User Manual

Portamess® 913 Cond and Portamess® 913 X Cond

Knick

Batteries for applications in hazardous locations

Batteries (3 x 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

The batteries listed in the table are used instead of the Varta batteries Type 4006, Type 8006 and Type 3706 listed in the EC-Type-Examination Certificate. These batteries were tested according to IEC 60079-0:2007, IEC 60079-11: 2006 by a notified body and the test results were set out in an IECEx test report.

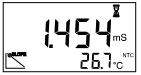
Equipped with the batteries listed in the table, the Model 91. X Cond portable conductivity meter may be used in hazardous areas.

Be sure to observe the temperature classes and ambient temperature ranges listed in the table for the different battery types.

Conventions Used in this Manual

ITALICS are used for texts which appear in the Portamess® 913 (X) Cond display.

Bold print is used to represent the texts of keys, e.g. **cal**.



Display examples

or

keys whose functions are explained are frequently shown in the left-hand column.

Note

Notes provide important information which should always be observed when using the meter.

Caution

Caution means that the instructions given must always be followed to prevent malfunctions or damage to the device.

Warning

Warning means that the instructions given must always be followed for your own safety. Failure to follow these instructions may result in injuries.

1 The Model 913 (X) Cond

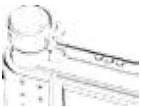
Package contents

Please check the completeness of the shipment after unpacking.

The package should include:

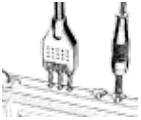
- Portamess® 913 (X) Cond incl. batteries and sensor container
- Carrying strap
- User manual
- Quickstart instructions in German, English and French
- Interface cable with adapter for printer and PC
- Paraly® transfer software

Intended use / Short description



- The Portamess® 913 (X) Cond measures conductivity, salinity, TDS and temperature in industry, the environment, food processing and waste-water treatment.
- Operation of the Portamess® 913 X Cond is also permitted in hazardous areas Zone 1.
- The meter meets the EMC requirements of 89/336/EEC and the recommendations as per NAMUR NE 21.
- The meter is IP 66 protected to EN 60 529 (jet water from all directions).
- Temperature compensation is automatic with an NTC 30 kΩ or a Pt 1000 temperature detector (automatic recognition during power-on). When using sensors without a temperature detector, the temperature can be manually specified.
- Calibration can be carried out by directly entering the cell constant, by calibrating with KCl 0.01 mol/l or 0.1 mol/l solutions or with any other calibration solutions.

- The data logger records up to 100 measured values with the temperature, date and time. Recording can be done either manually, interval or event-controlled.
- To minimize battery consumption, the meter switches off automatically when it is not operated for either one hour or twelve hours.



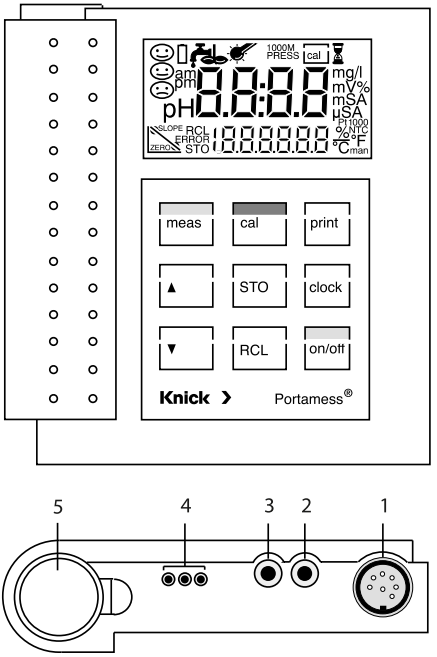
- Only three alkaline AA batteries are required for uninterrupted operation for approx. 1,000 hours.
- With the Paraly® software, the meter can be completely remote-controlled from a PC. All measured values and parameters can be read out and easily processed further (e.g. using Microsoft Excel).
- Measured values and meter records can also be output directly to a printer via the serial interface.

Caution

Never use the remote interface in hazardous areas!

