Operating Instructions
Liquiline To Go Ex CYM291

Endress+Hauser
People for Process Automation

Warranty
Defects occurring within 3 years from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender).
Subject to change.

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".

Registered Trademarks
The following names are registered trademarks. For practical reasons they are shown without trademark symbol in this manual.
- Memosens®
- Liquiline®
- Sensocheck®
- Sensoface®

Table of Contents

6 Package Contents

Check the shipment for transport damage and completeness.
The package of the Liquiline To Go Ex CYM291 includes:

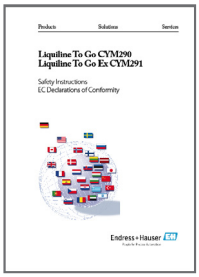
	Liquiline To Go Ex CYM291
Meter incl. 4 AA batteries and premounted quiver	√
Carrying strap	√
Data carrier with detailed user manuals	√
USB cable, 1.5 m	√
Safety instructions	√
Quickstart instructions in various languages	√
Certificates	√

Specific Test Report

CD-ROM

Complete documentation:

- User manuals in different languages
- Safety instructions
- Certificates
- Quickstart guides

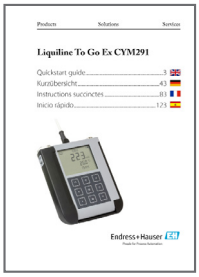


Safety Instructions

In official EU languages and others.

- EU Declarations of Conformity

CAUTION!
These safety instructions are part of the product documentation and must be observed.



Quickstart Guides

Installation and first steps:

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

Various languages on CD-ROM:

- German
- English
- French
- Italian
- Spanish
- Portuguese (Brazil)

Certificates

The Liquiline To Go Ex CYM291 is a portable multiparameter meter for measuring **pH, ORP**, **conductivity** or **oxygen**. With a plain text line on a high-contrast LCD, operation is largely intuitive.

The meter stands out by the following features:

- Application in hazardous locations up to Zone 0
- Use of digital Memosens sensors
- A detachable quiver protects the sensor and prevents it from drying out. Furthermore, it can be used for calibration.
- The rugged housing is made of a high-performance polymer. It provides high impact resistance and dimensional stability even when exposed to extreme moisture.
- Scratch-proof clear glass display, perfectly readable even after years
- Very long operating time with one set of batteries (4 x AA) for reliable operation even at high or very low operating temperatures
- Data logger with 5000 values
- Micro USB port
- Sensoface icons provide single-glance information on the sensor condition (page 9)
- Real-time clock and indication of battery charging level

Value-Added Features

Memosens

The Liquiline To Go Ex CYM291 can communicate with Memosens sensors. These digital sensors are automatically identified and the meter switches to the appropriate measurement method.
When a Memosens sensor is connected to the meter, it is indicated by the logo shown on the right. Furthermore, Memosens allows the storage of calibration data, which will be available and can still be used when the sensor is connected to another Memosens-capable device.

Sensoface

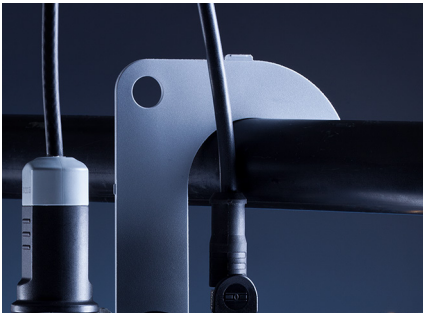
Sensoface provides quick information on the sensor condition. The three "smiley" faces as shown on the right represent the sensor condition during measurement and after a calibration. When the condition deteriorates, an "INFO …" message gives a hint to the cause.

Programmed buffers

"Programmed buffers" is a very convenient method for pH calibration with automatic buffer recognition. You only have to select the buffer set with the buffers used. The buffers can then be used in any order.

Protective Cover

The front of the meter is protected by a cover, which can be completely flipped over and secured to the back for operation.



Hook

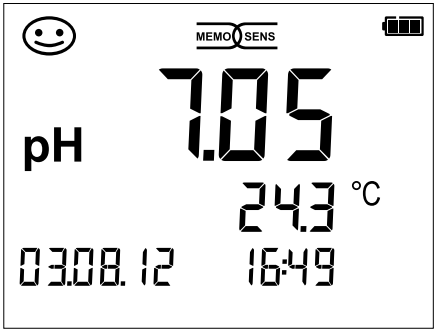
A fold-out hook on the back allows suspending the meter. This leaves your hands free for the actual measurement. The **rating plate** is located beneath the hook.

Protective Cover and Hook Combined

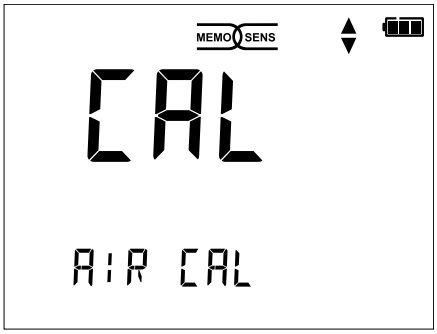
Cover and hook can be joined together to form a benchtop stand allowing comfortable and fatigue-free working at a lab bench or desk.

Display

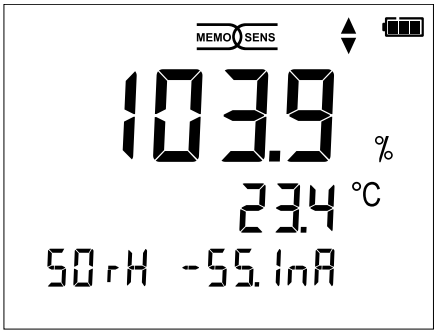
The meter has a three-line display for representing alphanumeric information such as measurement and calibration data, temperatures and date/time. Additional information is provided by means of icons (Sensoface, battery icon, etc.).
Some typical displays are shown here.



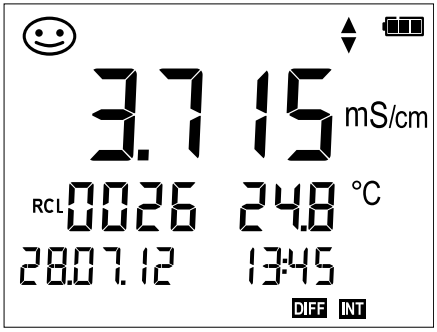
pH measurement
(display of measured value, temperature, date and time)



Oxygen calibration – step 1
(calibration in air)

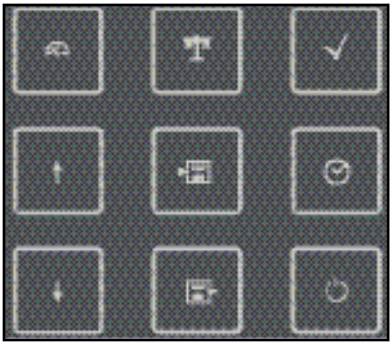


Oxygen calibration – step 2
(adjusting the relative humidity)



Logger data for conductivity
(display of measured value, memory location, temperature, date and time)

Clock
(display of hours and minutes, seconds and date)



Keypad

The keys of the membrane keypad have a noticeable pressure point.
They have the following functions:

- **Switches the meter on and displays the device and calibration data** (see Start-up)
- Switches the meter on / Activates measuring mode / Stops the data logger
- Starts calibration
- Activates configuration / Confirms entries
- Displays time and date, allows setting the clock using **set**
- View stored values
- Holds and saves a measured value, allows setting and starting the logger by pressing √ (page 32)
- ▲ ▼ When this icon is displayed, you can use the arrow keys for navigation.

