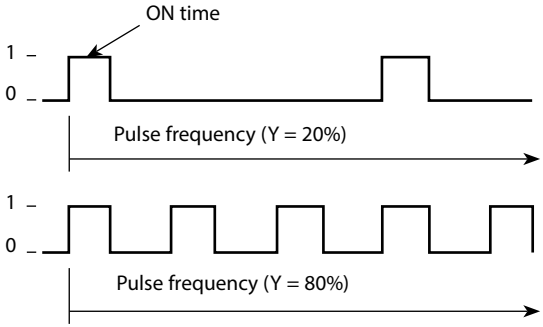
Output signal (relay contact) of pulse length controller



Pulse Frequency Controller (PFC)

The pulse frequency controller is used to operate a frequency-controlled actuator (metering pump). It varies the frequency with which the contacts are switched on. The maximum pulse frequency [pulses/min] can be defined. It depends on the actuator.
The contact ON time is constant. It is automatically calculated from the user-defined maximum pulse frequency:

Output signal (relay contact) of pulse frequency controller

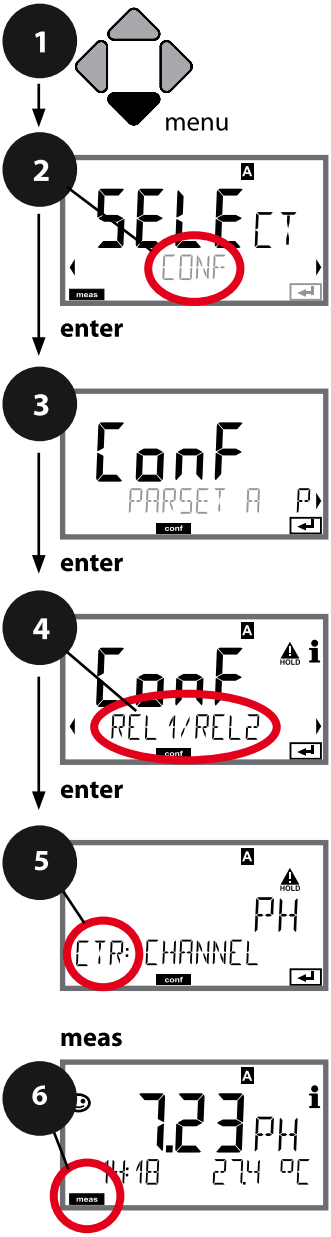


PID controller and behavior during HOLD

The following setting can be made for the controller: HOLD MODE = Y LAST/ Y OFF.
Y LAST: The controller output Y is maintained during HOLD
Y OFF: Y = 0 during HOLD (no control)

For a continuous (non-integrating) process, you should use the Y LAST setting.
For an integrating process (closed boiler), you should use Y OFF.

Controller, Process Variable, Controller Type, Setpoint



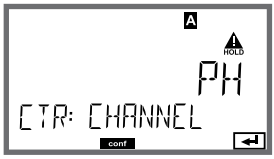
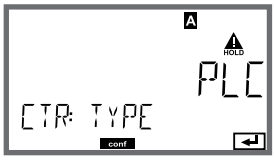
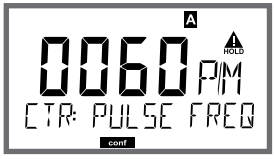
1 Press **menu** key.
2 Select **CONF** using ◂ ▸, press **enter**.
3 Select parameter set using ◂ ▸ keys, press **enter**.
4 Select **REL1/REL2** menu using ◂ ▸ keys, press **enter**.
5 All items of this menu group are indicated by the "CTR:" code.
Press **enter** to select menu, edit using arrow keys (see next page).
Confirm (and proceed) by pressing **enter**.
6 Exit: Press **meas** key until the [meas] mode indicator is displayed.

5

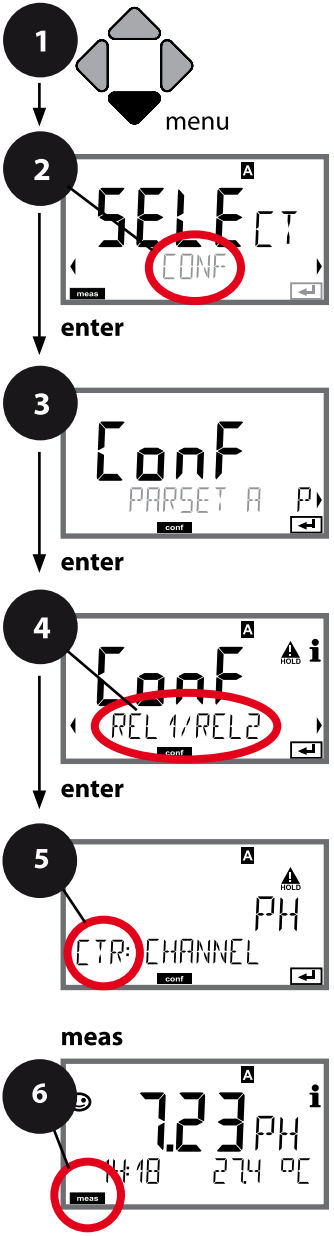
enter

Use of relays
Select process variable
Controller type
Pulse length
Pulse frequency
Desired value
Neutral zone Controller: P action
Controller: I action
Controller: D action
Behavior during HOLD

5

Menu item	Action	Choices
Use of relays	Select in the text line using ▲ ▼ keys: • Controller (CONTROLLER) Press **enter** to confirm.	**LIMITS** / CONTROLLER Selecting CONTROLLER leads to Controller menu group CTR.
Select process variable 	Select desired process variable using ▲ ▼ keys. Press **enter** to confirm.	Depending on module or Memosens sensor
Controller type 	Pulse length controller (PLC) or pulse frequency controller (PFC) Select using ▲ ▼ keys. Press **enter** to confirm.	**PLC**/PFC
Pulse length 	Only with PLC: Pulse length Adjust using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0...0600 SEC (**0010 SEC**)
Pulse frequency 	Only with PFC: Pulse frequency Adjust using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0...0180 P/M (**0060 P/M**) (pulses per minute)
Desired value 	Adjust setpoint using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	Depending on module or Memosens sensor

Controller, Neutral Zone, P, I, D Action Components, Behavior during HOLD

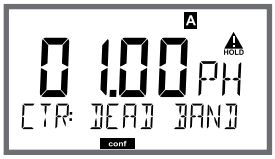
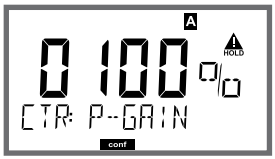
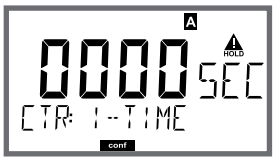
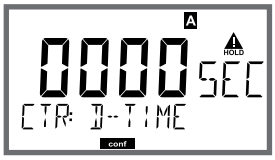


1 Press **menu** key.
2 Select **CONF** using ◂ ▸, press **enter**.
3 Select parameter set using ◂ ▸ keys, press **enter**.
4 Select **REL1/REL2** menu using ◂ ▸ keys, press **enter**.
5 All items of this menu group are indicated by the "CTR:" code.
Press **enter** to select menu, edit using arrow keys (see next page).
Confirm (and proceed) by pressing **enter**.
6 Exit: Press **meas** key until the [meas] mode indicator is displayed.

