The Art of Measuring. Knick

User Manual
English

# Portavo® 904(X) PH


Latest Product Information: www.knick.de

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

- Calimatic®
- Memosens®
- Paraly®
- Portavo®
- Sensocheck®
- Sensoface®

# Table of Contents

# 6 Package Contents

Check the shipment for transport damage and completeness.
The package of the Portavo 904(X) PH includes:

- The Portavo 904(X) PH incl. 4 AA batteries and premounted quiver
- Carrying strap
- Quickstart instructions in various languages
- Specific test report
- Safety instructions
- Certificates
- Data carrier with detailed user manuals and Paraly SW 112 software
- USB cable, 1.5 m

## Specific Test Report

## CD-ROM

Complete documentation:

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

## Safety Instructions

In official EU languages and others.

- EC Declarations of Conformity

## Certificates

- IECEx
- ATEX

## Quickstart Guides

Installation and first steps:

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

Various languages on CD-ROM and on our website:
www.knick.de

# 8 Overview of the Portavo 904(X) PH


**The Portavo 904(X) PH** is a portable pH meter. A plain-text line on the high-contrast LCD screen makes operation virtually self-explanatory. The device variant 904 X PH is available for applications in hazardous locations up to Zone 0.
The meter stands out by the following features:

- Use of digital Memosens sensors
- Memosens sensors and DIN pH sensors can be used on one device.
- 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 times with one set of batteries (4 x AA) or use of a Li-ion battery for reliable operation even at high or very low operating temperatures (Li-ion battery not suited for Portavo 904 X PH for application in a hazardous location)
- Data logger with 5000 values
- Micro USB port for communication with Paraly SW 112 software for data evaluation of digital sensors (Memosens)
- Sensoface icons provide single-glance information on the sensor condition (page 34)
- Calibration with "Calimatic" automatic buffer recognition (page 18)
- Manual calibration by entering individual buffer values
- Real-time clock and indication of battery charging level
- At measuring temperatures from -20 to +100 °C the temperature detector can be automatically identified.

## Value-Added Features

**Memosens**

The Portavo 904 can communicate with Memosens sensors. When these digital sensors are connected to the meter, they are automatically identified and 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.

**Automatic calibration with Calimatic**

Calimatic 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.

As delivered, this calibration method is preset. It can be adjusted or disabled in the configuration menu.

## 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. A label on the inner side of the cover explains the control functions and device messages.

## Hook

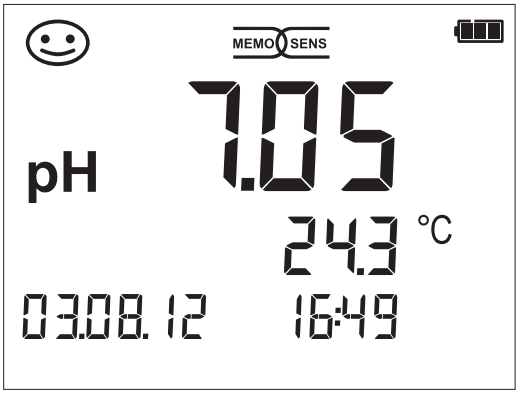
A fold-out hook on the back allows suspending the meter. This leaves your hands free for the actual measurement. The **rating plate** is located beneath the hook.

## Protective Cover and Hook Combined

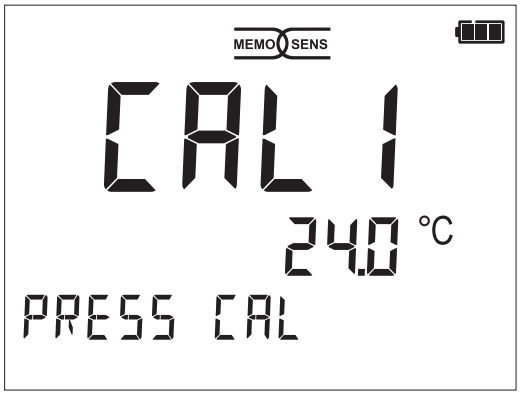
Cover and hook can be joined together to form a benchtop stand allowing comfortable and fatigue-free working at a lab bench or desk.

## Display

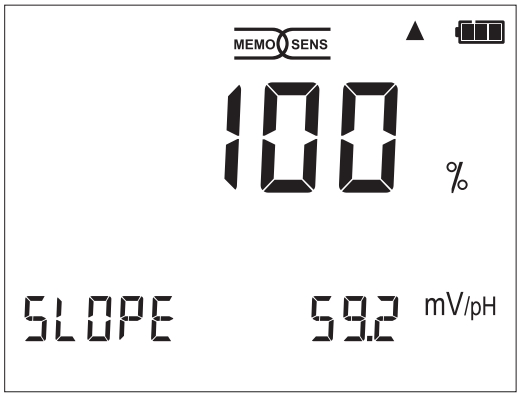
The meter has a three-line display for representing alphanumeric information such as measurement and calibration data, temperatures and date/time. Additional information is provided by means of icons (Sensoface, battery icon, etc.).
Some typical displays are shown here.