Check the shipment for transport damage and completeness (see Package Contents).

NOTICE!

Do not operate the device when one of the following conditions applies:

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

In this case, a professional routine test must be performed.
This test should be carried out at our factory.

Precautions for application in hazardous locations

WARNING!

- Only open the battery compartment of the Liquiline To Go Ex CYM291 outside the hazardous location.
- Never try to open the device. If a repair should be required, return the device to our factory.
- Never use the USB port within the hazardous location.

Inserting the Batteries

With four AA batteries, the Liquiline To Go Ex CYM291 has an operating time of approx. 500 h.
Open the battery compartment on the rear of the device. Be sure to observe the correct polarity when inserting the batteries (see markings in the battery chamber). Close the battery compartment cover and screw it handtight.

A battery icon in the display indicates the battery power level:

	Icon fully filled	Batteries at full capacity
	Icon partially filled	Battery capacity is sufficient
	Icon empty	Battery capacity not sufficient; calibration is possible, no logging
	Icon blinks	Only a few operating hours remaining, measurement is still possible **NOTICE!** It is absolutely necessary to replace the batteries.

WARNING!
When operating the Liquiline To Go Ex CYM291 in a hazardous location, only the battery types listed below may be used. The batteries must be from the same manufacturer and of identical type and capacity. Never use new and used batteries together ("Certificates", Control Drawing 209.009-150).

IECEx

Batteries for Application in Hazardous Locations

Batteries (4x each)	Temp. class	Ambient temperature range
Duracell MN1500	T4	–10 °C ≤ Ta ≤ +40 °C
Energizer E91	T3	–10 °C ≤ Ta ≤ +50 °C
Power One 4106	T3	–10 °C ≤ Ta ≤ +50 °C
Panasonic Pro Power LR6	T3	–10 °C ≤ Ta ≤ +50 °C

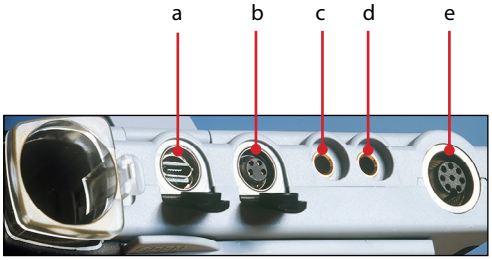
Connecting a Sensor

The Liquiline To Go Ex CYM291 provides several connections so that many types of sensors can be used for measurement (see illustration below). Note that only **one** sensor may be connected to the meter at a time. The meter recognizes the connected Memosens sensor and displays the Memosens logo.

Separate temperature probe

After power-on, a separate temperature probe is automatically recognized. When you want to replace the temperature probe, you must switch off the meter and then switch it on again.

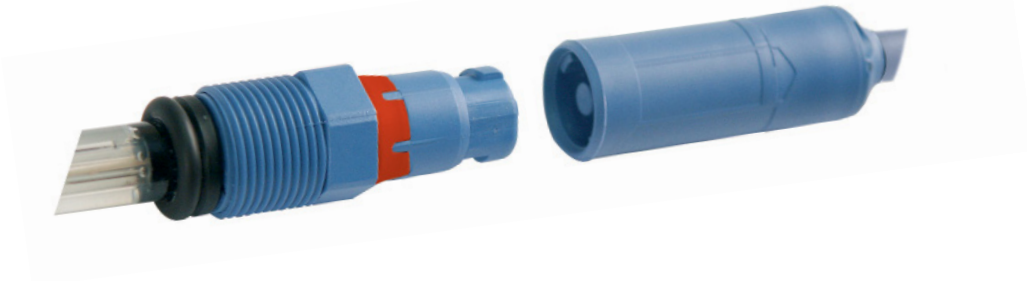
WARNING!
When using sensors without explosion protection approval, the Ex approval of the Liquiline To Go Ex CYM291 will be invalidated. Therefore, use the device only with sensors which have an appropriate Ex approval.

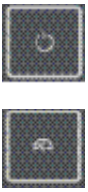


Connections

a - Micro USB port
b - M8, 4 pins, for Memosens lab cable
c - Temperature probe – GND
d - Temperature probe
e - M12, 8 pins, for Memosens sensors

Memosens sensors have a **cable coupling**, which allows convenient replacement of sensors while the cable remains connected to the meter. The connecting cable is connected to socket **b** (M8, 4 pins) or **e** (M12, 8 pins).





Switching On the Meter

When you have connected the sensor, you can switch the meter on by pressing the ⏻ or key.

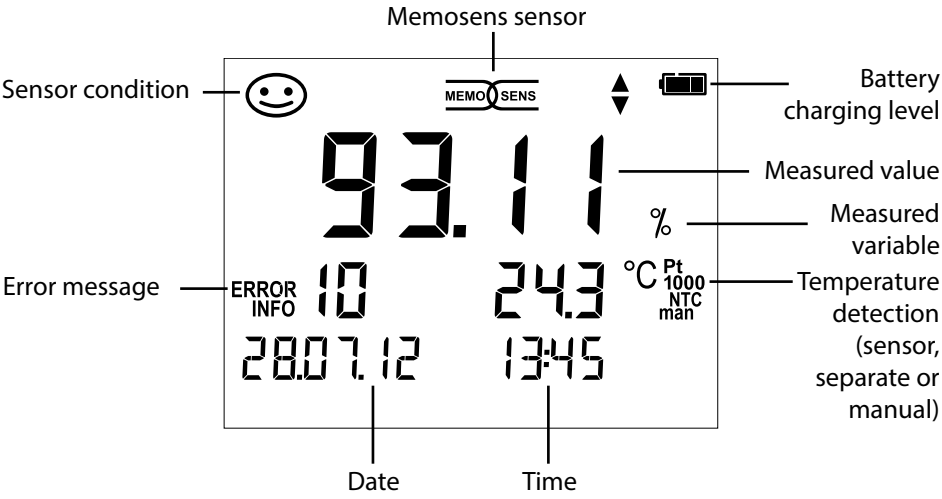
When the meter is switched on with the ⏻ key, first a self test is performed and then the calibration data and settings are displayed before the meter switches to measuring mode.

When the meter is switched on with the key, it immediately switches to measuring mode.

Depending on the connected sensor and the specific measuring task, several steps for configuration and calibration must be performed as described on the following pages.

Icons

Important information about the state of the device:



Configuration (pH)

Configuration is required to match the connected sensor and the desired measurement performance. Furthermore, you can select the suitable calibration method. The following table gives you an overview. Factory settings are shown in **bold print**.