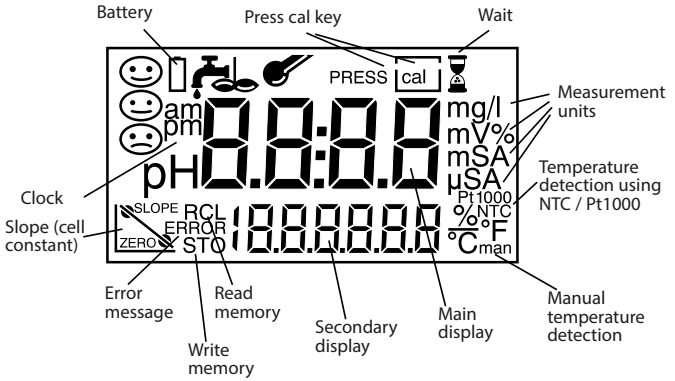
2 Operation

Meter design



1	Sensor connection
2, 3	Separate temperature probe connection
4	PC/printer interface connection
5	Sensor container, removable

Display



Keypad

Pressing **on/off** switches the meter on or off.
After power-on, the meter automatically carries out a self-test and adjusts itself to the connected temperature detector.

Pressing **meas** returns the meter to the measuring mode from any function. Pressing **meas** in the measuring mode displays the following parameters:

Cond measuring mode:	temperature compensation
tdS measuring mode:	TDS factor

Note

You can also switch the meter on by pressing **meas**. However, in this case only a short test is performed and the temperature detector is not identified. The meter assumes that the last temperature detector identified is used.

Pressing **cal** starts calibration.

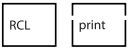
With ▲ and ▼ you can select and change parameters and select a mode.

Pressing **clock** switches the meter into the clock mode. All measurement processes are canceled and the battery consumption is reduced to a minimum.

Pressing **STO** records the measured value in the display and stores it in the data memory.

Pressing **RCL** displays stored measured values.

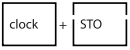
Pressing **print** outputs the currently measured value to a printer or PC.



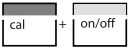
Pressing **RCL** and then **print** prints out the data memory.

Pressing **cal** and then **print** prints out the meter record.

Pressing **STO** and then **clock** switches the meter into the data logger mode.



Pressing **clock** and **STO** simultaneously activates the mode for setting the date and time.



Pressing **cal** and **on/off** simultaneously when the meter is switched off, opens the configuration menu.

Note

When pressing two keys simultaneously, make sure that the key shown at the left is pressed first.

Connection and start-up

Sensor connection

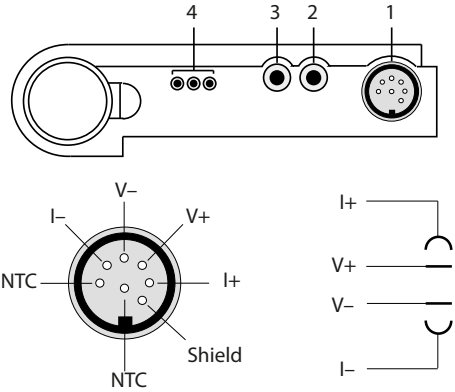
The following sensors from the line of accessories can be connected to the meter.

SE 202 2-electrode sensor with integrated NTC 30 kΩ temperature detector

SE 204 4-electrode sensor with integrated NTC 30 kΩ temperature detector

Connection assignment

Connection	Socket
Sensor	1
Separate temperature probe	2, 3
Remote interface	4



If no temperature detector is used for measurement, the meter operates with the manually set temperature and *man* appears in the display.

Note

When using a sensor with integrated temperature detector, do not connect an external temperature probe.

Note

If the meter is connected to a PC and is used to take measurements in a grounded liquid, measuring errors may result.

Note

Prior to first use, the cell constant, temperature compensation and time and date must be checked and set, if required. The cell constant is printed on the sensor head and listed in the sensor specifications (see also page 37).

Note

The calibration and configuration data remain permanently stored both with the meter switched off and with the batteries removed (battery replacement).

Start-up

Pressing **on/off** switches the meter into measuring mode. After power-on, the meter determines the connected temperature detector and performs a self test:

- Simultaneous appearance of all display segments
- Display of the model number
- Display of the software version

Note

For recognition of the temperature detector, the conductivity sensor must be connected to the meter before power-on. The temperature detector is only recognized during the power-on procedure after pressing **on/off.**

Note

The meter can also be switched on with **meas**. However, in this case only a short test is performed and the temperature detector is not identified. The meter assumes that the last temperature detector identified is used.

Note

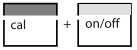
The SE 202 and SE 204 sensors have an integrated NTC temperature detector.