5

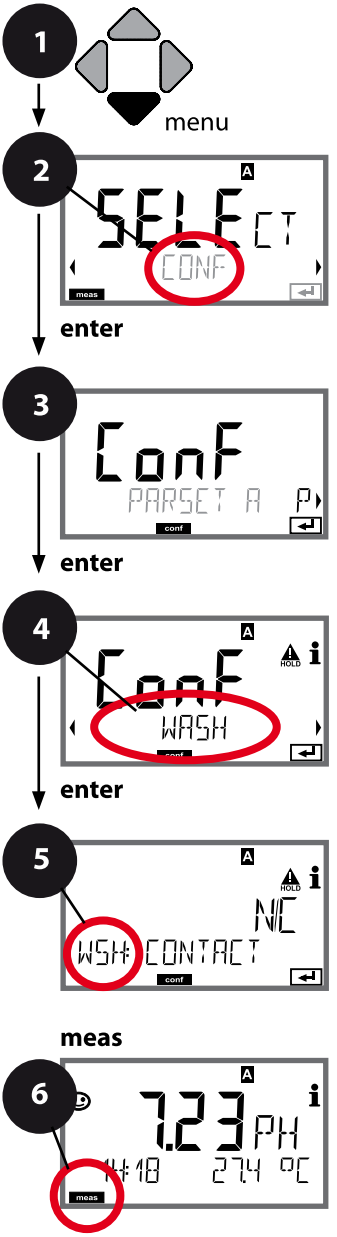
Use of relays	enter
Select process variable	
Controller type	
Pulse length	
Pulse frequency	
Desired value	
Neutral zone	
Controller: P action	
Controller: I action	
Controller: D action	
Behavior during HOLD	

5

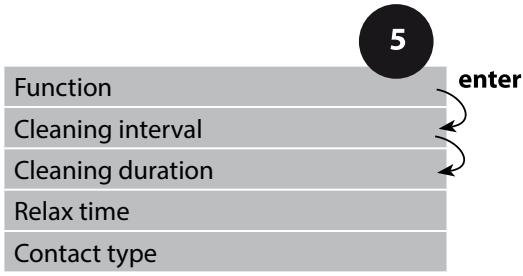
Menu item	Action	Choices
Neutral zone 	Adjust neutral zone using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	Depending on module or Memosens sensor
Controller: P action 	Adjust P action using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	10...9999% (**0100%**)
Controller: I action 	Adjust I action using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0...9999 SEC (**0000 SEC**)
Controller: D action 	Adjust D action using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0...9999 SEC (**0000 SEC**)
Behavior during HOLD* 	Select response using ▲ ▼ keys. Press **enter** to confirm.	**Y LAST** / Y OFF Y LAST: The controller output Y is maintained during HOLD Y OFF: Y = 0 during HOLD (no control)

*) **PID controller and behavior during HOLD**
For a continuous (non-integrating) process, you should use the Y LAST setting.
For an integrating process (closed boiler), you should use Y OFF.

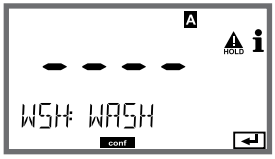
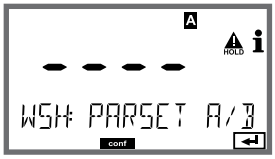
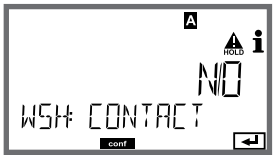
WASH Contact, Controlling a Rinsing Probe or Signaling the Parameter Set

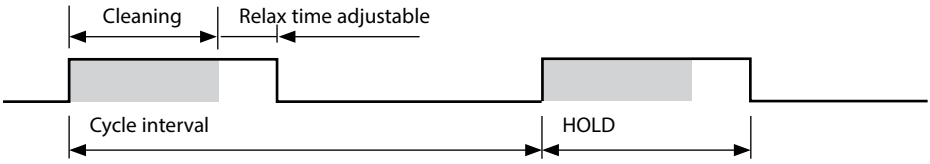


1 Press **menu** key.
2 Select **CONF** using ◂ ▸,
press **enter**.
3 Select parameter set A using ◂ ▸ keys,
press **enter**.
4 Select **WASH** menu using ◂ ▸ keys,
press **enter**.
5 All items of this menu group are indicated by the "WSH:" code.
Press **enter** to select menu,
edit using arrow keys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

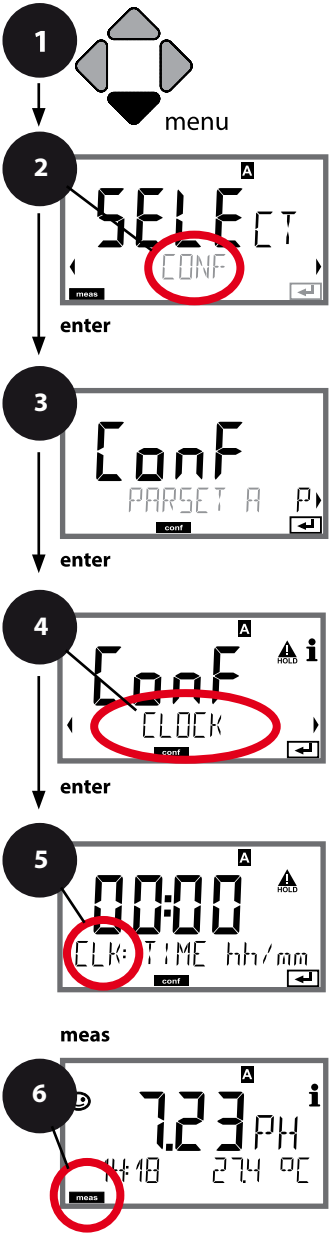


5

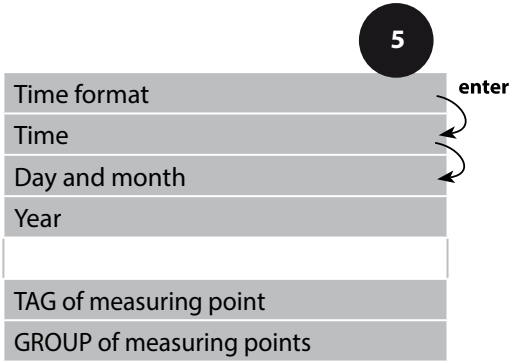
Menu item	Action	Choices
Function  	Select WASH contact function using ▲ ▼ keys. Press **enter** to confirm.	**WASH** / PARSET A/B WASH: Controlling a rinsing probe With PARSET A/B selected, the contact signals: "Parameter set A" (open contact) "Parameter set B" (closed contact)
Cleaning interval 	Only with WASH: Adjust value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0.0...999.9 h (**000.0 h**)
Cleaning duration 	Only with WASH: Adjust value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0...9999 SEC (**0060 SEC**) Relax time: 0000...1999 SEC **(0030 SEC)**
Contact type 	Only with WASH: N/O: normally open contact N/C: normally closed contact Select using ▲ ▼ keys. Press **enter** to confirm.	**N/O** / N/C



Time and Date, Measuring Point



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



Time and Date

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

In measuring mode the time is shown in the lower display. When using digital sensors, the calibration data is written in the sensor head. In addition, the logbook entries (cf Diagnostics) are provided with a time stamp.