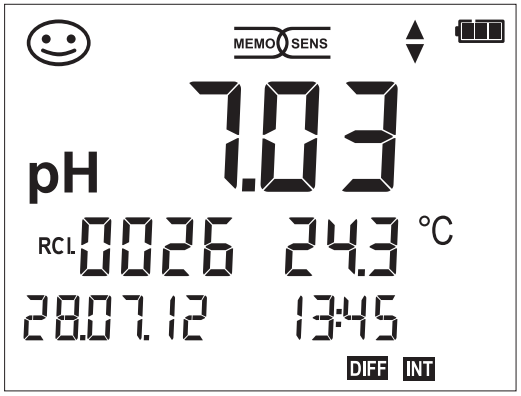

Measuring
(display of measured value, temperature, date and time)




Calibration – step 1




End of calibration
(display of slope)




Logger data
(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:

| | |
|---|---|
| **on/off** | Switches the meter on and displays the device and calibration data (see Start-Up) |
| **meas** | Switches the meter on / Activates measuring mode / Stops the data logger |
| **cal** | Starts calibration |
| **set** | Activates configuration / Confirms entries |
| **clock** | Displays time and date, allows setting the clock using **set** |
| **RCL** | View stored values |
| **STO** | Holds and saves a measured value, allows setting and starting the logger by pressing **set** (page 23) |
| ▲ ▼ | When this icon is displayed, you can use the arrow keys for navigation. |

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

**Caution!**
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 by the manufacturer.

**Precautions for application in hazardous locations**

**Warning!**

- Only open the battery compartment of the Portavo 90n X 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 Portavo has an operating time of over 1000 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 special lithium-ion battery suited to the battery compartment is available for the Portavo 904. The battery is recharged through the USB port.
**Note:** Not available for the Portavo 904 X (device variant for applications in hazardous locations).

**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 | Max. 10 operating hours remaining, measurement is still possible **Caution!** It is absolutely necessary to replace the batteries. |

**Warning!**
When using the Portavo 904 X (device variant for applications in hazardous locations) 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 (see also Control Drawing 209.009-110).

**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 Portavo 904(X) PH provides several connections so that many types of sensors can be used for measurement. Note that only **one** sensor may be connected to the meter at a time.
The meter automatically recognizes a connected Memosens sensor and switches accordingly. Memosens is signaled in the display.

**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.

---

**Caution!**

Always make sure that a sensor is connected to the meter before starting measurement.
Explanation: The analog pH input of the Portavo is an electrometer amplifier with an extremely high-impedance. When the sensor is not in contact with the medium or not connected to the meter, electric charges on the input can generate arbitrary, stable pH or mV values which will be shown in the display.

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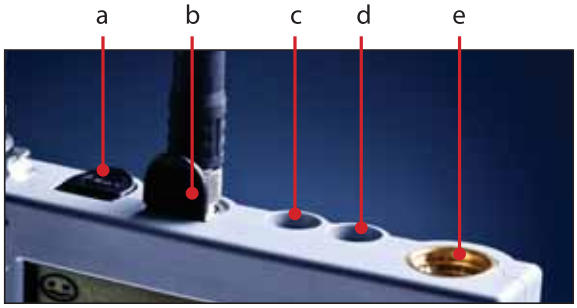



**Connections**

a - Micro USB port
b - M8, 4 pins for Memosens sensors
c - Temperature probe GND
d - Temperature probe
e - pH socket (DIN 19 262)

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 for Memosens sensors).



## Switching On the Meter

When you have connected the sensor, you can switch the meter on by pressing the **on/off** or **meas** key.