Configuration

The following basic settings can be changed in the configuration:

Function: *Cond* (conductivity), *SAL* (salinity) or *tdS* (Total Dissolved Solids or evaporation residue)

- Calibration by entering the cell constant (*AutCAL Off*) or calibration with calibration solution (*AutCAL On*)
- Automatic meter switch-off after 1 hour or 12 hours
- Interface: Printer output On/Off, baud rate
- Temperature display °C or °F
- Date and time format 24 hours and day, month, year or 12 hours (a.m./p.m.) and month, day, year



To activate the configuration, hold down **cal** with the meter switched off and then press **on/off**.

The menu items of the configuration menu are worked through in sequence. Use ▲ and ▼ to change the setting of the respective menu item. **STO** saves the parameters and switches to the next menu item.

Pressing **meas** exits the configuration menu at any time. The value last displayed and possibly changed will then not be saved.

Function

Select the measuring function: *Cond* (conductivity), *SAL* (salinity) or *tdS* (Total Dissolved Solids or evaporation residue).

Automatic or manual calibration

Select whether you wish to adapt the sensor by directly entering the cell constant or by calibrating with a calibration solution and automatic drift check.

(Default setting: Direct entry of the cell constant (*AutCAL OFF*))

Direct entry of the cell constant (*AutCAL OFF*) from 0.010 cm^{-1} to 199.9 cm^{-1}. (Default setting 0.475 cm^{-1})

Automatic calibration (*AutCAL On*) with 0.1 molar KCl solution, 0.01 molar KCl solution or entry of the temperature-compensated conductivity of another known calibration solution.

Automatic switch-off

To protect the batteries, the meter switches off automatically when not operated for a longer time.

You can select whether switch-off is to take place after one hour or after twelve hours (default setting: 1 hour).

If the data logger is active and during remote interface operation, the auto switch-off feature is disabled.

Interface

If the meter is controlled by a PC and interface conflicts occur when the **print** key is pressed, you should deactivate the print function *(Print OFF)*
(default setting: Print On, 4,800 bauds).

The transmission speed can be set to 600, 1200, 2400, 4800 or 9600 bauds.
The transmission speed must correspond to that set in the printer or PC.
Data format and protocol are permanently set to 7 bits, one stop bit, even parity and XON/XOFF protocol (NAMUR NE28).

Temperature display

The temperature can be displayed either in °C or °F (default setting: °C).

Date and time format

You can choose between the display format 24 hours and day.month.year and the format 12 hours a.m./p.m. and month.day.year.
(Default setting: 24 hours and day.month.year)

Calibration

By calibration, the Portamess® 913 (X) Cond is adjusted to the cell constant of the sensor.

It is generally sufficient to enter the cell constant specified by the sensor manufacturer.

General information on calibration

Calibration solutions Solutions for calibration of conductivity measuring devices are unbuffered systems. Care should be taken to use fresh conductivity standards and to avoid contamination of the conductivity standard by water droplets adhering to the conductivity sensor.

Clean sensors Before calibration, make sure that the conductivity sensor is clean. Residues should be rinsed off with distilled water. Afterwards, the sensor should be wiped dry and rinsed with the calibration solution to be used.

Cell constant The cell constant is determined by the size and geometric arrangement of the measuring electrodes. It is the characteristic parameter of conductivity sensors. The cell constant changes very little over time. The prerequisite is clean electrode surfaces without insulating deposits. Regular calibration is therefore generally not necessary.

4-electrode sensors With 4-electrode sensors the principle of separate current/voltage electrodes results in virtually no measuring errors even in the case of partial soiling of the measuring electrodes. However, electrodes completely soiled with insulating coatings cause the measurement to fail.

2-electrode sensors With 2-electrode sensors for the measurement of low conductivities, e.g. ultrapure water, no calibration with calibration solutions is possible in practice, as calibration solutions with a correspondingly low conductivity do not have a stable conductivity value. The use of calibration solutions with a higher conductivity (> 200 S/cm) would lead to considerable polarization errors. Therefore, the cell constant must be entered manually when using 2-electrode sensors.

SE 202 and SE 204 sensors

For the conductivity sensor models SE 202 and SE 204, the cell constant is specified with a tolerance of 2 % and 1.5 %. This cell constant is entered and stored in the calibration mode (*AutCAL OFF*). An additional calibration with calibration solutions is not necessary.