Note:

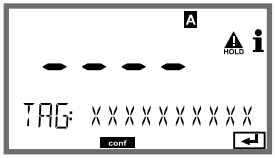
There is no automatic switchover from winter to summer time!

Be sure to manually adjust the time!

Sensor Verification (TAG, GROUP)

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

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

Menu item	Action	Choices
TAG of measuring point 	In the lower display line you can enter a designation for the measuring point (TAG) and for a group of measuring points (GROUP) if applicable. Up to 32 digits are possible. By pressing **meas** (repeatedly) in the measuring mode you can view the tag number. Select character using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm.	A...Z, 0...9, – + < > ? / @ The first 10 characters are seen in the display without scrolling.
GROUP of measuring points	Select number using ▲ ▼ keys, select next digit using ◀ ▶ keys. Confirm by pressing **enter**	0000 ... 9999 **(0000)**

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.

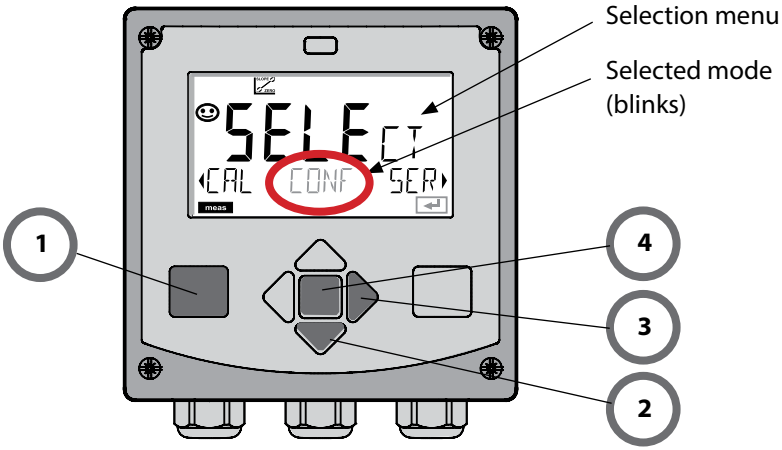
When using ISFET sensors or sensors with a zero point other than pH 7, the nominal zero point must be adjusted each time a new sensor is connected. This is important if you want to obtain reliable Sensoface messages. The Sensoface messages issued during all further calibrations are based on this basic 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:
(With MSPH-MSPH multichannel operation, you have to select the sensor first.)

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 sec) (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.

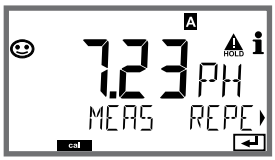


Zero Adjustment

pH

This adjustment allows the use of ISFET sensors with differing nominal zero (pH only). The function is available when ISFET has been select 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) Now the device is in HOLD mode.
	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.	After end of calibration, the outputs remain in HOLD mode for a short time.

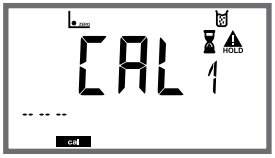
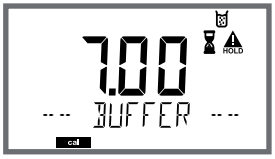
Note for Zero Adjustment

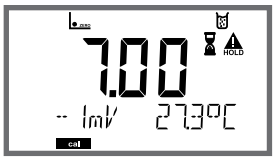
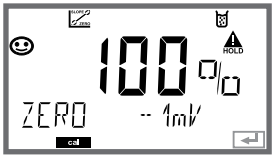
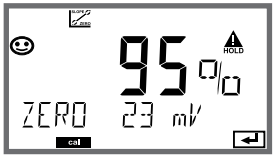
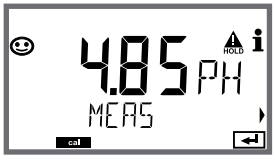
After having adjusted the zero offset, be sure to calibrate the sensor following one of the procedures as described on the next pages.

pH: Automatic Calibration

pH

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.

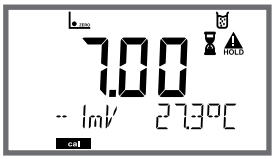
Display	Action	Remark
	Select Calibration. Press **enter** to proceed.	
	Ready for calibration. Hourglass blinks. Select calibration method: CAL_PH Press **enter** to proceed.	Display (3 sec) Now the device is in HOLD mode.
	Remove the sensor, clean it, and immerse it in the first buffer solution (it 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. Buffer recognition terminated, the nominal buffer value is displayed, then zero point and temperature.	To reduce the sensor response time, first move it about in the buffer solution and then hold it still.

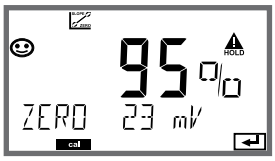
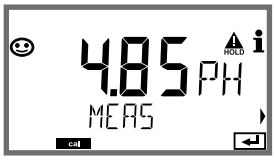
Display	Action	Remark
	Stability check. The measured value [mV] is displayed, "CAL2" and "enter" are blinking. Calibration with the first buffer is terminated. Remove the sensor from the first buffer solution and rinse it thoroughly. **Use the arrow keys to select:** • END (1-point cal) • CAL2 (2-point 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. Exit: HOLD is deactivated with delay.	When 2-point cal is exited: 

pH: Manual Calibration

pH

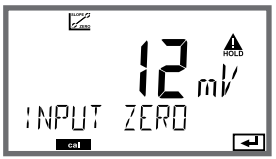
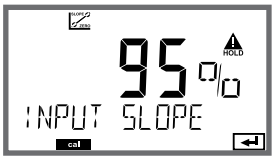
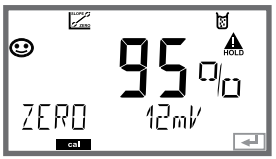
The MAN calibration mode and the type of temperature detection are selected during **configuration**. For calibration with manual buffer specification, you must enter the pH value of the buffer solution used in the device for the proper temperature. Any desired buffer solution can be used for calibration.