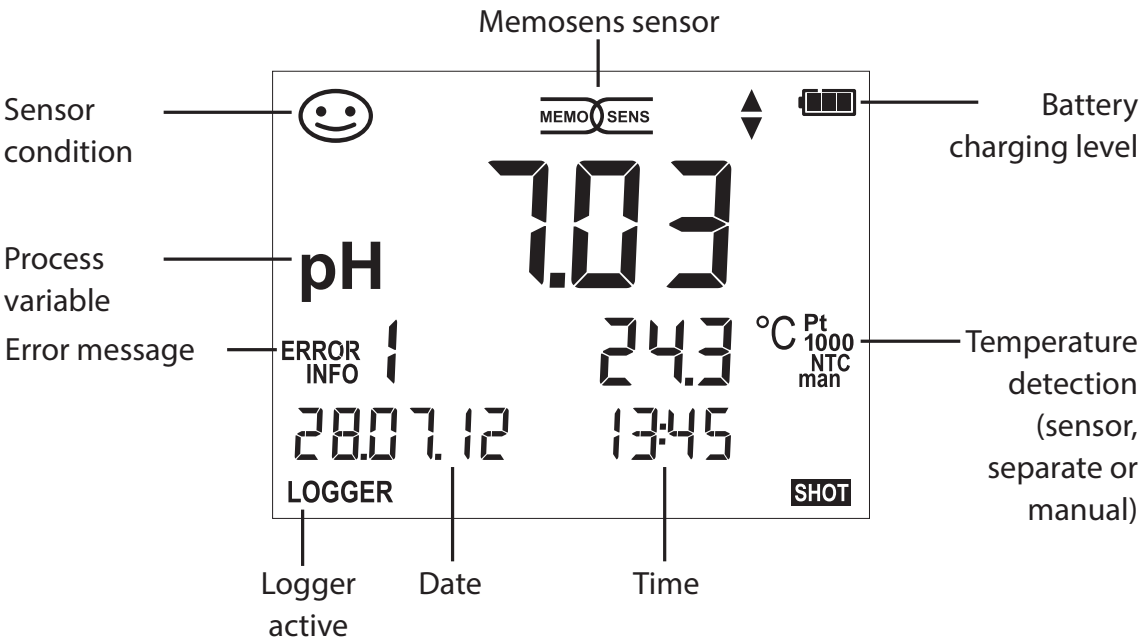
When the meter is switched on with the **on/off** key, first a self test is performed and then the calibration data and settings are displayed before the meter switches to measuring mode.

When the meter is switched on with the **meas** 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:




## pH Configuration

Prior to measurement, a configuration should be performed 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

↓ **set**

"Setup" display

Select using arrow keys, confirm by pressing **set**.

| | | |
|---|---|---|
| Display 1 | **pH x.xx** / pH x.xxx / mV / (°C for analog pH only) | |
| Display 2 | **OFF** / date + time / date / time | |
| CAL Timer | **OFF** / 1 ... 99 days | |
| CAL | **CALIMATIC**/Manual/DATA INPUT/(ISFET-Zero)/FREE CAL | |
| CAL POINTS | 1 / 2 / 3 / **1-2-3** (for CALIMATIC, Manual, FREE CAL) | |
| BUFFER SET (CALIMATIC, FREE CAL) ▲▼ **set** ↔ | -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 4.01/7.00/10.01/12.00 |
| | -07- | WTW techn. buffers 2.00/4.01/7.00/10.00 |
| | -08- | Hamilton 2.00/4.01/7.00/10.01/12.00 |
| | -09- | Reagecon 2.00/4.00/7.00/9.00/12.00 |
| | -10- | DIN 19267 1.09/4.65/6.79/9.23/12.75 |
| | -U1- | loadable via Paraly SW 112 (User) |
| 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)<br>**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 **set**.


## CALIMATIC 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** | |
| CAL<br>CALIMATIC | Calibration method, the number of calibration points and the buffer set have been selected in the configuration menu. |
| ↓ | |
| CAL **1**/2/3<br>PRESS CAL | Dip sensor in **1st**/2nd/3rd buffer solution.<br>It does not matter which buffer solution is taken first. |
| ↓ **cal** | |
| pH, mV value,<br>temperature | |
| ↓ | Depending on the number of calibration points, the procedure described 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.

**Note:** To abort calibration, you can press **meas** 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

↓ **cal**

CAL
DATA INPUT

↓

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

↓ **cal**

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

↓ **cal**

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

**Note:** To abort calibration, you can press **meas** at any time.


## MANUAL Calibration

**(Manual calibration)**

The calibration method is selected in the configuration menu.

Measurement

↓ **cal**

CAL
MANUAL

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

↓

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

↓ **cal**

pH display blinks
PRESS CAL

Use ▲▼ to set the temperature-corrected pH value taken from the buffer table.

↓ **cal**

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.

**Note:** To abort calibration, you can press **meas** 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**

CAL
CALIMATIC blinks

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

↓ **cal**

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

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

**Keys for 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 meter on using the **on/off** or **meas** 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 **STO** key, you can hold and save a measured value (see data logger, page 23).


Measurement can also be controlled via the Paraly SW 112 software.

## Switching the Measured Value Display

During measurement, you can switch between pH and mV display by pressing the **meas** key.

## Adjusting the Temperature

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

1) Press **meas** 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.