Measurement
↓ √

"Setup" display

Select using arrow keys, confirm by pressing √.

Display 1	**pH x.xx** | pH x.xxx | mV
Display 2	**OFF** | date + time | date | time
CAL Timer	**OFF** | 1 ... 99 days
CAL	**PROG.BUFFERS**|Manual|DATA INPUT|(ISFET-Zero)| FREE CAL
CAL POINTS	1 | 2 | 3 | **1-2-3** (for PROG.BUFFERS, Manual, FREE CAL)
BUFFER SET (PROG.BUFFERS, FREE CAL) ▲▼ √	**-01- Endress+Hauser** 2.00|4.01|6.98|9.95|11.87 -02- Mettler-Toledo 2.00|4.01|7.00|9.21 -03- Knick CaliMat 2.00|4.00|7.00|9.00|12.00 -04- Ciba (94) 2.06|4.00|7.00|10.00 -05- NIST technical 1.68|4.00|7.00|10.01|12.46 -06- NIST standard 1.679|4.006|6.865|9.180 -07- HACH 4.01|7.00|10.01|12.00 -08- WTW techn. buffers 2.00|4.01|7.00|10.00 -09- Hamilton 2.00|4.01|7.00|10.01|12.00 -10- Reagecon 2.00|4.00|7.00|9.00|12.00 -11- DIN 19267 1.09|4.65|6.79|9.23|12.75
Auto OFF	**OFF**| 0.1h | 1h | 6h | 12h
Temp Unit	**°C** | °F
Time Format	**24h** | 12h
Date Format	**dd.mm.yy** | mm.dd.yy
Default	**NO** | YES (reset to factory settings) **Note:** All data logger entries will be deleted.

▲ This icon prompts you to select a menu item using the arrow keys –
▼ the selection is confirmed by pressing √.

Cond

Configuration (Cond)

Configuration is required to match the connected sensor and the desired measurement performance. Furthermore, you can select the suitable calibration method. The following table gives you an overview. Factory settings are shown in **bold print**.

Measurement

↓ √

"Setup" display

Select using arrow keys, confirm by pressing √.

Display	**Cond** | SAL g/kg | TDS mg/l
MOHM cm	**OFF** | On
Cond Unit	**mS/cm** | S/m
TDS Factor	0.0 … **1.0** (if display = TDS)
TC *	**OFF** | LINEAR | NLF | NACL | HCL | NH3 | NAOH (if display = Cond)
TC LINEAR	0.0 … 20.0 %/K | **2.1 %/K** (if TC = LINEAR)
REF. Temp.	0 … 100 °C | **25 °C** (32 … 212 °F | **77 °F)** (if TC = LINEAR)
CAL	**CELL CONST.** | COND | <25°C> 74.0µS/cm | <25°C> 149.6µS/cm | <25°C> 1.406mS/cm | <25°C> 12.64mS/cm | <25°C> 107.00mS/cm |FREE CAL
Auto OFF	**OFF** | 0.1h | 1h | 6h | 12h
Temp. Unit	**°C** | °F
Time Format	**24h** | 12h
Date Format	**dd.mm.yy** | mm.dd.yy
Default	**NO** | YES (reset to factory settings) **Note**: All data logger entries will be deleted.

▲ This icon prompts you to select a menu item using the arrow keys –
▼ the selection is confirmed by pressing √.

* Temperature compensation

Configuration (Oxy)

Configuration is required to match the connected sensor and the desired measurement performance. Furthermore, you can select the suitable calibration method. The following table gives you an overview. Factory settings are shown in **bold print**.

Measurement

↓ √

"Setup" display

Select using arrow keys, confirm by pressing √.

Display 1	**Saturation in % air** | Concentration in mg/l
Display 2	**OFF** | date + time | date | time
Altitude	**0** … 4000 m
Salt Correct	**0.0** … 45.0 g/kg
CAL	**AIR CAL** | ZERO CAL | DATA INPUT | FREE CAL
▲ CAL Timer	√ ↔ **OFF** | 1 … 99 days
▼ Auto OFF	**OFF** | 0.1h | 1h | 6h | 12h
Temp Unit	**°C** | °F
Time Format	**24h** | 12h
Date Format	**dd.mm.yy** | mm.dd.yy
Default	**NO** | YES (reset to factory settings) **Note**: All data logger entries will be deleted.

▲ This icon prompts you to select a menu item using the arrow keys –
▼ the selection is confirmed by pressing √.

pH

"Programmed Buffers" Calibration

(Calibration with automatic buffer recognition)

The calibration method is selected in the configuration menu. Calibration is required to adjust the sensor to the meter. It is indispensable for achieving comparable and reproducible measurement results.

Measurement

↓ ⚖

CAL
PROG. BUFFERS

Calibration method, the number of calibration points and the buffer set have been selected in the configuration menu.

↓

CAL **1**/2/3
PRESS CAL

Dip sensor in **1st**/2nd/3rd buffer solution.
It does not matter which buffer solution is taken first.

↓ ⚖

pH, mV value,
temperature

↓

Depending on the number of calibration points, the procedure described above for CAL **1**/2/3 is repeated.

mV value blinks until calibration is completed, then successive display of:
CAL DATA
1/2/3 CAL POINTS
ZERO POINT
SLOPE
Then the meter switches to measuring mode.

Please note: To abort calibration, you can press ⏲ at any time.
This will be confirmed by the display message "CAL ABORTED".
Exception: When you have selected "CAL POINTS 1-2-3" and the first calibration step has been completed, the calibration process cannot be stopped any more.

DATA INPUT Calibration

(Calibration by entering known sensor values)

The calibration method is selected in the configuration menu.

Measurement

↓ T

CAL
DATA INPUT

↓

ZERO POINT — Use ▲▼ to select the value for the zero point.

↓ T

SLOPE — Use ▲▼ to select the value for the slope.

↓ T

The calibration data will be displayed successively:
Date and time
ZERO POINT
SLOPE
Then the meter switches to measuring mode.

Please note: To abort calibration, you can press ⏲ at any time.

pH

MANUAL Calibration

(Manual calibration)

The calibration method is selected in the configuration menu.

Measurement

↓ T

CAL
MANUAL

The number of calibration points has been selected in the configuration menu.

↓

CAL **1**/2/3
PRESS CAL

↓ T

pH display blinks
PRESS CAL

Take the temperature-corrected pH value from the buffer description and enter it using ▲▼.

↓ T

mV display blinks

↓

Depending on the number of calibration points, the procedure described above for CAL **1**/2/3 is repeated.

mV value blinks until calibration is completed, then successive display of:
CAL DATA
1/2/3 CAL POINTS
ZERO POINT
SLOPE
Then the meter switches to measuring mode.

Please note: To abort calibration, you can press ⌓ at any time.
This will be confirmed by the display message "CAL ABORTED".
Exception: When you have selected "CAL POINTS 1-2-3" and the first calibration step has been completed, the calibration process cannot be stopped any more.

FREE CAL Calibration

(Free selection of calibration method)

FREE CAL calibration is selected in the configuration menu.