Display	Action	Remark
	Select Calibration. Press **enter** to proceed.	
	Ready for calibration. Hourglass blinks.	Display (3 sec) Now the device is in HOLD mode.
	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. Exit: HOLD is deactivated with delay.	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, e.g., determined beforehand in the laboratory.

Display	Action	Remark
	Select Calibration. Press **enter** to proceed.	
	"Data Input" Ready for calibration. Hourglass blinks.	Display (3 sec) Now the device is in HOLD mode.
	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.	Exit: HOLD is deactivated with delay.

Converting slope [%] to slope [mV/pH] 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

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

ZERO = Sensor zero

V_{AS} = Asymmetry potential

S = Slope

pH

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

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

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 – e.g., the standard hydrogen electrode. In that case the temperature-corrected potential (see table) of the reference electrode used must be entered during calibration. During measurement, this value is then added to the ORP measured.
Please make sure that measurement and calibration temperature are the same since the temperature behavior of the reference electrode is not automatically taken into account.

Temperature dependence of 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

Calculating the rH (reference system: Ag/AgCl/KCl 3 mol/l)
$rH = 2 (((ORP + E_{REF})/E_N) + pH)$

ORP oxidation-reduction potential measured between the platinum electrode and the reference electrode
E_{REF} temperature-dependent potential of the reference electrode measured relative to SHE (standard hydrogen electrode)
E_N Nernst potential (temperature dependent)
pH currently measured pH value

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) Now the device is in HOLD mode.
	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**	After end of calibration, the outputs remain in HOLD mode for a short time.

pH

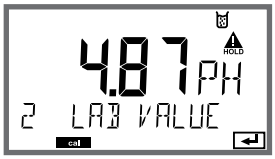
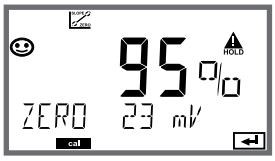
Calibration by sampling (one-point calibration).
During product calibration the sensor remains in the process.
The measurement process is only interrupted briefly.

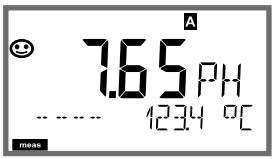
Procedure:

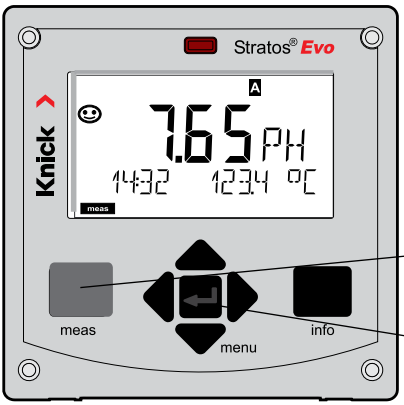
1) The sample is measured in the lab or directly on the site using a portable meter. To ensure an exact calibration, the sample temperature must correspond to the measured process temperature.
   During sampling the device saves the currently measured value and then returns to measuring mode. The "calibration" 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) Now the device is in HOLD mode.
	The stored value is displayed (blinking) and can be overwritten 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	After end of calibration, the outputs remain in HOLD mode for a short time.	

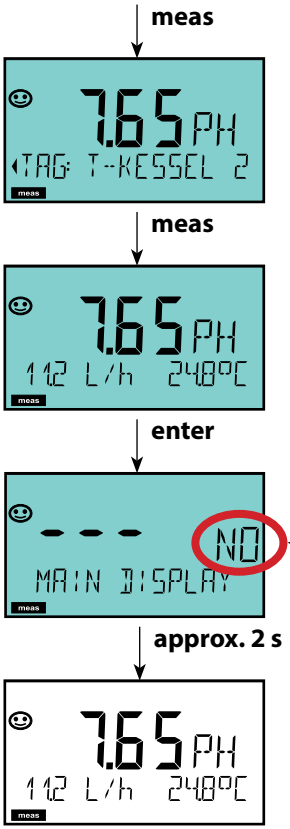
Display	Remark
 or AM/PM and °F:  	From the configuration or calibration menus, you can switch the device to measuring mode by pressing the **meas** key. In the measuring mode the upper display line shows the configured process variable (pH, ORP [mV] or temperature), the lower display line shows the time and the second configured process variable (pH, ORP [mV] or temperature). The [meas] mode indicator lights and the active parameter set (A/B) is indicated. **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 different displays. When no key has been pressed for 60 sec, the device returns to MAIN DISPLAY.	
 	1) Selecting the parameter set (if set to "manual" in the configuration). Select the desired parameter set using the ◂ ▸ arrow keys (PARSET A or PARSET B blinks in the lower display line). Press **enter** to confirm. Further displays (each by pressing **meas**). 2) Display of tag number ("TAG") 3) Display of time and date 4) Display of output currents



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

meas key

enter key



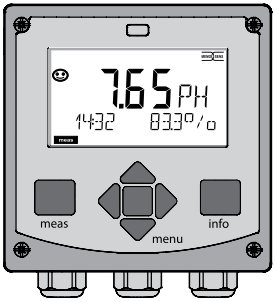
By pressing **meas** briefly you can step through further displays such as tag number (TAG) or flow (L/h).
These displays are turquoise. After 60 sec they switch back to the main display.

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

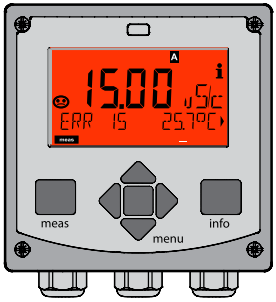
The secondary display shows "MAIN DISPLAY – NO".
Use the **UP** / **DOWN** arrows to select "MAIN DISPLAY – YES"
and confirm by pressing **enter**.
The display color changes to white.
This display is now shown in measuring mode.

Color-Coded User Interface

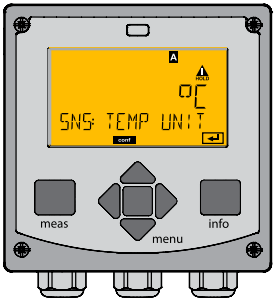
The color-coded user interface guarantees increased operating safety. Operating modes are clearly signaled.
The normal measuring mode is white. Information text appears on a green screen and the diagnostic menu appears on turquoise. The orange HOLD mode (e.g., during calibration) is quickly visible as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



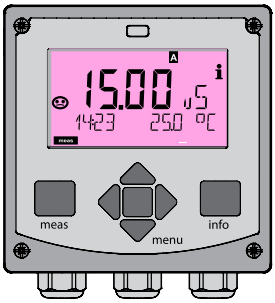
White:
Measuring mode



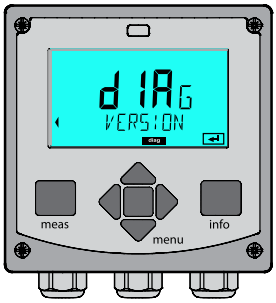
Red blinking:
Alarm, error



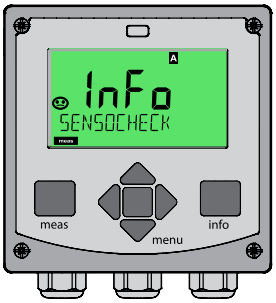
Orange:
HOLD mode



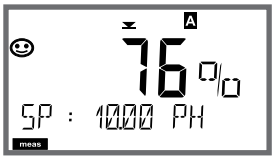
Magenta:
Maintenance request



Turquoise:
Diagnostics



Green:
Info texts

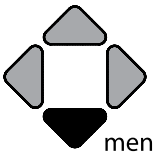
Display	Remark
With activated controller you can also step through the following displays by pressing the **meas** key. When no key has been pressed for 60 sec, the device returns to the standard display.	
	Upper display: Controller output Y The controller output can be modified using ▲ ▼. This allows control systems to be tested and, above all, started smoothly. Lower display: Setpoint Depending on configuration setting: pH, mV, or temperature.