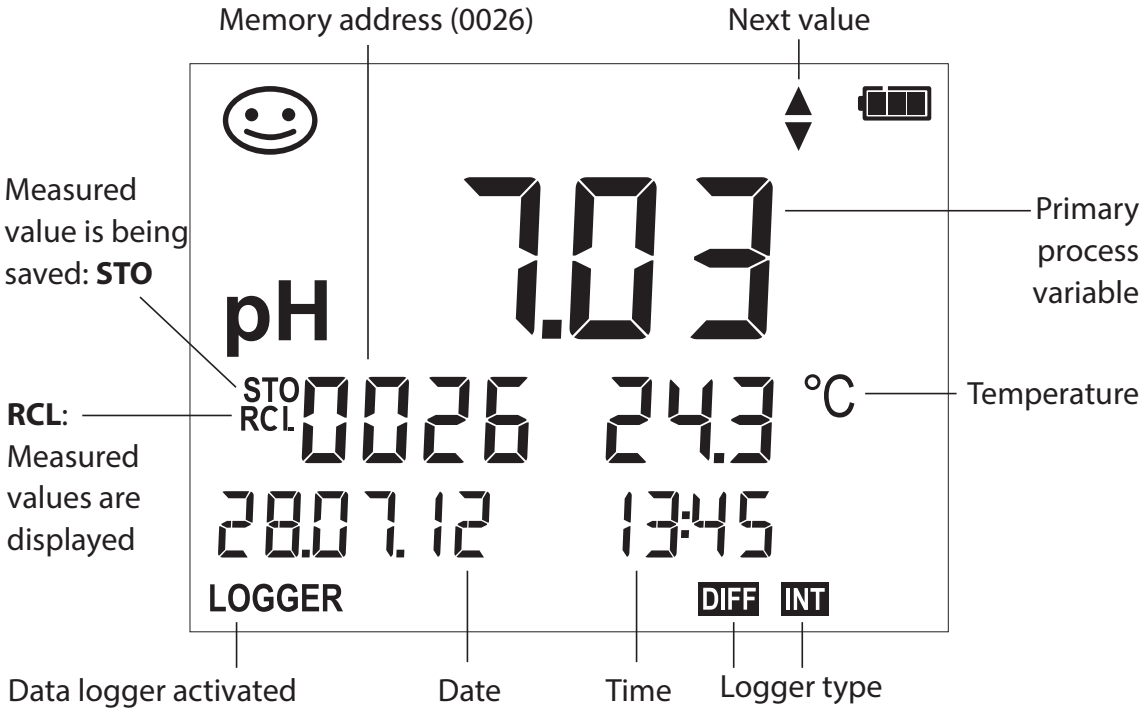
## The Data Logger

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 **STO** 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.
The Paraly SW 112 software allows convenient management of the data logger. It is always the currently selected process variable which is recorded. The "STO" icon and the memory address is displayed briefly to indicate that an entry is being saved.

**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 **STO** key is pressed.

| Measurement<br>Logger **activated** |
|---|

↓ **STO**

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

**Manual logging when logger is deactivated**

| Measurement<br>Logger **deactivated** |
|---|

↓ **STO**

| Measured value is maintained<br>Proposed address blinks<br>(address of the last recorded value + 1) |
|---|

If desired: Select start address using ▲▼.