Calibration by direct entry of the cell constant (*AutCAL OFF*)

SE 202 sensor: c = 0.1 cm^{-1}

SE 204 sensor: c = 0.475 cm^{-1}

Press **cal** to activate calibration. The cell constant determined or set during the last calibration is displayed. Pressing **meas** exits calibration again.

Use ▲ and ▼ to set the cell constant of the sensor and confirm by pressing **cal**. The meter will then switch back to the measuring mode.

Calibration with 0.1 or 0.01 molar KCl solution *(AutCAL On)*

Note

Impurities must always be prevented from getting into the calibration solutions.

Pressing **cal** activates calibration.
Calibration can be exited again by pressing **meas**. Then, the cell constant of the last calibration is displayed briefly.

Select the calibration solution used (*CALSoL*). A 0.1 and a 0.01 molar KCl solution are available to choose from. Press **cal** to confirm the corresponding solution.

Immerse the clean and dry sensor in the calibration solution (see also "Clean sensors", page 19).

Press **cal** to start calibration. If calibration is not desired, cancel the process by pressing **meas**.

During calibration the lower line indicates the temperature. The automatic drift check checks the stability of conductivity and temperature. The hourglass indicator flashes.

When the measured values are stable, the temperature-compensated table value of the KCl solution is displayed. The measured conductivity value flashes.

Confirm by pressing **cal**.

The determined cell constant is displayed for a few seconds. Then, the meter switches back into the measuring mode.

Calibration with any calibration solution *(AutCAL On)*

Note

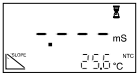
Impurities must always be prevented from getting into the calibration solutions.

Pressing **cal** activates calibration.
Calibration can be exited again by pressing **meas**. Then, the cell constant of the last calibration is displayed briefly.

First confirm any of the 0.1 or 0.01 mol/l KCl solutions *(CALSoL)* by pressing **cal**.

Immerse the clean and dry sensor in the calibration solution (see also "Clean sensors", page 19).

Press **cal** to start calibration. If calibration is not desired, cancel the process by pressing **meas**.



During calibration the lower line indicates the temperature. The automatic drift check checks the stability of conductivity and temperature. The hourglass indicator flashes.

When the measured values are stable, the temperature-compensated table value of the KCl solution is displayed. The measured conductivity value flashes.

See the table of your calibration solution for the conductivity value which belongs to the displayed measuring temperature.

Set the temperature-compensated conductivity in the meter using ▲ and ▼, then confirm it by pressing **cal**.

The determined cell constant is displayed for a few seconds. Then, the meter switches back into the measuring mode.

Measurement

Measuring mode

Pressing **meas** accesses the measuring mode from all functions. In the measuring mode, the main display indicates the measured variable and the secondary display shows the temperature.

Note

If the Portamess® 913 (X) Cond is connected to a PC and measurements are taken in a grounded liquid, measuring errors may result.

Measuring the conductivity (Cond)

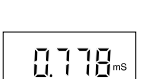
The main display indicates the measured conductivity, the secondary display shows the temperature.

Temperature compensation

The meter offers various temperature compensation methods. With **meas** and ▲ or ▼, the temperature compensation method can be selected and set:

(*tc OFF*) No temperature compensation

(*tc nLF*) Temperature compensation with non-linear characteristic to EN 27088 for natural water and ultrapure water (reference temperature 25 °C). In the secondary display *tc* also appears.

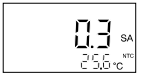


(*tc 0.01 – 9.99 %/°C*) Temperature compensation with linear characteristic and definable temperature coefficients (reference temperature 25 °C). In the secondary display *tc* also appears.

Note

When you have selected temperature compensation with linear characteristic, you can only exit this function or select the nonlinear function when the temperature coefficient has been set to 0.00.

Measuring the salinity (SAL)



The main display indicates the measured salinity in ‰ (g/kg), the secondary display shows the temperature.

TDS determination (TDS)

The main display indicates the concentration of the dissolved solids contributing to the solution conductivity (TDS, comparable to the evaporation residue) in mg/l, the secondary display the temperature.

TDS factor Pressing meas and then ▲ or ▼ sets the TDS factor within the range 0.40 – 1.00.

Note The TDS factor depends on the composition of the water to be tested and must be determined for each water type.