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

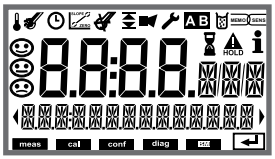
CALDATA	Viewing the calibration data
SENSOR	Viewing the sensor data
SELFTEST	Starting a device self-test
LOGBOOK	Viewing the logbook entries
MONITOR	Displaying currently measured values
VERSION	Displaying device type, software version, serial number

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

Note:
HOLD is not active during Diagnostics mode!

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

Display	Menu item
    	**Displaying the calibration data** (Example: pH) Select CALDATA using ◂ ▸, confirm by pressing **enter**. Use the ◂ ▸ keys to select the desired parameter from the bottom line of the display: The selected parameter is shown in the upper display line. Press **meas** to return to measurement.
 	**Displaying the sensor data** For analog sensors, the type is displayed (STANDARD / ISFET). Cannot be operated with digital transmitters. 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**

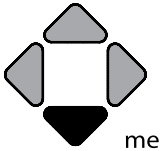
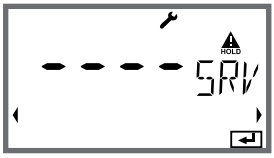
Display	Menu item
	**Displaying the logbook entries** Select LOGBOOK using ◂ ▸, press **enter** to confirm. With the ▲ ▼ keys, you can scroll backwards and forwards through the logbook (entries -00-...-99-), -00- being the last entry.
	If the display is set to date/time, you can search for a particular date using the ▲ ▼ keys. Press ◂ ▸ to view the corresponding message text.
	If the display is set to the message text, you can search for a particular message using the ▲ ▼ keys. Press ◂ ▸ to display the date and time. Press **meas** to return to measurement.
	**Extended logbook / Audit Trail (via TAN)** With the ▲ ▼ keys, you can scroll backwards and forwards through the extended logbook (entries -000-...-99-), -000- being the last entry. **Display: CFR** Audit Trail also records function activations (CAL CONFIG SERVICE), some Sensoface messages (cal timer, wear), and opening of the enclosure.

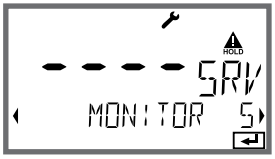
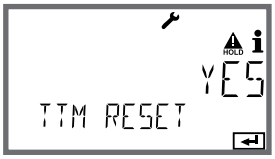
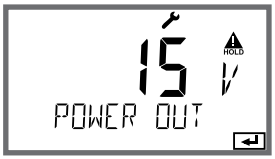
Display	Menu item
	**Displaying the currently measured values (sensor monitor – example: pH)** Select MONITOR using ◂ ▸, press **enter** to confirm. Use the ◂ ▸ keys to select the desired parameter from the bottom line of the display: mV_PH mV_ORP RTD R_GLASS R_REF I-INPUT (for digital sensors also: OPERATION TIME SENSOR WEAR LIFETIME CIP SIP AUTOCLAVE, for ISM sensors in addition: ACT (adaptive cal 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 examples:	
	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/ bootloader version** and **serial number** for all device components. Use the ▴ ▾ keys to switch between software and hardware version. Press **enter** to proceed to next device component.

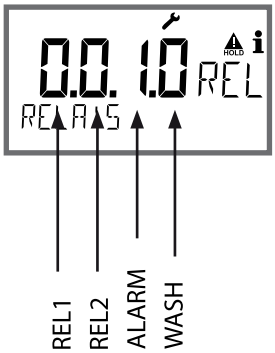
In the Service mode you can access the following menus:

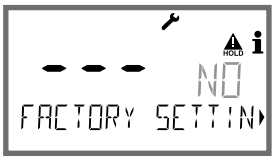
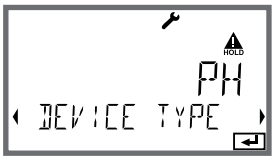
MONITOR	Displaying currently measured values
SENSOR	Displaying the sensor data; ISM only: resetting TTM; ISM, Memosens, InduCon: incrementing the autoclaving counter
POWER OUT	Power output (adjustable: 3.1/12/15/24 V)
OUT1	Testing current output 1
OUT2	testing current output 2
RELAIS	Testing the function of the 4 relays
CONTROL	Testing the controller function
CODES	Assigning and editing passcodes
DEVICE TYPE	Selecting the measuring function
DEFAULT	Resetting the device to factory settings
OPTION	enabling options via TAN

Note:
HOLD is active during Service mode!

Action	Key/Display	Remark
Activate Service		Press **menu** key to call the selection menu. Select SERVICE using ◀ ▶ keys, press **enter** to confirm.
Passcode		Enter passcode "5555" for service mode using the ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.
Display		In service mode the following icons are displayed: • HOLD triangle • Service (wrench)
Exit	**meas**	Exit by pressing **meas**.

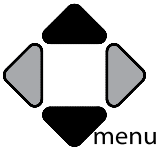
Menu item	Remark
	**Displaying currently measured values (sensor monitor) with HOLD mode activated:** Select MONITOR using ◂ ▸, press **enter** to confirm. Select variable in the bottom text line using ◂ ▸. The selected parameter is shown in the upper display line. As the device is in HOLD mode, you can perform validations using simulators without influencing the signal outputs. Hold **meas** depressed for longer than 2 sec to return to Service menu. Press **meas** once more to return to measurement.
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".
POWER OUT 	**POWER OUT, adjusting the output voltage** Here, you can select an output voltage of 3.1/12/15/24 V. When the SE 740 optical oxygen sensor has been selected, the output voltage will be automatically set to 15 V, regardless of the setting in the SERVICE menu.