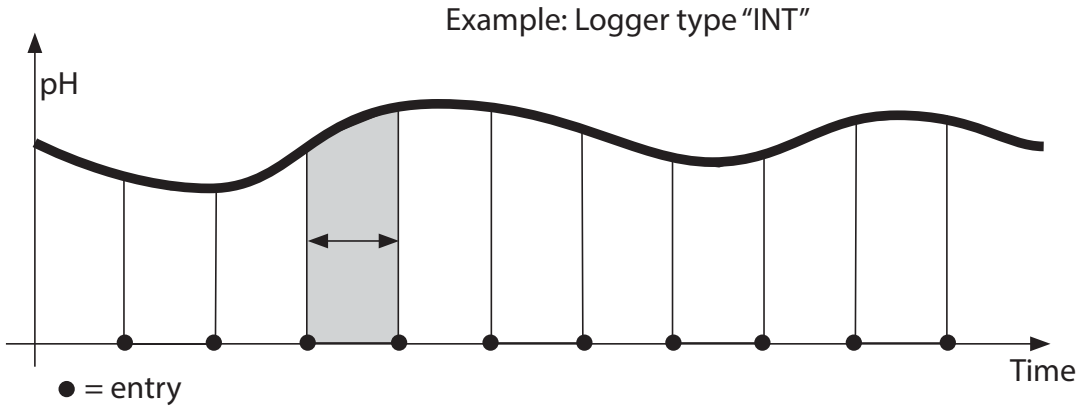
↓ **STO**

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

**Interval (INT)**

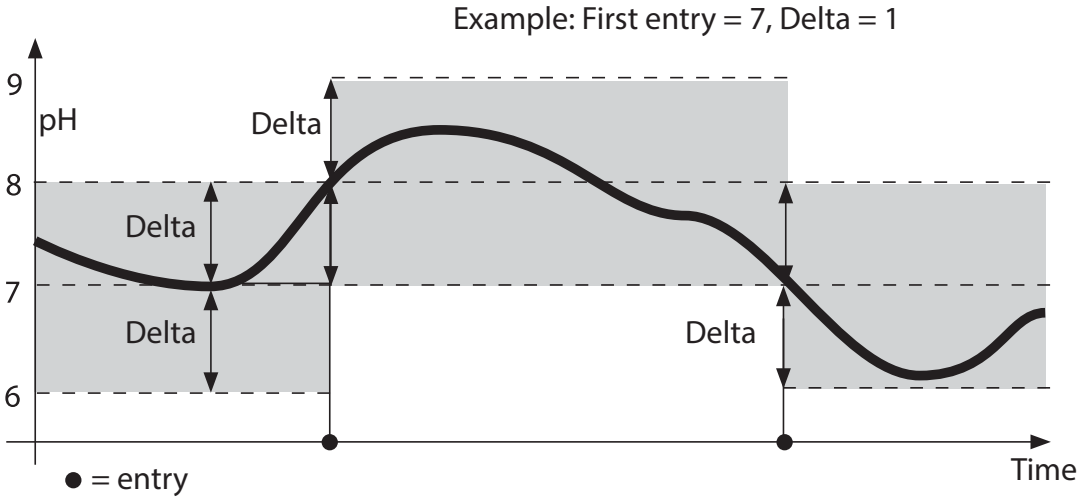
In this mode, the measured values are cyclically recorded.

Example: Logger type "INT"



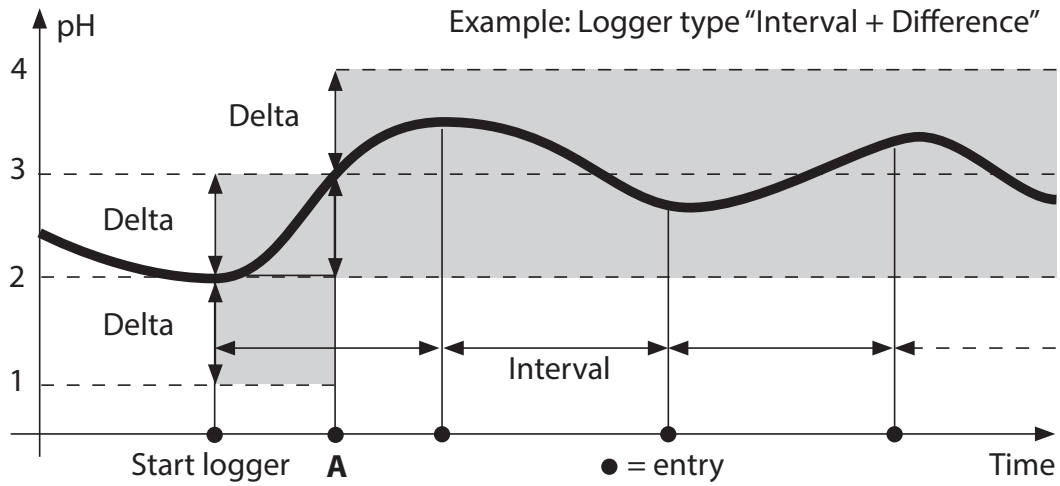
**Difference (DIFF)**

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)**

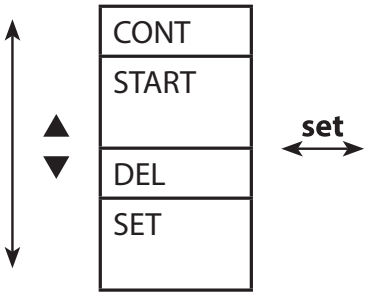
When the delta range related to the last DIFF entry is exceeded, a new entry is created (example: entry **A**) and the delta range is displaced upwards or downwards by the delta value. As long as the measured value remains within the delta range, logging is performed at the preset interval. The first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



## Data Logger Menu

Logger display

Select using arrow keys, confirm by pressing **set**.




| | |
|---|---|
| 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:<br>DIFF, INT, DIFF+INT, SHOT (see table below) |

| **Overview of data logger menu (default in bold print)** | | | |
|---|---|---|---|
| Logger type | DIFF | Delta pH / mV | OFF / pH 0.01…14.00 / **pH 1.00**<br>OFF / 1… 1000 mV / **1 mV** |
| | | Delta °C / °F | OFF / 0.1 … 50.0 °C / **1.0 °C**<br>OFF / 0.1 …90 °F / **1.0 °F** |
| | INT | Interval | h:mm:ss<br>0:00:01 … 9:59:59 / **0:01:00** |
| | DIFF+INT | DIFF | See logger type DIFF |
| | | INT | See logger type INT |
| | SHOT | Currently selected process variable is recorded | |

## Configuring the Data Logger

Prerequisite: The data logger is stopped (press **meas**).

