
4110(W) / 4110-3

pH ELECTRODES WITH GEL ELECTROLYTE



a xylem brand

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1 General information

Automatic sensor recognition

The sensor electronics with the stored sensor data are in the connecting head of the electrode. The data include, among other things, the sensor type and series number. In addition, the calibration data are stored in the sensor with each calibration and the calibration history is recorded (the last 10 calibrations). The data is recalled by the meter when the sensor is connected and is used for measurement and for measured value documentation.

Storing the calibration data in the sensor ensures that the correct slope and asymmetry are automatically used if the sensor is operated with different meters. On the other hand, different calibrated sensors can be used with one meter without the need to recalibrate.

The digital transmission technique guarantees the failure-free communication with the meter even with long connection cables. The sensor firmware can be updated via the meter.

2 Commissioning, measuring, calibration

2.1 Commissioning

Scope of delivery

- Electrode 4110(W)
- Operating manual

Commissioning

Prepare the electrode for measuring as follows:

- Remove the watering cap from the electrode tip. Possible salt deposits in the area of the watering cap do not affect the measuring characteristics and can easily be removed with deionized water.



Please keep the watering cap. It is required for the electrode to be stored. Always keep the watering cap clean.

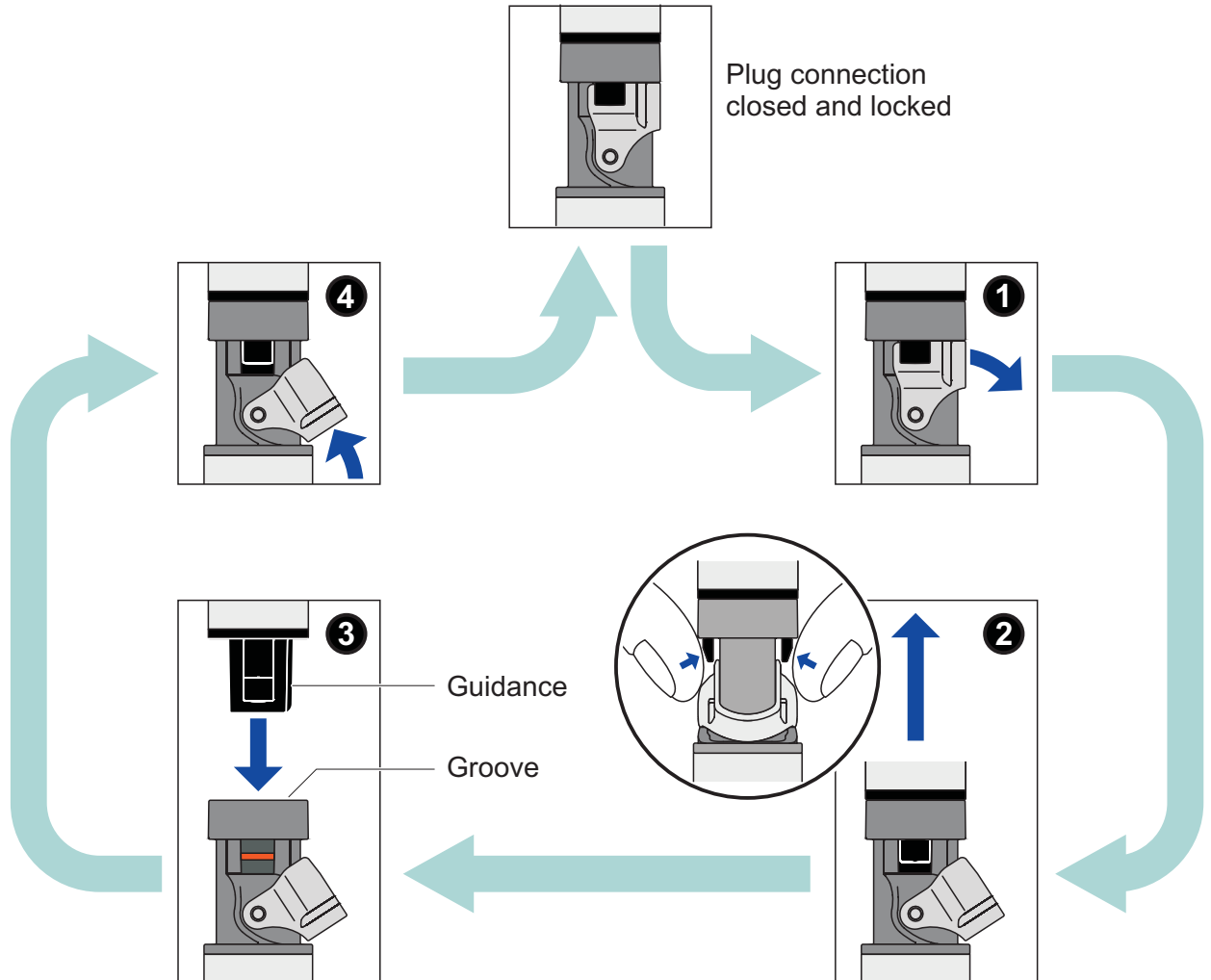
- Remove any gas bubbles behind the pH membrane by shaking.
- Connect the electrode to the meter.