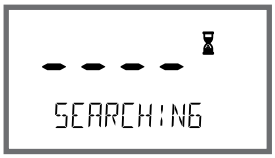
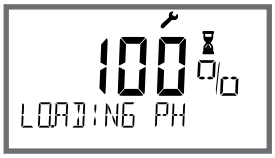
Menu item	Remark
	**Specifying the current for outputs 1 and 2:** Select OUT1 or OUT2 using the ◂ ▸ keys, press **enter** to confirm. Enter a valid current value for the respective output using ▲ ▼ ◂ ▸ keys. Confirm by pressing **enter**. For checking purposes, the actual output current is shown in the bottom right corner of the display. Exit by pressing **enter** or **meas**.
	**Relay test (manual test of contacts):** Select RELAIS using ◂ ▸, press **enter** to confirm. Now the status of the 4 relays is "frozen". The 4 digits of the main display represent the respective states (from left to right: REL1, REL2, ALARM, WASH). The digit for the selected relay blinks. Select one of the 4 relays using the ◂ ▸ keys, close (1) or open (0) using the ▲ ▼ keys. Exit by pressing **enter**. The relays will be re-set corresponding to the measured value. Press **meas** to return to measurement.

Menu item	Remark
	**Assigning passcodes:** In the "SERVICE - CODES" menu you can assign passcodes to DIAG, HOLD, CAL, CONF and SERVICE modes (Service preset to 5555). **When you have lost the Service passcode,** you have to request an "Ambulance TAN" from the manufacturer specifying the serial number and hardware version of your device. To enter the "Ambulance TAN", call the Service function and enter passcode 7321. After correct input of the ambulance TAN the device signals "PASS" for 4 sec and resets the Service passcode to 5555.
	**Reset to factory settings:** In the "SERVICE - DEFAULT" menu you can reset the device to factory settings. **NOTICE!** After a reset to factory setting the device must be reconfigured completely, including the sensor parameters!
	**Option request:** Communicate the serial number and hardware/software version of your device to the manufacturer. These data can be viewed in the Diagnostics/Version menu. The "transaction number" (TAN) you will then receive is only valid for the device with the corresponding serial number. **Releasing an option:** Options come with a "transaction number" (TAN). To release the option, enter this TAN and confirm by pressing **enter**.
	**Device type:** Changing the measuring function, e.g., after having replaced a Memosens sensor. Not possible with a measuring module installed.

Power Disruption while Loading the Process Variable

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

Action	Key/Display	Remark
Device start		If the power supply is disrupted while the process variable is loaded (e.g., during initial start-up or when changing the process variable), the following can occur:
Reconnecting the power supply		After the power supply has been reconnected, the analyzer starts and then remains in --FIRMW UPDATE-- mode. If this occurs, disconnect the power supply.
Restoring the factory settings		Press the ▲ ▼ keys simultaneously and hold them depressed while the analyzer is reconnected to the power supply.
Device start		Release the keys when the display shows LOADING BASE. The analyzer will restart with the BASE software when 100 % is reached.

Action	Key/Display	Remark
Searching for the process variable		Then the analyzer searches for a measuring module or Memosens sensor.
Loading the process variable, automatic		When a module or a sensor has been found, the loading progress is shown in percentages.
Loading the process variable, manual		If neither module nor sensor are found, the display shows DEVICE TYPE. The selected process variable blinks. You can modify it using the ▲ ▼ keys. Press **enter** to load the process variable displayed.
Loading ...		Make sure that the power supply is not interrupted before the **process variable is fully loaded (100%)**.

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 04	SENSOR FAILURE	**Failure in sensor**
ERR 05	CAL DATA	**Error in cal data**
ERR 10	ORP RANGE	**Display range violation** ORP: < -1999 mV or > 1999 mV
ERR 11	RANGE	**Display range violation**
ERR 12	MV RANGE	**mV range**
ERR 13	TEMPERATURE RANGE	**Temperature range violation** (See "Measuring range" on page 160)
ERR 14	rH RANGE	**Range error (rH)**
ERR 15	SENSOCHECK GLASS-EL	**Glass Sensocheck (pH)**
ERR 60	OUTPUT LOAD	**Load error**
ERR 61	OUTPUT 1 TOO LOW	**Output current 1** < 0 (3.8) mA
ERR 62	OUTPUT 1 TOO HIGH	**Output current 1** > 20.5 mA
ERR 63	OUTPUT 2 TOO LOW	**Output current 2** < 0 (3.8) mA
ERR 64	OUTPUT 2 TOO HIGH	**Output current 2** > 20.5 mA

Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
ERR 95	SYSTEM ERROR	**System error** Restart required. If error still persists, send in the device for repair.
ERR 97	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 98	CONFIGURATION ERROR	**Error in configuration or calibration data** Configuration or calibration data defective; completely reconfig-ure and recalibrate the device.
ERR 99	DEVICE FAILURE	**Error in factory settings** EEPROM or RAM defective This error message only occurs in the case of a total defect. The device must be repaired and recalibrated at the factory.
ERR 100	INVALID SPAN OUT1	**Span Out1 configuration error** Selected span too small
ERR 101	INVALID SPAN OUT2	**Span Out2 configuration error** Selected span too small

Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
ERR 102	**pH:** FAILURE BUFFERSET -U1-	**Parameter error** Specifiable buffer set U1
	Multichannel operation: **MSPH/MSPH, MSPH/MSOXY:** A FAILURE BUFFERSET -U1-	**Parameter error** Specifiable buffer set U1, sensor A
ERR 104	INVALID PARAMETER CONTROLLER	**Parameter error** Controller
ERR 105	INVALID SPAN I-INPUT	**Parameter error** Current input
ERR 106	INVALID CHANNEL SELECTION OUT1/2	Multichannel operation: **MSPH/MSPH, MSPH/MSOXY:** Currents not assigned
ERR 107	INVALID CHANNEL SELECTION RELAYS	Multichannel operation: **MSPH/MSPH, MSPH/MSOXY:** Limit values not assigned
ERR 108	Multichannel operation: **MSPH/MSPH, MSPH/MSOXY:** INVALID CHANNEL SELECTION CONTROL	Controller not assigned

Sensoface messages:

Calibration timer expired:	OUT OF CAL TIME CALIBRATE OR CHANGE SENSOR
TTM for ISM (pH):	OUT OF MAINTENANCE CLEAN SENSOR
TTM for ISM (Oxy):	OUT OF MAINTENANCE CHECK ELECTROLYTE AND MEMBRANE
DLI for ISM:	END OF LIFETIME CHANGE SENSOR OR INNERBODY
ISFET sensor offset:	SENSOR ISFET-ZERO CALIBRATE OR CHANGE SENSOR
Sensor zero/slope:	SENSOR ZERO/SLOPE CALIBRATE OR CHANGE SENSOR
Sensor response:	SENSOR DRIFT CALIBRATE OR CHANGE SENSOR
Sensor wear (pH):	SENSOR WEAR CHANGE SENSOR
Sensor wear (Oxy MS):	SENSOR WEAR CHECK ELECTROLYTE AND MEMBRANE
Sensor wear (LDO, SE 740):	SENSOR WEAR CHANGE SENSOR CAP
Autoclaving counter:	AUTOCLAVE CYCLES OVERRUN
CIP cycles exceeded:	CIP-CYCLES OVERRUN
SIP cycles exceeded:	SIP-CYCLES OVERRUN
Sensor TAG does not correspond to device entry.	WRONG SENSOR TAG
Sensor GROUP does not correspond to device entry.	WRONG SENSOR GROUP xxxx

Sensocheck, Sensoface Sensor Monitoring

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

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

Sensoface message
The Sensocheck message is also output as error message Err 15. The alarm contact is active, the display backlighting turns red (when configured correspondingly). Sensoface can be output as a 22-mA signal via the current outputs.