Measurement

↓ **STO**

Measured value is maintained

↓ **set**

Logger: CONT blinks

↓ ▼

Logger: START blinks

↓ ▼

Logger: DEL blinks

↓ ▼

Logger: SET blinks

↓ **set**

Logger: Current logger type blinks

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

↓ **set**

Select the appropriate parameters using ▲▼ and confirm each selection by pressing **set**. When configuration is finished, CONT blinks. You can start the data logger by selecting START or CONT (see page 28).

## 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

↓ **STO**

Measured value is maintained

↓ **set**

Logger: CONT blinks

↓ **set**

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

If desired: Select start address using ▲▼.

↓ **set**

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

↓ **STO**

Measured value is maintained

↓ **set**

Logger: CONT blinks

↓ ▼

Logger: START blinks

↓ **set**

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

## Displaying the Logger Data

Pressing the **RCL** key displays all stored values. The Paraly SW 112 software allows convenient management of the data logger.

Measurement

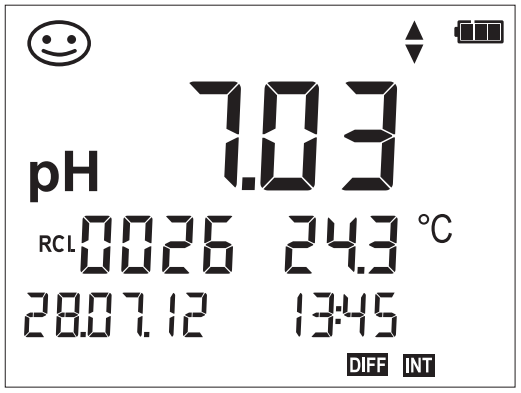
↓ **RCL**

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

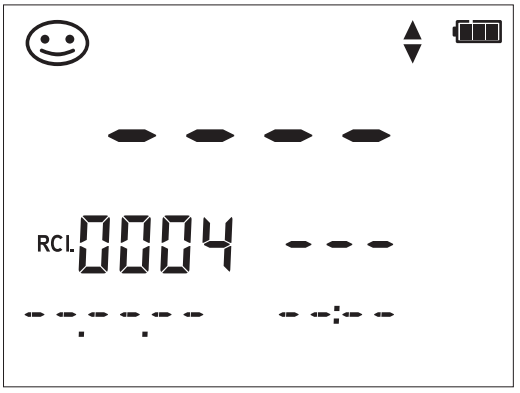
Use ▲▼ to select the desired address. Empty memory locations will also be displayed.

↓ **RCL** or **meas**

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 **meas** key.

Measurement, logger **activated**

↓ **meas**

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 **STO** and send it to any desired address.

## Clearing the Data Logger

Selecting "DEL" deletes all data records.

Measurement

↓ **STO**

Measured value is maintained

↓ **set**

Logger: CONT blinks

↓ ▼

Logger: START blinks

↓ ▼

Logger: DEL blinks
PRESS SET

↓ **set**

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


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

# Paraly SW 112 Software

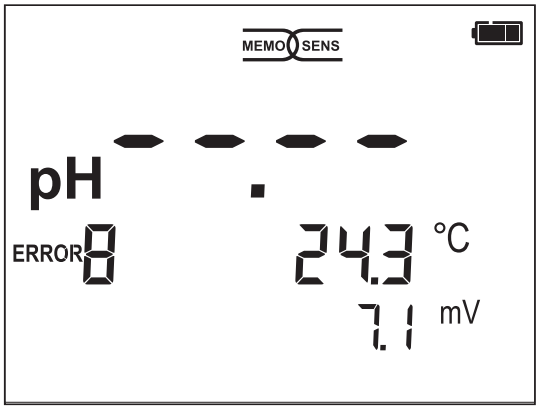
The Paraly SW 112 software supplements the Portavo series. It allows convenient management of the data that have been acquired by the meters as well as simple and clear configuration of the meters. Paraly SW 112 starts automatically when the Portavo USB port is connected to the computer.