Measurement

↓ ⚖

CAL
PROG. BUFFERS blinks

Use ▲▼ to select the required calibration method (PROG. BUFFERS, DATA INPUT or MANUAL).

↓ ⚖

Perform the selected calibration (see PROG. BUFFERS, DATA INPUT or MANUAL calibration).

Cond

CELL CONST. Calibration

(Calibration by entry of cell constant)

The calibration method is selected in the configuration menu.

Measurement

↓ T

CAL
CELL CONST.

The conductivity will be shown in the display and can be compared with a reference solution (temperature-corrected).

↓

Value blinks

Use ▲▼ to select the value for the cell constant.

↓ T

Calibration will be performed. Automatic return to measuring mode.

COND Calibration

(Calibration by entry of conductivity)

The calibration method is selected in the configuration menu.

Measurement

↓ T

CAL
COND

Dip sensor in solution.

↓

Value blinks

Use ▲▼ to adjust the temperature-corrected conductivity value. NOTICE: Here, the meter does not perform a temperature compensation!

↓ T

Calibration will be performed. Automatic return to measuring mode.

Calibration with Calibration Solution

(Automatic calibration with preselected calibration solution)

The calibration method is selected in the configuration menu.

NOTICE!

- Make sure that the values of the calibration solutions used correspond exactly to those specified in this manual. If not, the resulting cell constant will be incorrect.
- When calibrating in a liquid, make sure that the sensor, the separate temperature probe (if present) and the calibration solution have the same temperature. Only this ensures that the cell constant is determined correctly.

Measurement

↓

CAL
<25°C> 107.00mS/cm
PRESS CAL

Dip sensor in calibration solution.
The meter automatically compensates for the temperature deviation!

↓

Measured value
Temperature
Cal solution conductivity
Hourglass blinks

↓

Calibration will be performed. Automatic return to measuring mode.

Cond

FREE CAL Calibration

(Free selection of calibration method)

FREE CAL calibration is selected in the configuration menu.

Measurement

↓ T

CAL
CELL CONST. blinks

Use ▲▼ to select the desired calibration method (CELL CONST., COND, <25°C> 74.0µS/cm, <25°C> 149.6µS/cm, <25°C> 1.406mS/cm, <25°C> 12.64mS/cm, <25°C> 107.00mS/cm).

↓ T

Perform the selected calibration (see CELL CONST., COND or calibration solution).

AIR CAL Calibration

(Calibrating the slope in air)

The calibration method is selected in the configuration menu.

Measurement

↓ ⚖

CAL
AIR CAL

Place sensor in air and wait until the measured values have stabilized.

↓

Measured value
Temperature
xxx rH blinks

Use ▲▼ to adjust the correct value for relative humidity.

↓ ⚖

xxx nA blinks
Hourglass blinks

Calibration will be performed.

↓

CAL DATA

↓

Date
SLOPE xxx nA

Slope calibration data is displayed.

↓

Automatic return to measuring mode.

Please note: To abort calibration, you can press ⏲ at any time.

Oxy

ZERO CAL Calibration

(Zero calibration with oxygen-free medium)

The calibration method is selected in the configuration menu.

Measurement	
↓	
CAL ZERO CAL	
↓	
xxx nA PRESS CAL blinks	Place sensor in oxygen-free medium (e.g., nitrogen 5.0) and wait until the measured values have stabilized.
↓	
CAL DATA	Calibration will be performed.
↓	
Date ZERO P. xxx nA	Zero calibration data is displayed.
↓	
Date SLOPE xxx nA	Slope calibration data is displayed.
↓	

Automatic return to measuring mode.

Please note: To abort calibration, you can press at any time.

DATA INPUT Calibration

(Calibration by entering known sensor values)

The calibration method is selected in the configuration menu.

Measurement

↓ ⚖

CAL
DATA INPUT

↓

xx blinks
nA
ZERO POINT

Use ▲▼ to adjust the known value for the sensor zero point.

↓ ⚖

xxx blinks
nA
SLOPE

Use ▲▼ to adjust the known value for the sensor slope.

↓ ⚖

Calibration will be performed. Automatic return to measuring mode.

Please note: To abort calibration, you can press ⏲ at any time.

Oxy

FREE CAL Calibration

(Free selection of calibration method)

FREE CAL calibration is selected in the configuration menu.

Measurement

↓ T

CAL
AIR CAL blinks

Use ▲▼ to select the desired calibration method (AIR CAL, ZERO CAL, DATA INPUT).

↓ T

Perform the selected calibration (see AIR CAL, ZERO CAL or DATA INPUT calibration).

pH | Oxy | Cond

Keys for measurement

Once you have completed all preparations, you can start with the actual measurement.

1) Connect the desired sensor to the meter. Some sensors require a special preparation. Please proceed according to the operating instructions for the sensor.
2) Switch the device on using the ⏻ or ⌓ key.
3) Depending on the measurement method and the sensor used, immerse the sensing part of the sensor in the medium to be measured.
4) Watch the display and wait for the reading to stabilize.
5) By pressing the ▸☰ key, you can hold and save a measured value (see data logger, page 32).

Toggling the Measured Value Display

During measurement, you can toggle the measured value display by pressing ⌓:

- pH: between pH and mV
- Cond: between compensated and uncompensated measured value (when temperature compensation, SAL or TDS are activated)
- Oxy: not applicable

Adjusting the Temperature

When you connect a sensor without temperature detector, you can manually adjust the temperature for measurement or calibration:

1) Press ⌓ to access measuring mode.
   The adjusted temperature will be displayed.
2) Set the desired temperature value using the ▼ or ▲ arrow.
   Holding the key depressed changes the temperature value at high speed.

pH | Oxy | Cond

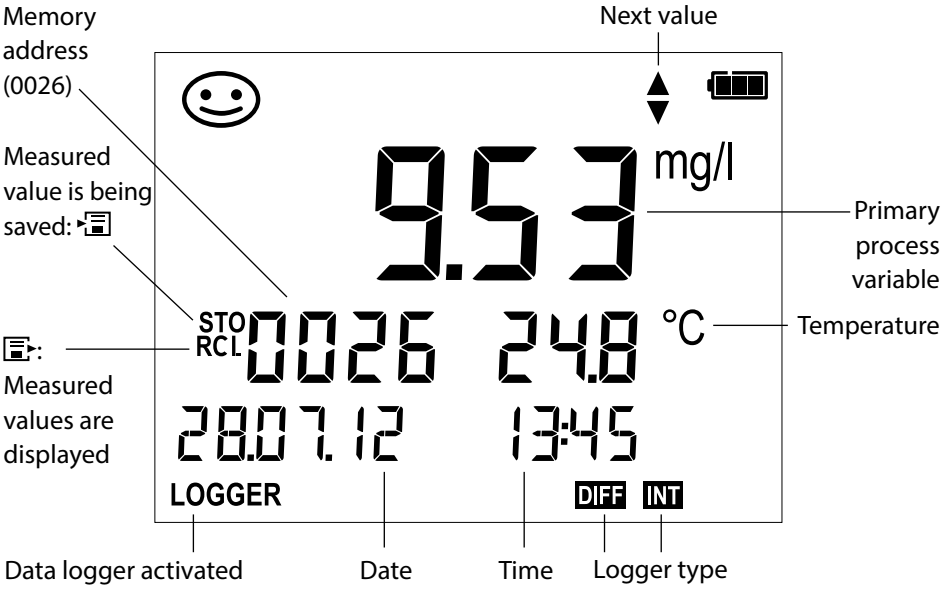
Data Logger

The meter provides a data logger. **Prior to use**, it must be configured and then activated. You can choose from the following logger types:

- DIFF (signal-controlled logging of measured variable and temperature)
- INT (time-controlled logging at a fixed interval)
- DIFF+INT (combined time- and signal-controlled logging)
- SHOT (manual logging by pressing the key)

The data logger records up to 5000 entries and saves them in a circular buffer. Already existing entries will be overwritten.
The following data are recorded: primary value, temperature, time stamp and device status.