Disabling Sensocheck and Sensoface

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

Operating status	OUT 1	OUT 2	REL1/2	Alarm	Time out
Measure					-
DIAG					60 s
HOLD					No
CAL					No
CONF					20 min
SERVICE					20 min
SERVICE OUT 1					20 min
SERVICE OUT 2					20 min
SERVICE RELAIS					20 min
SERVICE (CODES, DEVICE TYPE; OPTION)					20 min
Cleaning function					No

Explanation:

as configured (Last/Fix or Last/Off)

active

manual

Devices (basic digital devices)	Order No.
Stratos Evo A402N	A402N
Stratos Evo A402B (operation in hazardous locations, Zone 2)	A402B

Interchangeable modules for measurement with analog sensors or 2nd Memosens channel	
pH	MK-PH015N
Oxy	MK-OXY045N
Cond	MK-COND025N
CondI	MK-CONDI035N
Cond-Cond	MK-CC065N
2nd Memosens channel	MK-MS095N

Interchangeable modules for measurement with analog sensors, hazardous area Zone 2	
pH, hazardous area Zone 2	MK-PH015X
Oxy, hazardous area Zone 2	MK-OXY045X
Cond, hazardous area Zone 2	MK-COND025X
CondI, hazardous area Zone 2	MK-CONDI035X

TAN options	
HART	SW-A001
Logbook	SW-A002
Extended logbook (AuditTrail)	SW-A003
Oxygen trace measurement	SW-A004
Current input	SW-A005
ISM digital	SW-A006
Pfaudler	SW-A007

Mounting accessories	Order No.
Pipe-mount kit	ZU 0274
Panel-mount kit	ZU 0738
Protective hood	ZU 0737
M12 socket for sensor connection with Memosens cable / M12 connector	ZU 0860

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

pH			
Display range	pH value	–2.00 ... 16.00	
(depending on sensor)	ORP	–1999 ... 1999 mV	
	Temperature	–20.0 ... +200.0 °C (–4 ... + 392 °F)	
	rH value (combo sensor)	000.0 ... 200.0 rH	
Measurement error [1)]	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	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-	Specifiable buffer set with 2 buffer solutions	
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		
Calibration timer	Interval 0000 ... 9999 h (Patent DE 101 41 408)		
Sensocheck	Automatic monitoring of glass electrode		
Delay	Approx. 30 s		
Sensoface	Provides information on the sensor condition (can be switched off) Evaluation of zero/slope, calibration interval, Sensocheck		

*) user-defined

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

pH

TC of process medium	Linear -19.99 ... +19.99 %/K, ultrapure water	
Reference temperature	25 °C	
Temperature input	Pt100 / Pt1000 / NTC / Balco * 2-wire connection, adjustable	
Measuring range	Pt100/Pt1000	–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)]	< 0.5 K (± 1 K for Pt100; < 1 K for NTC > 100°C)	
MK-PH015... module		
ISM input	"One wire" interface for operation with ISM (digital sensors) (6 V / Ri= approx. 1.2 kΩ)	
Power output	for operating an ISFET adapter	
	+3 V / 0.5 mA	
	-3 V / 0.5 mA	

Input	for Memosens or optical sensors (SE 740)		
Data In/Out	Asynchronous interface, RS-485, 9600/19200 Bd		
Power supply	Terminal 1: +3.08 V/10 mA, Ri < 1 ohm, short-circuit-proof		
	Terminal 5: 3.1 … 24 V/1W in four discrete levels (3.1/12/15/24 V), short-circuit-proof (levels are software-selectable), 15 V automatic with SE 740 sensor selected		
I input (TAN)	4 ... 20 mA / 50 ohms		
Function	Input of pressure or temperature values from external sensors		
Resolution	Approx. 0.05 mA		
Measurement error [1]	< 1% current value + 0.1 mA		
Door contact	outputs a signal when the door is open		
	Logbook entry (FDA)		
HOLD input	Galvanically separated (optocoupler)		
Function	Switches device to HOLD mode		
Switching voltage	0 ... 2 V AC/DC	HOLD inactive	
	10 ... 30 V AC/DC	HOLD active	
CONTROL input *	Galvanically separated (optocoupler)		
Function	Selecting parameter set A/B or flow measurement (FLOW)		
Parameter set A/B	Control input	0 ... 2 V AC/DC	Parameter set A
		10 ... 30 V AC/DC	Parameter set B
FLOW	Pulse input for flow measurement 0 ... 100 pulses/s		
	Display:	00.0 … 99.9 l/h	
Output 1	0/4 ... 20 mA, max. 10 V, floating (terminals 8 / 9, galvanically connected to output 2)		
Overrange *	22 mA in the case of error messages		
Characteristic	Linear, with conductivity measurement also bilinear or logarithmic		
Output filter *	PT_1 filter, time constant 0 ... 120 s		
Measurement error [1]	< 0.25% current value + 0.025 mA		
Output 2	0/4 ... 20 mA, max. 10 V, floating (terminals 9 / 10, galvanically connected to output 1)		
Overrange *	22 mA in the case of error messages		
Characteristic	Linear, with conductivity measurement also bilinear or logarithmic		
Output filter *	PT_1 filter, time constant 0 ... 120 s		
Measurement error [1]	< 0.25% current value + 0.025 mA		

*) user-defined

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

Power Out Power supply	Power supply output for operating optical sensors (SE 740), selectable between 3.1 V / 12 V / 15 V / 24 V, short-circuit-proof (for SE 740 fixed to 15 V), max. power 1 W
Alarm contact	Relay contact, floating
Contact ratings	AC < 250 V / < 3 A / < 750 VA DC < 30 V / < 3 A / < 90 W
Contact response *	N/C (fail-safe type)
Wash contact	Relay contact, floating
Contact ratings	AC < 250 V / < 3 A / < 750 VA DC < 30 V / < 3 A / < 90 W
Contact response *	N/C or N/O
Min/max limits	Min/max contacts, floating, but inter-connected
Contact ratings	AC < 250 V / < 3 A / < 750 VA DC < 30 V / < 3 A / < 90 W
Contact response *	N/C or N/O
Response delay *	0000 ... 9999 s
Setpoints *	As desired within range
Hysteresis *	User-defined
Real-time clock	Different time and date formats selectable
Power reserve	> 5 days
Display	LC display, 7-segment with icons, colored backlighting
Primary display	Character height approx. 22 mm, unit symbols approx. 14 mm
Secondary display	Character height approx. 10 mm
Text line	14 characters, 14 segments
Sensoface	3 status indicators (friendly, neutral, sad face); provides information on the sensor condition. Evaluation of zero/slope, response, calibration interval, wear, Sensocheck (can be disabled), sensor verification (TAG, GROUP)
Mode indicators	meas, cal, conf, diag Further icons for configuration and messages
Alarm indication	Display blinks, red backlighting
Keypad	Keys: meas, info, 4 cursor keys, enter
2 parameter sets	Parameter set A and B, switchover via CONTROL input or manually
Diagnostics functions	
Calibration data	Calibration date, zero, slope
Device self-test	Automatic memory test (RAM, FLASH, EEPROM)
Display test	Display of all segments
Logbook	100 events with date and time 200 entries (Audit Trail) with extended logbook (TAN)