The Paraly SW 112 software stands out by the following features:

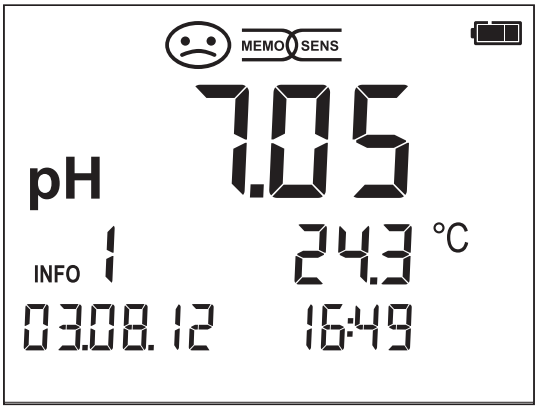
- Intuitive Windows user interface
- Easy configuration and management of several meters
- Display of device and sensor information
- Configuration of individual buffer sets
- Convenient management and evaluation of the data logger
- Export function for Microsoft Excel
- Print function
- Updating the device software

**Note**: A detailed user manual for the Paraly SW 112 software can be found on the included data carrier.

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 8 (identical calibration media)




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.

## "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 | ISFET: Operating point (asymmetry potential) |
| | INFO 8 | ISFET: Leakage current |
| | INFO 9 | ORP offset |

## Error Messages

The following error messages can be shown in the display.

| Message | Cause | Remedy |
|---|---|---|
|  blinks | Battery empty | Replace batteries |
| ERROR 1 | pH 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 | Sensor zero point too high/low | Thoroughly rinse the sensor and re-calibrate. If this does not help, replace the sensor. |
| ERROR 5 | Sensor slope too high/low | |
| 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 | Cal media interchanged | Repeat calibration. |
| ERROR 11 | Measured value unstable Drift too high | 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 (Setup: DEFAULT YES), 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 25 | Buffer distance (user-defined buffer table) | Re-enter the buffer table. |

## Accessories

| Item | Order No. |
|---|---|
| Robust field case (for meter, sensor, various small parts and user manual) | ZU 0934 |
| Adapter for BNC pH sensors to DIN socket | ZU1190 |
| Replacement quiver (5 units) | ZU 0929 |
| Memosens lab cable, M8, 4 pins | CA/MS-001XFA-L |
| Li-ion battery | ZU 0925 |

Please visit our website for more information on our product range: **www.knick.de.**

## Sensors

| Analog pH-sensors | Order No. |
|---|---|
| pH/Pt1000 sensor (plastic body, length 120 mm) | SE 101 N |
| pH/Pt1000 sensor (glass body, length 110 mm) | SE 102 N |
| pH puncture sensor (plastic body, length 65/25 mm) | SE 104 N |
| pH/Pt1000 sensor for measurements in hazardous areas Zone 0, incl. equipotential bonding cable | ZU 6979 |
| Pt1000 temperature detector | ZU 6959 |
| Pt 1000 temperature detector with tilted tip | ZU 0156 |

| Digital pH sensors | Order No. |
|---|---|
| pH/temp sensor (plastic body, length 120 mm) | SE 101 NMS |
| pH/temp sensor (glass body, length 110 mm) | SE 102 NMS |

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

## Knick CaliMat Buffer Solutions

Ready-to-use quality pH buffer solutions

| pH value (20 °C) | Quantity | Order No. |
|---|---|---|
| 2.00 ± 0.02 | 250 ml | CS-P0200/250 |
| 4.00 ± 0.02 | 250 ml | CS-P0400/250 |
| | 1000 ml | CS-P0400/1000 |
| | 3000 ml | CS-P0400/3000 |
| 7,00 ± 0,02 | 250 ml | CS-P0700/250 |
| | 1000 ml | CS-P0700/1000 |
| | 3000 ml | CS-P0700/3000 |
| 9.00 ± 0.02 | 250 ml | CS-P0900/250 |
| | 1000 ml | CS-P0900/1000 |
| | 3000 ml | CS-P0900/3000 |
| 12.00 ± 0.05 | 250 ml | CS-P1200/250 |
| **Buffer sets** | | |
| Set 4.00 | 3 x 250 ml | CS-PSET4 |
| Set 7.00 | 3 x 250 ml | CS-PSET7 |
| Set 9.00 | 3 x 250 ml | CS-PSET9 |
| Set 4.00, 7.00, 9.00 | 250 ml each | CS-PSET479 |