4110	– via the sensor cable to a free IDS connector on the meter
4110W	– via a connecting cable (accessory) to a free IDS connector on the meter or – wireless via an IDS WA-S adapter (accessory) to a WA-capable meter Accessories for the connection of the 4110W sensor to the meter: See chapter 7 WEAR PARTS AND ACCESSORIES. Opening and closing the IDS plug connection, see section 2.2 OPENING AND CLOSING THE IDS PLUG CONNECTION.

- Calibrate the electrode according to the operating manual of the meter and observe the following rules while doing so.

2.2 Opening and closing the IDS plug connection

This section only applies to IDS plug variants (4110W).



Opening the plug connection

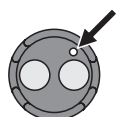
- If necessary, clean the plug connection.
- Open the locking device (step 1).
- Use your thumb and index finger to press the clips of the connector together, and pull the connector out of the plug (step 2).

Closing the plug connection

- Make sure that the plug connection is completely dry and clean.
- Align the guidance of the connector with the groove in the plug and insert the connector in the unlocked plug until it catches (step 3).
- Close the locking device (step 4).

2.3 Calibration and measurement: General rules

- Avoid the carryover of any solution (sample or buffer solution) from one measurement to the next by taking the following measures:
 - Shortly rinse the calibration and sample beakers with the solution the beakers are to be filled with next.
 - Between measurements, rinse the electrode with the solution that follows. Alternatively, you can also rinse the electrode with deionized water and then carefully dab it dry.
- To measure in aqueous solutions, it is recommended to immerse the electrode in a vertical or slightly tilted position.
- Observe the correct depth of immersion and make sure the contact between the junction and test sample is thorough. The junction is in the area of the bottom end of the shaft (see arrow).



4110(W)

Caution: Only the shaft part of the electrode may be immersed!

- For measurements in aqueous solutions, provide approximately the same stirring conditions for measuring as for calibrating.

Subsequent calibrations

The frequency of subsequent calibrations depends on the application. Many meters provide an option where you can enter a calibration interval. After the calibration interval has expired, the meter will automatically remind you of the due calibration.

3 Storage

During short measuring breaks

Immerse the electrode in reference electrolyte (KCl 3 mol/l, Ag⁺ free). Prior to the next measurement, shortly rinse the electrode with the test sample or deionized water.



Do not scratch the pH membrane.

Overnight or longer

Put the clean electrode in the watering cap that is filled with reference electrolyte (KCl 3 mol/l, Ag⁺ free).