Display: Icons related to the data logger



Operating Modes of the Data Logger (Logger Type)

Manual logging when logger is activated (SHOT)

In this mode, a measured value is recorded when the key is pressed.

Measurement Logger **activated**

The measured value is saved to the address of the last recorded value + 1

Manual logging when logger is deactivated

Measurement Logger **deactivated**

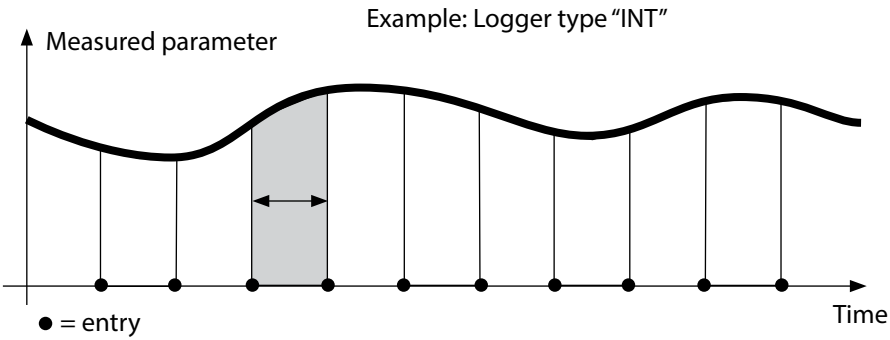
Measured value is maintained Proposed address blinks (address of the last recorded value + 1)

If desired: Select start address using ▲▼.

Measured value is saved to the desired address (e.g., for overwriting an incorrect measurement).

Interval (INT)

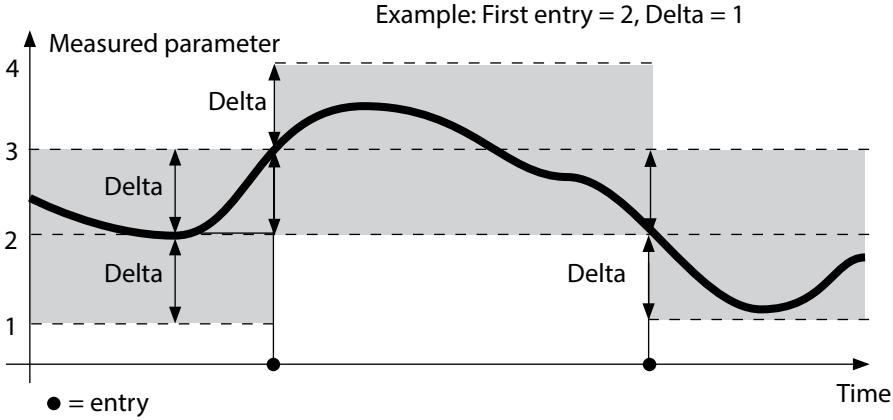
In this mode, the measured values are cyclically recorded.



pH | Oxy | Cond

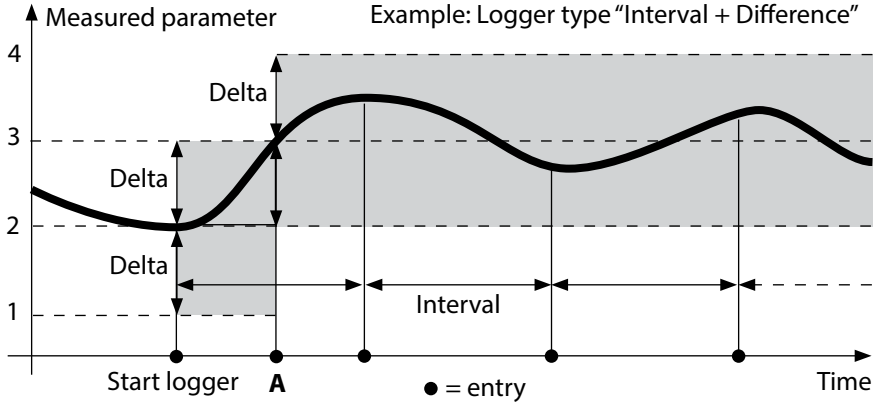
Difference (DIFF)

When the delta range (process variable and/or temperature) related to the last entry is exceeded, a new entry is created and the delta range is displaced upwards or downwards by the delta value. The first entry is automatically created when the data logger is started.



Difference + Interval combined (DIFF+INT)

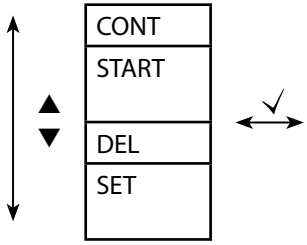
When the delta range related to the last DIFF entry is exceeded, a new entry is created (example: entry **A**) and the delta range is displaced upwards or downwards by the delta value. As long as the measured value remains within the delta range, logging is performed at the preset interval. The first DIFF entry is automatically created when the data logger is started.



Data Logger Menu

Logger display

Select using arrow keys, confirm by pressing √.



CONT	Select start address and start the data logger
START	Deletes all entries and starts the data logger at start address 0001
DEL	Deletes all entries
SET	Select logger type and configure: DIFF, INT, DIFF+INT, SHOT (see table below)

Overview of data logger menu (default in bold print)			
Logger type	DIFF	Delta % **air**	OFF | 0.1 … 100 % air | **1.0 % air** OFF | 0.01 … 20 mg/l | **1.00 mg/l**
		Delta **pH**	OFF | pH 0.01…14.00 | **pH 1.00** OFF | 1… 1000 mV | **1 mV**
		Delta **Cond**	OFF | **1** … 1000 mS/cm OFF | 0.1 … 100 S/m | **1 S/m**
		Delta SAL	OFF | **0.1** … 45.0 g/kg
		Delta TDS	OFF | **1** … 1999 mg/l
		Delta °C / °F	OFF | 0.1 … 50.0 °C | **1.0 °C** OFF | 0.1 …100 °F | **1.0 °F**
	INT	Interval	h:mm:ss 0:00:01 … 9:59:59 | **12:02:00 AM**
	DIFF+INT	DIFF	See logger type DIFF
		INT	See logger type INT
	SHOT	Currently selected process variable is recorded	

pH | Oxy | Cond

Configuring the Data Logger

Prerequisite: The data logger is stopped (press).