Manual temperature specification The *man* display signals that no temperature detector is connected. The meter operates with the manually specified temperature. The specified temperature can be edited with the ▲ and ▼ keys in the *Cond* measuring mode.

Data memory

Up to one hundred measured values can be saved in the data memory together with the temperature, date and time. Storage is performed either manually or automatically using the data logger. The currently measured value is stored.

Write memory Press **STO**.
The currently measured value is shown in the display.

Select any memory location with ▲ and ▼.
Press **STO** to store the measured value in the selected memory location

After storing, the memory location number is automatically incremented and the meter returns to measuring mode.

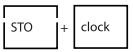
Read memory Pressing **RCL** displays the last stored value.

Select any memory location using ▲ and ▼.
Pressing **RCL** switches between the measured value and the time/date of storage.

This allows, for example, searching for a value that was stored at a certain time.

Pressing **meas** returns to the measuring mode.

Clear memory To clear the entire data memory, press **STO** to access the memory mode and then press **clock** to access the data logger mode.



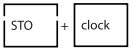
Here, select Clear (*CLr*) using ▲ or ▼.

By confirming this with **STO**, the entire data memory is cleared.

If you do not want to clear the memory, press **meas** to cancel.

Data logger

Data logger The data logger records up to 100 measured values together with temperature, time and date. Data storage is performed either manually (at the press of a key), interval- or event-controlled. The data logger always saves the currently measured variable.



Press **STO** to access the memory mode and then **clock** to access the data logger mode.
The currently measured value is shown in the display.

Pressing **STO** confirms the selected mode. In the Continue and Start mode this also starts the data logger. The current memory location is shown in the display. If "*Clear*" has been selected, all memory locations are cleared and the meter returns to measuring mode.

Pressing **meas** ends the data logger mode.

Data logging modes

After pressing **STO**, logging is continued after the memory location in which the last measured value was stored (continue). Press **meas** to exit logging.

After pressing **STO**, the entire data memory is cleared without starting the data logger (clear).

After pressing **STO**, the entire data memory is cleared. Storage begins from memory location "*00*" (start). Press **meas** to exit logging.

Setting the data logger parameters

In the parameter setting mode, you select whether data logging is to be interval-controlled, event-controlled or manual. Press **STO** to access the logging functions.

To select interval-controlled logging of measured values, press **STO** and set the interval in which the recording is to take place using ▲ and ▼. The interval range is between 5 seconds and 60 minutes. Default time (factory-set) is 2 minutes. After selecting your interval time, press **STO** to enter the value.

With event-controlled data logging, a measured value is not saved until it deviates from the last memory value by the preset differential value. Using the time which is also stored, you can determine when the value has changed. The differential value is entered in the subsequent parameter-setting step.

Note

The differential value is always based on the currently set measured variable (conductivitiy, salinity or TDS). This means that if differential conductivity values are to be logged, the meter must be set to conductivity measurement prior to parameter setting and data logging.

With manual data logging, the measured values are saved by pressing **STO**.

After selecting the above parameters, select "Continue" or "Start" using the ▲ and ▼ keys and then press **STO** to commence logging.

Note

The data logger is a ring memory, i.e. it does not stop after reaching the last memory location (99). Recording is automatically continued with memory location number 00. To avoid losing data by overwriting, download stored data and clear the logger before beginning a new set of data. Be aware of this when using interval-controlled data logging.

Clock mode

clock

Pressing **clock** exits the measuring mode, or enters the clock mode with the meter switched off. The time and date are displayed.
In this mode the battery consumption of the meter is reduced to a minimum.

Setting clock To set the time or date, the clock mode must be activated.

clock + STO

Press **clock** and **STO** simultaneously.

The time display flashes.
Now, the time can be set using ▲ and ▼.

Pressing **STO** again saves the displayed time.
Now, the date can be set.

Press **STO** again to save the date. Now, the year can be set.
Press **STO** to confirm the year. The meter returns to the clock mode.

meas

Press **meas** to return to measuring mode.

Serial interface

Note

If the meter is connected to a PC and measurements are taken in a grounded liquid, measuring errors may result.

With the remote interface, you can directly send data to a printer with serial port or set up a direct connection to a personal computer. Via the computer, the meter can be completely remote controlled and all data and parameters can be read. Using the printer (e.g. printer ZU 0244), you can directly print measured values, the memory and records.

Interface parameters

The RS 232 interface can be defined for all common baud rates.