| | | | |
|---|---|---|---|
| **pH/mV input** | pH socket, DIN 19 262 (13/4 mm) | | |
| pH range | -2 … 16 | | |
| Decimal places *) | 2 or 3 | | |
| | Input resistance | $1 \times 10^{12}$ Ω | (0 … 35 °C) |
| | Input current | $1 \times 10^{-12}$ A | (at RT, doubles every 10 K) |
| Measuring cycle | Approx. 1 s | | |
| Measurement error[1,2,3)] | < 0.01 pH, TC < 0.001 pH/K | | |
| mV range | -1300 … +1300 mV | | |
| Measuring cycle | Approx. 1 s | | |
| Measurement error[1,2,3)] | < 0.1 % meas. val. + 0.3 mV, TC < 0.03 mV/K | | |
| **Temperature input** | 2 x 4 mm dia. for integrated or separate temperature detector | | |
| Measuring ranges | NTC30 temp detector | -20 … +120°C | |
| | Pt1000 temp detector | -40 … +250°C | |
| Measuring cycle | Approx. 1 s | | |
| Measurement error[1,2,3)] | < 0.2 K (Tamb = 23 °C); TC < 25 ppm/K | | |
| **Memosens pH input** | M8 socket, 4 pins, for Memosens lab cable | | |
| Display ranges [4)] | pH | -2.00 … +16.00 | |
| | mV | -2000 … +2000 mV | |
| | Temperature | -50 … +250 °C | |
| **Memosens pH input ISFET** | M8 socket, 4 pins, for Memosens lab cable | | |
| Display ranges [4)] | pH | -2.00 … +16.00 | |
| | mV | -2000 … +2000 mV | |
| | Temperature | -50 … +250 °C | |
| **Memosens ORP input** | M8 socket, 4 pins, for Memosens lab cable | | |
| Display ranges [4)] | mV | -2000 … +2000 mV | |
| | Temperature | -50 … +250 °C | |
| Sensor standardization *) | ORP calibration (zero adjustment) | | |
| Permissible calibration range | ΔmV (offset) | -700 … +700 mV | |

*) User-defined
1) According to EN 60746-1, at nominal operating conditions
2) ± 1 count
3) Plus sensor error
4) Ranges depending on Memosens sensor

| | | |
|---|---|---|
| **Sensor standardization** *) | pH calibration | |
| Operating modes *) | CALIMATIC | Calibration with automatic buffer recognition |
| | MANUAL | Manual calibration with entry of individual buffer values |
| | DATA INPUT | Data entry of zero and slope |
| 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 | 4.01/7.00/10.01/12.00 |
| | -07- WTW techn. buffers | 2.00/4.01/7.00/10.00 |
| | -08- Hamilton | 2.00/4.01/7.00/10.01/12.00 |
| | -09- Reagecon | 2.00/4.00/7.00/9.00/12.00 |
| | -10- DIN 19267 | 1.09/4.65/6.79/9.23/12.75 |
| | -U1- (User) | loadable via Paraly SW 112 |
| 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

| | | |
|---|---|---|
| **Connections** | 1 x pH socket, DIN 19 262<br>2 x 4-mm socket for separate temperature detector<br>1 x M8 socket, 4 pins, for Memosens lab cable<br>1 x Micro USB-B for data transmission to PC<br>**Portavo 904 X:**<br>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 | Battery power level, logger | |
| Notices | Hourglass | |
| Keypad | [on/off], [cal], [meas], [set], [▲], [▼], [STO], [RCL], [clock] | |
| **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 and configuration via Paraly SW 112 software | |
| **Diagnostics functions** | | |
| Sensor data (Memosens only) | Manufacturer, sensor type, serial number, operating time | |
| Calibration data | Calibration date, zero, slope | |
| 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<br>EN 61326-2-3<br>(Particular Requirements for Transmitters) | |
| **Explosion protection** | Portavo 904 X | |
| | Global | IECEx Ex ia IIC T4/T3 Ga |
| | Europe | ATEX II 1 G Ex ia IIC T4/T3 Ga |
| | USA, Canada | IS Class I, Division 1, Groups A,B,C,D, T4 / T3, Ta = 40 °C / 50 °C; Entity; Type 4X<br>IS Class I, Zone 0, AEx ia IIC T4 / T3, Ta = 40 °C / 50 °C; Entity; Type 4X |
| | For electrical parameters and further specifications, see Control Drawing No. 209.009-110 | |

| | | | |
|---|---|---|---|
| **RoHS conformity** | According to directive 2011/65/EC | | |
| **Power supply** | | | |
| Portavo 904 | Batteries: 4 x AA alkaline or 4 x NiMH (rechargeable)<br>or 1 x Li-ion battery, USB chargeable | | |
| Portavo 904 X | 4 x AA batteries<br>For battery types, see Control Drawing No. 209.009-110 | | |
| Operating time | Approx. 1000 h (alkaline) | | |
| **Nominal operating conditions** | | | |
| Ambient temperature | -10 °C … +55 °C | | |
| Ambient temperature 904 X | -10 °C ≤ Ta ≤ +40 °C<br>-10 °C ≤ Ta ≤ +50 °C<br>-10 °C ≤ Ta ≤ +50 °C<br>-10 °C ≤ Ta ≤ +50 °C | T4<br>T3<br>T3<br>T3 | Duracell MN1500<br>Energizer E91<br>Power One 4106<br>Panasonic Pro Power LR6 |
| Transport/<br>Storage temperature | -25 … +70 °C | | |
| 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 | | |

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