Measurement

↓

Measured value is maintained

↓ ✓

Logger: CONT blinks

↓ ▼

Logger: START blinks

↓ ▼

Logger: DEL blinks

↓ ▼

Logger: SET blinks

↓ ✓

Logger: Current logger type blinks

Select desired logger type using ▲▼: DIFF, INT, DIFF+INT or SHOT.

↓ ✓

Select the appropriate parameters using ▲▼ and confirm each selection by pressing ✓. When configuration is finished, CONT blinks. You can start the data logger by selecting START or CONT (see page 37).

Starting the Data Logger using CONT

Prerequisite: Data logger is configured. Every time the meter has been switched off, the data logger must be restarted (exception: SHOT).

Measurement

↓ 📠

Measured value is maintained

↓ √

Logger: CONT blinks

↓ √

Address of the last recorded value + 1 blinks (proposed start address)

If desired: Select start address using ▲▼.

↓ √

The measured value is saved to the selected start address (exception: SHOT).
"… FREE MEMORY" is displayed.
"LOGGER" and "active logger type" icons are displayed.

Starting the Data Logger using START

Prerequisite: Data logger is configured. All existing entries are deleted.
The start address for saving the values is 0001. Every time the meter has been switched off, the data logger must be restarted (exception: SHOT).

Measurement

↓ 📠

Measured value is maintained

↓ √

Logger: CONT blinks

↓ ▼

Logger: START blinks

↓ √

All entries will be deleted. "5000 FREE MEMORY" is displayed.
"LOGGER" and "active logger type" icons are displayed.

pH | Oxy | Cond

Displaying the Logger Data

Pressing the key displays all stored values.

Measurement

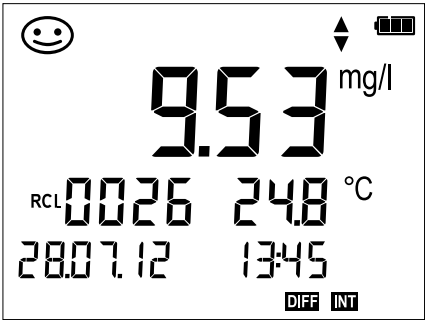
↓ key

The "RCL" icon and the last recorded value is displayed.

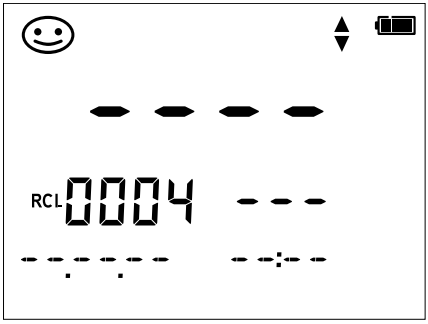
Use ▲▼ to select the desired address. Empty memory locations will also be displayed.

↓ key or

Return to measurement



Example:
Measured value stored at location 0026



Example:
Empty memory location 0004

Stopping the Data Logger

You can stop the data logger at any time by pressing the key.

Measurement, logger **activated**

Data logger is stopped. "LOGGER" and "active logger type" icons are no longer displayed. It is still possible to hold a measured value by pressing and send it to any desired address.

Clearing the Data Logger

Selecting "DEL" deletes all data records.

Measurement

Measured value is maintained

Logger: CONT blinks

Logger: START blinks

Logger: DEL blinks
PRESS SET

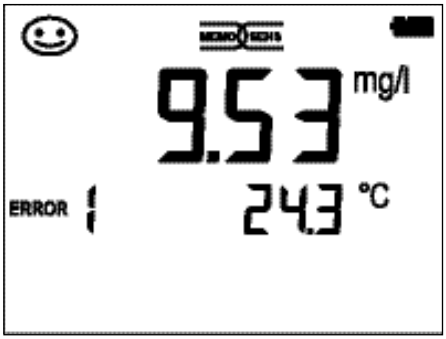
All stored data are deleted.
"0000 DELETED" is displayed.

pH | Oxy | Cond

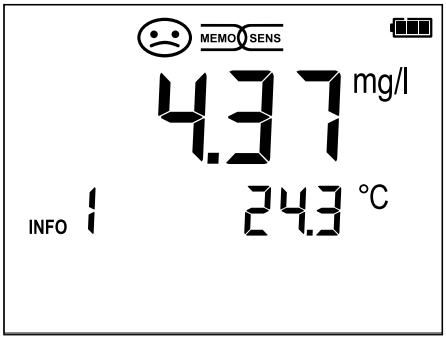
Press the ⏲ key to access the clock mode. Date and time will be displayed in the format as set in the configuration menu.
To set the clock, proceed as follows:

Display of time+date		
↓ √		
Hour display blinks SET HOUR	▲ ▼	Set value.
↓ √		
Minute display blinks SET MINUTE	▲ ▼	Set value.
↓ √		
Seconds display blinks and shows 00	√	Clock is started, the seconds count up.
↓ √		
Year display blinks SET YEAR	▲ ▼	Set value.
↓ √		
Month display blinks SET MONTH	▲ ▼	Set value.
↓ √		
Day display blinks SET DAY	▲ ▼	Set value.
↓ √		
Display of corrected time+date		

Error messages are indicated as "ERROR …" on the display. Information on the sensor condition is indicated by the "Sensoface" icon (friendly, neutral, sad) possibly accompanied by an info message ("INFO …").



Example of an error message:
ERROR 1 (value out of range)



Example of a "Sensoface" message:
INFO 1 (cal timer expired)

Sensoface (the "smiley" icon) provides information on the sensor condition (maintenance request). Measurement can still be performed. After a calibration, the corresponding Sensoface icon (friendly, neutral, sad) is shown together with the calibration data. Otherwise, Sensoface is only visible in measuring mode.

The most important error messages and "Sensoface" info messages are shown on the inside of the protective cover.
A complete list of messages and their meanings is provided in the following tables.

pH | Oxy | Cond

"Sensoface" Messages

The "Sensoface" icon provides information on the sensor condition:

Sensoface	Meaning
	Sensor is okay
	Calibrate the sensor soon
	Calibrate or replace the sensor

The "neutral" and "sad" Sensoface icons are accompanied by an "INFO …" message to give a hint to the cause of deterioration.

Sensoface	Message	Cause
	INFO 1	Calibration timer
	INFO 3	Sensocheck
	INFO 5	Zero/Slope
	INFO 6	Response time
	INFO 7	Operating point (asymmetry potential)
	INFO 8	Leakage current
	INFO 9	ORP offset
	INFO 10	Polarization

Error Messages

The following error messages can be shown in the display.