Setting is carried out in the Configuration menu

- Baud rate: 600 Bd
  1,200 Bd
  2,400 Bd
  4,800 Bd (default setting)
  9,600 Bd

The data format and protocol are permanently set to:

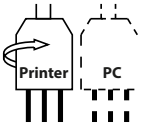
- 7 bits
- even parity
- one stop bit
- XON/XOFF protocol

Note

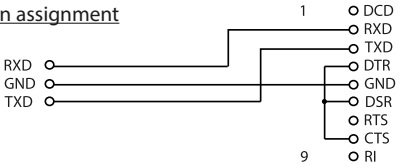
For the command set of the Portamess® 913 (X) Cond, refer to the online help of the Paraly® transfer software.

Interface cable

Only one interface cable is required to operate with a printer or PC. By simply turning the plug around on the meter's interface port, the cable can be used to connect either printer or PC. The label facing the operator should match the output device being connected.



Connection assignment



Standard settings for ZU 0244 Lab Printer

Meter configuration

Parameter	Setting
Baud rate	*4800*
Printer	*On*

Printing measured values and records

Note

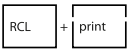
Make sure that the printer function is activated in the configuration *(Print On)* and the set baud rate corresponds to that of the printer.

Printing measured values

Press **print** while in the measuring mode to print out the currently measured value. The measured value is printed out together with the temperature, date, time and a three digit identification number. The identification number is reset when the meter is switched off.

Printing the memory

Press **RCL** and then **print** to print out the stored data. All stored measured values are printed with temperature, date, time and memory location number. If you only want to print individual memory locations, press **RCL**. Then select the desired memory location using ▲ or ▼. Press **print** to start printing.

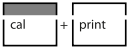


Note

If the permissible measurement or temperature range has been exceeded during data logging or if the clock has not been set, the line on the printout will be marked with "#". If temperature compensation was active during data logging, the line on the printout will be marked with "!".

Printing the record

To print out the meter record, press **cal** and then **print**. The record printout contains:



- a calibration record with the data of the last calibration
- the settings of the configuration menu
- a record of the last meter self-test

3 Troubleshooting

Error messages

Range limits exceeded

If a measured value lies outside the ranges accepted by the meter, an error message appears and the measured-value display flashes.

ERROR 1

The measurement range was exceeded.

Possible causes:

- Sensor defective
- Break in sensor cable
- Wrong sensor connected
- Wrong cell constant entered

ERROR 3

The measured temperature is outside the ranges:

Conductivity:	–20 °C to +120 °C
nLF:	0 °C to 120 °C
Salinity:	0 °C to 30 °C
TDS:	10 °C to 40 °C

Possible causes:

- Temperature detector in the sensor defective
- Short circuit in temperature detector
- Wrong temperature detector connected

Note

When changing the conductivity sensor, note that the temperature detector type (Pt 1000/NTC 30 kΩ) is only recognized when the meter is switched on with **on/off**.

Calibration error messages

If errors occur during calibration, or if the determined sensor data are outside the valid range, an error message appears (*ERROR 6, ERROR 11*).

ERROR 6

The cell constant lies outside the permissible range $< 0.01\ cm^{-1}$ or $> 199.9\ cm^{-1}$.

Possible causes:

- No sensor connected during calibration
- Wrong calibration solution
- Sensor not immersed far enough in calibration solution

ERROR 11

The calibration was canceled after approx. 2 minutes, because the drift was too large. This message only appears briefly during calibration.

Possible causes:

- Sensor defective or dirty
- Sensor cable insufficiently shielded or defective
- Strong electric fields influence the measurement
- Major temperature fluctuation of the calibration solution
- Calibration solution unstable
- Conductive connection between potential to ground, PC, meter and measured medium

ERROR 14

If the clock has not been set, e.g. after battery replacement, this error message is displayed. To clear the message, set the clock (see page 28).

ERROR 15

If errors occur during transmission via the RS 232 interface, this error message appears.

To eliminate the error message, switch the meter off and then on again. Should the error message occur again, check the settings in the Configuration menu.

Possible causes:

- Wrong transmission rate (baud rate) set (see page 17)
- Error during transmission
- Wrong data format (see page 17), e.g. parity bit

ERROR 18 If the meter detects an error during the self-test, an error message appears.

Possible causes:

- Configuration or calibration data are defective. Completely reconfigure and recalibrate the meter.