*) user-defined

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

Service functions	
Current source	Current specifiable for output 1 and 2 (00.00 ... 22.00 mA)
Sensor monitor	Display of direct sensor signals (mV/temperature/operating time)
Relay test	Manual control of relay contacts
Device type	Selecting the measuring function
Data retention	Parameters, calibration data, logbook > 10 years (EEPROM)
Electrical safety	Protection against electric shock by protective separation of all extra-low-voltage circuits against mains according to EN 61010-1
Explosion protection (A402B)	see Control Drawing or www.knick.de
EMC	EN 61326
Emitted interference	Class B (residential environment)
Immunity to interference	Industrial environment
RoHS conformity	according to EC directive 2002/95/EC
Power supply	80 V (–15%) ... 230 (+10%) V AC ; ≤ 15 VA ; 45 … 65 Hz 24 V (–15%) … 60 (+10%) V DC ; 10 W Overvoltage category II, protection class II
Nominal operating conditions	
Ambient temperature	–20 ... +55 °C /–4 ... +131 °F
Transport/Storage temperature	–30 ... +70 °C / –22 ... +158 °F
Relative humidity	10 ... 95% not condensing
Enclosure	Molded enclosure made of PBT/PC, glass fiber reinforced
Mounting	Wall, pipe/post or panel mounting
Color	Gray, RAL 7001
Ingress protection	IP 67 / NEMA 4X outdoor (with pressure compensation)
Flammability	UL 94 V-0
Dimensions	H 148 mm, W 148 mm, D 117 mm
Control panel cutout	138 mm x 138 mm to DIN 43 700
Weight	1.2 kg (1.6 kg incl. accessories and packaging)
Cable glands	3 knockouts for M20 x 1.5 cable glands 2 knockouts for NPT ½" or rigid metallic conduit
Connections	Terminals, conductor cross section max. 2.5 mm^2

*) user-defined

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

HART communication	Digital communication via FSK modulation of output current 1
	Device identification, measured values, status and messages, parameter setting, calibration, records
Conditions	Output current ≥ 3.8 mA and load resistance ≥ 250 ohms

*) user-defined
1) according to IEC 746 Part 1, at normal operating conditions

-01- Mettler-Toledo
(corresponds to former "Knick technical buffers")

°C	pH			
0	2.03	4.01	7.12	9.52
5	2.02	4.01	7.09	9.45
10	2.01	4.00	7.06	9.38
15	2.00	4.00	7.04	9.32
20	2.00	4.00	7.02	9.26
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

pH

-02- Knick CaliMat
(Values also apply to Merck-Titrisols, Riedel-de-Haen Fixanals.)

°C	**pH**				
Order No.	CS-P0200A/...	CS-P0400A/...	CS-P0700A/...	CS-P0900A/...	CS-P1200A/...
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

-03- Ciba (94) buffers
Nominal values: 2.06 4.00 7.00 10.00

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

* extrapolated

pH

-04- Technical buffers to NIST

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

* Values complemented

-05- NIST standard buffers
NIST Standard (DIN 19266 : 2015-05)

°C	pH				
0	1.666	4.000	6.984	9.464	
5	1.668	3.998	6.951	9.395	13.207
10	1.670	3.997	6.923	9.332	13.003
15	1.672	3.998	6.900	9.276	12.810
20	1.675	4.000	6.881	9.225	12.627
25	**1.679**	**4.005**	**6.865**	**9.180**	**12.454**
30	1.683	4.011	6.853	9.139	12.289
35	1.688	4.018	6.844	9.102	12.133
37		4.022	6.841	9.088	
38	1.691				12.043
40	1.694	4.027	6.838	9.068	11.984
45					11.841
50	1.707	4.050	6.833	9.011	11.705
55	1.715	4.075	6.834	8.985	11.574
60	1.723	4.091	6.836	8.962	11.449
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	

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
Nominal values: 4.01 7.00 10.01 (± 0,02 at 25 °C)

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

* Values complemented

-07- WTW techn. buffers

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

pH

-08- Hamilton Duracal buffers

°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

* Values complemented

-09- Reagecon buffers

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

* Values complemented

pH

-10- DIN 19267 buffers

°C	pH				
0	1,08	4,67	6,89	9,48	13,95*
5	1,08	4,67	6,87	9,43	13,63*
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
95	1,13*	4,82*	6,81*	8,81*	10,89*

* Values extrapolated

-U1- Specifiable Buffer Set

You can specify a buffer set with 2 buffer solutions in the temperature range of 0 ... 95 °C, step width: 5 °C.
To do so, select buffer set -U1- in the configuration menu.
As delivered, the Ingold technical buffer solutions pH 4.01 / 7.00 are stored as buffer set and can be edited.

Conditions for the specifiable buffer set:

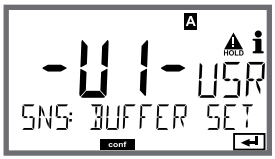
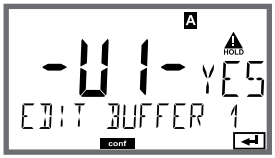
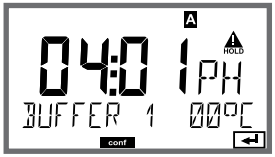
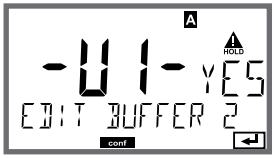
- All values must lie in the range pH 0 ... 14.
- Maximum difference between two adjacent pH values (5 °C step width) of the same buffer solution: pH 0.25
- The values of buffer solution 1 must be lower than those of buffer solution 2:
  The difference between values for identical temperatures must be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

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

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

-U1- Specifiable Buffer Set

pH

Step	Action/Display	Remark
Select buffer set -U1- (CONFIG / SNS menu)		
Select buffer solution 1 for editing.	 Select "YES" using up/ down arrow.	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		

D

Q

R

S

T

U

W

Z

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Stratos Evo A402: pH Measurement

TA-212.101-pH-KNE01 20170831 Software version: 1.x