Message	Cause	Remedy
blinks	Battery empty	Replace batteries
ERROR 1	Value out of range	Check whether the measurement conditions correspond to the adjusted measuring range.
ERROR 2	ORP value out of range	
ERROR 3	Temperature value out of range	
ERROR 4	Zero point too high/low	Thoroughly rinse the sensor and recalibrate. If this does not help, replace the sensor.
ERROR 5	Slope too high/low	
ERROR 6	Cell constant too high/low	Enter nominal cell constant or calibrate the sensor using a known solution.
ERROR 8	Calibration error: Identical buffers	Use a buffer solution with a different nominal value before starting the next calibration step.
ERROR 9	Calibration error: Buffer unknown	Make sure that you use the same buffer set as configured.
ERROR 10	Calibration media interchanged	Repeat calibration.
ERROR 11	Measured value unstable Stability criterion not met	Leave the sensor in the liquid until the temperature is stable. If this does not help, replace the sensor.
ERROR 14	Time and date invalid	Set time and date
ERROR 18	Configuration invalid	Restart, reset to factory settings, configure and calibrate. If this does not help, send in the device for repair.
ERROR 19	Factory settings error	Device defective, send it in.
ERROR 21	Sensor error (Memosens)	Connect operational Memosens sensor.
ERROR 22	Sensor conflict	Connect only **one** sensor.

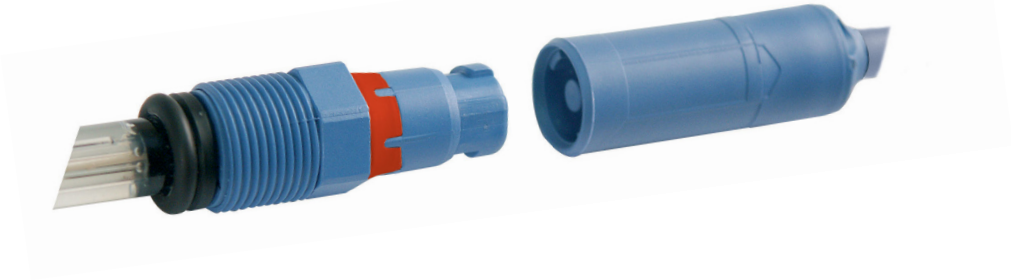
pH

pH Sensors

Product Name (Link to Product Configurator)	Sensor Type
Orbisint CPS11D	Digital pH sensor
Orbisint CPS12D	Digital ORP sensor
Memosens CPS16D	Combined digital pH/ORP sensor
Memosens CPS31D	Digital pH sensor
Ceraliquid CPS41D	Digital pH sensor
Ceraliquid CPS42D	Digital ORP sensor
Ceragel CPS71D	Digital pH sensor
Ceragel CPS72D	Digital ORP sensor
Memosens CPS76D	Combined digital pH/ORP sensor
Orbipore CPS91D	Digital pH sensor
Orbipore CPS92D	Digital ORP sensor
Memosens CPS96D	Combined digital pH/ORP sensor
Ceramax CPS341D	Digital non-glass pH sensor
Tophit CPS441D	Digital non-glass pH sensor
Tophit CPS471D	Digital non-glass pH sensor
Tophit CPS491D	Digital non-glass pH sensor
Orbipac CPF81D	Digital pH sensor
Orbipac CPF82D	Digital ORP sensor

The Product Configurator can be accessed at: www.endress.com/<product name>

Memosens sensors have a **cable coupling**, which allows convenient replacement of sensors while the cable remains connected to the meter.



Endress+Hauser Buffer Solutions (pH)

Ready-to-use quality pH buffer solutions

Quality buffers from Endress+Hauser - CPY20

Solutions which are traced by a DAkkS-accredited Endress+Hauser buffer laboratory (DkkS = German Accreditation Body) to a primary reference material of the PTB and to standard reference material of the National Institute of Standards and Technology (NIST) in accordance with DIN 19266 are used as secondary reference buffer solutions.

CPY20 Buffer Sets	Quantity
pH 2.00	5000 ml / 100 ml / 250 ml
pH 4.01	5000 ml / 100 ml / 250 ml / 18 ml
pH 6.98	5000 ml / 100 ml / 250 ml / 18 ml
pH 9.95	5000 ml / 100 ml / 250 ml
pH 11.87	5000 ml / 100 ml / 250 ml

Accessories for pH

Item

1.5 m sensor cable ATEX CYK20 BAB1C2

CPY7 electrolyte vessel, reservoir for KCl electrolyte, 150ml

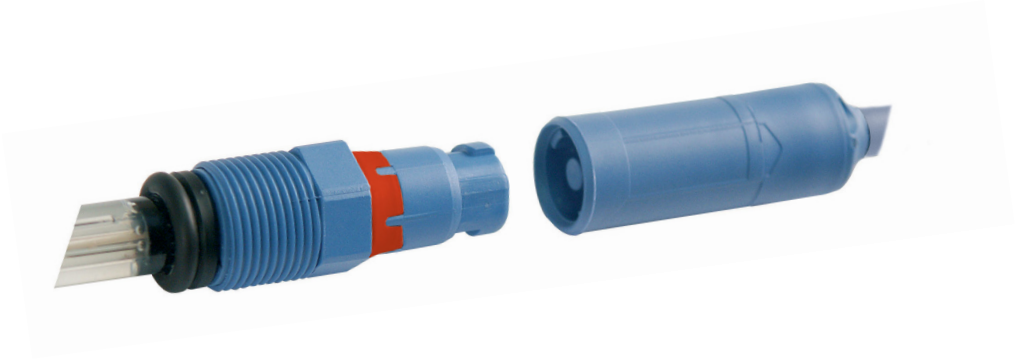
The Product Configurator can be accessed at:
www.endress.com

Cond

Conductivity Sensors

Product Name (Link to Product Configurator)	Sensor Type
Condumax CLS15D	Conductivity sensor
Condumax CLS16D	Conductivity sensor
Condumax CLS21D	Conductivity sensor
Memosens CLS82D	Conductivity sensor

Memosens sensors have a **cable coupling**, which allows convenient replacement of sensors while the cable remains connected to the meter.



CLY11 Conductivity Calibration Solutions

CLY11-A, 74 µS/cm (reference temp. 25°C (77 °F)), 500ml (16.9 fl.oz)
CLY11-B, 149.6 µS/cm (reference temp. 25°C (77 °F)), 500ml (16.9 fl.oz)
CLY11-C, 1.406 mS/cm (reference temp. 25°C (77 °F)), 500ml (16.9 fl.oz)
CLY11-D, 12.64 mS/cm (reference temp. 25°C (77 °F)), 500ml (16.9 fl.oz)
CLY11-E, 107.00 mS/cm (reference temp. 25°C (77 °F)), 500ml (16.9 fl.oz)

Accessories for Conductivity

Item (Link to Product Configurator)

1.5 m sensor cable ATEX CYK20 BAB1C2

Conducal CLY421 calibration set

- Conductivity calibration set (case) for ultrapure water applications
- Complete, factory-calibrated measuring set with certificate, traceable to SRM of NIST and DKD, for comparative measurement in ultrapure water up to max. 20 µS/cm
- Product Configurator on the product page: www.endress.com/cly421

The Product Configurator can be accessed at:
www.endress.com

Oxy

Oxygen Sensors

Product Name
(Link to Product Configurator)