ERROR 19 Error in the factory settings or system memory. *FAIL* appears in the display.

Possible causes:

- EPROM or RAM defective
- Error in meter factory settings

Note

This error message should normally not occur, as the data are protected from loss with multiple safety functions. Should this error message nevertheless appear, no remedy is available. The meter must be repaired and recalibrated at the factory.

4 Maintenance

Changing the batteries

When the battery symbol appears in the display, the batteries need replacement. However, the meter can still be used for a few days. When the battery voltage continues to drop, the meter will switch itself off.

Never change the batteries within a hazardous area. Use only the batteries specified on page 5. Make sure that the meter is carefully closed again and that the protective cover is properly mounted on the meter after changing the batteries (see also "Additional safety notes for ATEX", page 4).

To replace the batteries, you need 3 alkaline AA cells and a screwdriver (either straight-blade or Phillips).

- Close the protective cover and remove the sensor container.
- Lift the hook, unscrew the four screws on the back of the meter and remove the lid.
- Remove the old batteries from the battery holder.
- Insert the new batteries in the specified direction.
- Make sure the protective cover is in the notches provided and the rubber seal is correctly seated, especially near the sensor socket.
- Remount the lid and secure it with the screws.
  Be sure to tighten the screws thoroughly.
- Remount the sensor container.

Note

When changing the batteries, all calibration and configuration data are retained. The time and date must be reset. The current memory location number of the measured-value memory is set to *00*.

Note

After battery replacement recording will also be continued with memory location *00* when the meter is in the data logger "Continue" mode. If you have stored measured values before battery replacement and you do not want to overwrite them, set the first memory location to be written with **RCL** and ▲ or ▼ before restarting the data logger.

Caution

If you want to store the meter for a longer time, the batteries must always be removed beforehand. Leaky batteries may damage the meter.

Cleaning the meter

To remove dust and dirt, the external surfaces of the meter may be cleaned with water, and also with a mild household cleaner if necessary.

Caution

Beware of electrostatic charging when using the meter in hazardous areas!

For example, never wipe the meter with a dry cloth.

Appendix

Accessories

		Ref. No.
	Printer	ZU 0244
	Printer paper (5 rolls)	ZU 0249
	Printer ribbon (5 units)	ZU 0250
	Sensor container, 5 units (for leak-proof storage of the sensors)	ZU 0262
	Replacement flow-through cell for SE 202 2-electrode sensor	ZU 0284
	Adapter for 2-pole banana plug to meter socket	ZU 0289
	Adapter for 8-pole plug to meter socket for connection of ZU 6985 lab sensor	ZU 0290
Sensors	2-electrode sensor incl. flow-through cell Material: stainless steel 1.4571 Cell constant: 0.100 cm^{-1} Range: 0.01 – 199.9 µS/cm	SE 202
	4-electrode sensor Material: epoxy/graphite Cell constant: 0.475 cm^{-1} Range: 0.1 µS/cm – 500 mS/cm	SE 204
Conductivity standards	13.88 mS /cm, 250 ml (0.1 mol/l KCl)	ZU 0348
	1413 µS/cm, 250 ml (0.01 mol/l KCl)	ZU 0349
	15 µS/cm, 300 ml	ZU 0350

Specifications for Portamess® 913 (X) Cond

Ranges	Conductivity:	0.1 µS/cm to 1,000 mS/cm (c > 0.8 cm^{-1}) 0.1 µS/cm to 500 mS/cm (c = 0.2 to 0.8 cm^{-1}) 0.01 µS/cm to 199.9 µS/cm (c < 0.2 cm^{-1})
	Temperature:	–20.0 to +120.0 °C / –4 to 248 °F nLF: 0 to 120 °C
	Salinity:	0.0 to 45.0 g/kg (0 to 30°C)
	TDS:	0 to 1,999 mg/l (10 to 40°C)
Display	LCD 35 x 67 mm, character height 15 mm	
Measurement cycle	Approx. 2 sec	
Measurement error (± 1 count)	Conductivity:	< 0.5 % of measured value[1)]
	Temperature:	< 0.3 K
Input 1 (Sensor)	Multi-contact for 2 and 4-electrode sensors with integrated temperature detector	
Input 2 (Temperature)	4-mm sockets for separate Pt 1000 / NTC (30 kΩ) temperature detector	
Permissible cell constant	0.010 to 199.9 cm^{-1} (adjustable)	
Sensor standardization	Direct entry of the cell constants, Automatic determination of the cell constants with KCl solution 0.01 mol/l or 0.1 mol/l, Sensor standardization with any known solutions	
Meter self-test	During switch-on routine, segment test, display of model number and software version	
Temperature measurement	Pt 1000 / NTC 30 kΩ (automatic recognition during power-on) or manual temperature entry	
Temperature compensation	Linear characteristic: 0.01 to 9.99 %/°C nLF (non-linear characteristic for ultrapure water and natural water to EN 27088	
Data memory	100 memory locations: conductivity, salinity or TDS, with temperature, date and time	
Data logger	Manual, interval-controlled or event-controlled	