Oxymax COS22D digital oxygen sensor

Accessories for Oxygen

Item

COS22Z maintenance kit

1.5 m sensor cable ATEX CYK20 BAB1C2

The Product Configurator can be accessed at:
www.endress.com

Connections	1x M8 socket, 4 pins, for Memosens lab cable 1 x M12 socket, 8 pins, for Memosens sensors 2 x 4-mm socket for separate temperature detector 1 x micro USB-B for operation without batteries **Be sure to observe the safety instructions when using the USB port.**	
Display	LCD STN 7-segment display with 3 lines and icons	
Sensoface	Status indication (friendly, neutral, sad)	
Status indicators	For battery power level, logger	
Notices	Hourglass	
Keypad	[⏻], [⚖], [⏲], [√], [▲], [▼], [▶], [▶], [🕒]	
Data logger	With up to 5000 memory locations	
Recording	Manual, interval- or event-controlled	
Communication	USB 2.0	
Profile	HID, driverless installation	
Usage	Data exchange	
Diagnostics		
Sensor data (Memosens only)	Manufacturer, sensor type, serial number, operating time	
Calibration data	Calibration date; zero and slope, or cell constant, resp.	
Device self-test	Automatic memory test (FLASH, EEPROM, RAM)	
Device data	Device type, software version, hardware version	
Data retention	Parameters, calibration data > 10 years	
EMC	EN 61326-1 (General Requirements)	
Emitted interference	Class B (residential area)	
Immunity to interference	Industry EN 61326-2-3 (Particular Requirements for Transmitters)	
Explosion protection	CYM291	
	Global	IECEx Ex ia IIC T4/T3 Ga
	Europe	ATEX II 1 G Ex ia IIC T4/T3 Ga

pH | Oxy | Cond

RoHS conformity	According to directive 2011/65/EU	
Power supply	4 x AA batteries For battery types, see Control Drawing No. 209.009-150	
Operating time	Approx. 500 h (alkaline)	
Nominal operating conditions		
Ambient temperature	-10 °C ≤ Ta ≤ +40 °C (+14 ... +104 °F) T4 -10 °C ≤ Ta ≤ +50 °C (+14 ... +122 °F) T3	Duracell MN1500 Energizer E91, Power One 4106 and Panasonic Pro Power LR6
Transport/Storage temp.	-25 … +70 °C (-13 ... +158 °F)	
Relative humidity	0 … 95 %, short-term condensing allowed	
Housing		
Material	PA12 GF30 (silver gray RAL 7001) + TPE (black)	
Protection	IP 66/67 with pressure compensation	
Dimensions	Approx. (132 x 156 x 30) mm	
Weight	Approx. 500 g	

Memosens pH input (also ISFET)	M8 socket, 4 pins, for Memosens lab cable or M12 socket, 8 pins, for Memosens sensors	
Display ranges [1]	pH	-2.00 … +16.00
	mV	-1999 … +1999 mV
	Temperature	-50 … +250 °C (-58 ... +482 °F)
Memosens input ORP	M8 socket, 4 pins, for Memosens lab cable or M12 socket, 8 pins, for Memosens sensors	
Display ranges [1]	mV	-1999 … +1999 mV
	Temperature	-50 … +250 °C (-58 ... +482 °F)
Sensor standardization *	ORP calibration (zero adjustment)	
Permissible calibration range	ΔmV (offset)	-700 … +700 mV
Sensor standardization *	pH calibration	
Operating modes *	PROG.BUFFERS	Calibration with automatic buffer recognition
	MANUAL	Manual calibration with entry of individual buffer values
	DATA INPUT	Data entry of zero and slope
"Programmed buffers" buffer sets *	-01- Endress+Hauser	2.00/4.01/6.98/9.95/11.87
	-02- Mettler-Toledo	2.00/4.01/7.00/9.21
	-03- Knick CaliMat	2.00/4.00/7.00/9.00/12.00
	-04- Ciba (94)	2.06/4.00/7.00/10.00
	-05- NIST technical	1.68/4.00/7.00/10.01/12.46
	-06- NIST standard	1.679/4.006/6.865/9.180
	-07- HACH	4.01/7.00/10.01/12.00
	-08- WTW techn. buffers	2.00/4.01/7.00/10.00
	-09- Hamilton	2.00/4.01/7.00/10.01/12.00
	-10- Reagecon	2.00/4.00/7.00/9.00/12.00
	-11- DIN 19267	1.09/4.65/6.79/9.23/12.75
Permissible calibration range	Zero point	6 ... 8 pH
	With ISFET: Operating point (asymmetry)	-750 … +750 mV
	Slope	Approx. 74 … 104 %
	(possibly restricting notes from Sensoface)	
Calibration timer *	Interval 1 … 99 days, can be switched off	
Sensoface	Provides information on the sensor condition	
Evaluation of	zero/slope, response, calibration interval	

* User-defined
1) Ranges depending on Memosens sensor

Cond

Conductivity input	M8 socket, 4 pins, for Memosens lab cable	
Measuring ranges	CLS15D	k = 0.01 : 0-20 µS/cm k = 0.1 : 0-200 µS/cm
	CLS16D	k = 0.1 : 0.04 µS/cm - 500 µS/cm
	CLS21D	k = 1 : 10.0 µS/cm - 20.0 mS/cm
	CLS82D	k = 1 µS/cm - 500 mS/cm
Permissible cell constant	0.005 … 200.0 cm^{-1} (adjustable)	
Measuring cycle	Approx. 1 s	
Temperature compensation	Linear 0 … 20 %/K, default 2.1%/K, reference temperature adjustable nLF: 0 … 120 °C NaCl HCl (ultrapure water with traces) NH3 (ultrapure water with traces) NaOH (ultrapure water with traces)	
Display resolution (autoranging)	Conductivity	0.001 µS/cm (c < 0.05 cm^{-1}) 0.01 µS/cm (c = 0.05 … 0.2 cm^{-1}) 0.1 µS/cm (c > 0.2 cm^{-1})
	Resistivity	00.00 … 99.99 MΩ cm
	Salinity	0.0 … 45.0 g/kg (0 … 30 °C)
	TDS	0 … 1999 mg/l (10 … 40 °C)
Sensor standardization	Cell constant	Input of cell constant with simultaneous display of conductivity value and temperature
	Input of solution	Input of conductivity of the calibration solution with simultaneous display of cell constant and temperature
	Auto	Automatic determination of the cell constant with calibration solution
Measurement error[1,2,3)]	< 0.5 % meas.val. + 0.4 µS * c [4)]	

1) according to EN 60746-1, at nominal operating conditions
2) ± 1 count
3) plus sensor error
4) c = cell constant

Memosens input, oxygen	M8 socket, 4 pins, for Memosens lab cable or M12 socket, 8 pins, for Memosens sensors	
Display ranges [1]	Saturation	0.000 ... 200.0 %
	Concentration	000 µg/l … 20.00 mg/l
Temperature meas. range [1]	-20 … +150 °C	
Sensor standardization	Automatic calibration in air (100 % RH) Zero calibration	

1) Ranges depending on Memosens sensor

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