[1)] For conductivities > 500 mS/cm: < 1% meas. value

Remote interface	Serial RS 232 interface, bidirectional, asynchronous, baud rate user-defined (600 to 9,600 baud), can be used as either printer or computer interface	
Data retention	Configuration/calibration data and factory settings >10 years	
Automatic switch-off	After either 1 or 12 hours, ineffective during interface or data logger operation	
EMC	Emitted interference: EN 61 326 Class B Immunity to interference: EN 61 326, EN 61 326/A1 and NAMUR NE 21	
Explosion protection (913 X Cond only)	II 2(1)G Ex ia IIC T3/T4 Ga, PTB 01 ATEX 2161	
Ambient temperature	Operation:	–10 to +50 °C (T3) –10 to +40 °C (T4)
	Transport and storage:	–20 to +70 °C
Power supply	3 AA (LR 6) batteries, alkaline-manganese For hazardous-area applications: Temperature class T4 (–10 ... +40 °C): Duracell MN1500 Temperature class T3 (–10 ... +50 °C): Energizer E91, Power One 4106, Panasonic Pro Power LR6 See page 5	
Operating time	Approx. 1,000 h[2)], clock operation > 2 years	
Enclosure	Material: PA Type of protection: IP 66, with integrated sensor container	
Dimensions	133 x 160 x 30 mm (W x H x D)	
Weight	Approx. 560 g with batteries	

Specifications for ZU 0244 Printer

Printer type	Matrix printer
Interface	Serial RS 232 interface
Paper	Normal paper, width 57.5 mm (2.25 inches)
Data transfer	Baud rate: 4,800 baud, data bits: 7, stop bits: 1, parity: even
Power supply	230 V AC ± 10 %
Dimensions	197 x 73 x 153 mm (W x H x D)
Weight	Approx. 1.2 kg including plug-in power pack

[2)] Due to storage, the service life of the included batteries may be shorter.

Glossary

Automatic switch-off (AutOFF)	To protect the batteries, the meter switches off automatically when not operated for a longer period. Switch-off can take place after either one hour or twelve hours. When data logger or remote interface are active, the auto switch-off feature is disabled.
cal	Key for activating calibration.
Calibration	Adjustment of the conductivity meter to the cell constant of the sensor used.
Calibration solution	Solution with exactly defined conductivity for calibrating a conductivity meter.
Data logger	The data logger records up to 100 measured values together with the temperature, date and time in the data memory. Recording takes place either interval or event-controlled (measured-value difference) or manually at the push of a button.
Data memory	Up to 100 measured values can be stored in the data memory together with the temperature, time and date.
Evaporation residue	See TDS.
GLP	Good Laboratory Practice: Rules for conducting and documenting measurements in the laboratory.
meas	Pressing this key returns to the measuring mode from all other levels. In the Cond measuring mode, the set temperature compensation is displayed by pressing **meas**, in the TDS mode, the TDS factor is displayed.
NAMUR	German committee for measurement and control standards in the chemical industry

nLF	Non-linear temperature compensation for ultrapure water with NaCl traces and for natural water to EN 27088, reference temperature = 25 °C. **Note:** With SE 202 sensor and flow-through cell, the resolution is 0.01 µS/cm – ideal for measurement of ultrapure water.
Response time	Time from the start of a calibration step to the stabilization of the measured value.
Salinity	The salinity indicates the salt content, particularly of sea waters as a cumulative parameter. It is specified in g/kg (‰).
TDS	Total Dissolved Solids, corresponds to the concentration of the dissolved solids contributing to the conductivity – comparable to the evaporation residue.