NOTE

pH electrodes must not be stored dry or in deionized water. The electrode could be permanently damaged by this. If the liquid in the watering cap has dried up, condition the electrode in reference electrolyte (KCl 3 mol/l, Ag⁺ free) for at least 24 hours.



During longer storing periods, salt sediments may develop on the watering cap. They do not affect the measuring characteristics and can easily be removed with deionized water when the electrode is put into operation again.

4 Aging

pH electrodes are consumables. Every pH electrode undergoes a natural aging process. With aging, the responding behavior becomes slower and the electrode slope and asymmetry change. Moreover, extreme operating conditions can considerably shorten the lifetime of the electrode. These are:

- Strong acids or lyes, hydrofluoric acid, organic solvents, oils, fats, bromides, sulfides, iodides, proteins
- High temperatures
- High changes in pH and temperature.

The warranty does not cover failure caused by measuring conditions and mechanical damage.

5 Maintenance and cleaning

Cleaning

Remove water-soluble contamination by rinsing with deionized water. Other types of contamination have to be removed as follows while the contact time with the detergents should be kept as short as possible:

Contamination	Cleaning procedure
Fat and oil	Rinse with water containing household washing-up liquid
Lime and hydroxide deposits	Rinse with citric acid (10 % by weight)

NOTE

Hydrofluoric acid, hot phosphoric acid and strong alkaline solutions destroy the glass membrane.

After cleaning

Rinse the electrode with deionized water and condition it in reference elec-

trolyte solution for at least 1 hour. Then recalibrate the electrode.

6 Technical Data

Measurement	pH measuring range	0.000 ... 14.000
	Allowed temperature range	0 ... 80 °C
Accuracy of the IDS measuring technique	Measured parameter	Accuracy (± 1 digit)
	pH	± 0.004
	U [mV]	± 0.2
	T [°C]	± 0.1
General features	Reference electrolyte	Gel
	Junction	Fiber (4110(W))
	Temperature sensor	Integrated NTC 30 (30 kΩ at 25 °C / 77 °F)
Connection cable	Lengths	4110: 1,5 / 3 m 4110W: 1,5 / 3 m
	Diameter	4.3 mm
	Smallest allowed bend radius	Fixed installation:20 mm Flexible use:60 mm
	Plug type	Socket, 4 pins
Shaft dimensions, material	Shaft length	120 mm
	Shaft diameter	12 mm
	Shaft material	PPE/PS (4110(W))
	IDS plug	<ul style="list-style-type: none"> ● Synthetic materials: Glass fiber reinforced Noryl, TPU, TPC-ET, POM, PVC, PEEK, PBT ● O-ring: FPM ● Contacts gold ... -Plated
IDS plug	Connection type	4 pole, watertight plug connection with lock, reverse polarity protected
Storage	With watering cap; filled with KCl 3 mol/L, Ag ⁺ free	

Model	Reference electrolyte	Junction	NTC	Special features	Double junction
4110	Gel	Fiber	Yes	Plastic shaft	Yes
4110-3	Gel	Fiber	Yes	Plastic shaft	Yes

7 Wear parts and accessories

Maintenance equipment	Description	Model	Order no.
	Reference electrolyte solution 250 ml to fill the watering cap (KCl 3 mol/l, Ag ⁺ -free)	KCl-250	109 705Y
Connection cable 4110(W) - meter	Description	Model	Order no.
	IDS connection cable, 1.5 m	IDS-CABLE-1.5	903 850Y
	IDS connection cable, 3 m	IDS-CABLE-3	903 851Y
Radio connection 4110(W) - meter	Description	Model	Order no.
	WA capable IDS meter + radio module for IDS meter	see Internet	
	Radio module for plug head sensor	IDS WA-S	108 141Y

8 Disposal

At the end of its operational lifetime, the electrode must be returned to the disposal or return system statutory in your country (electronic waste). If you have any questions, please contact your supplier.

Contact Information

Ordering & Technical Support

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When placing an order please have the following information available:

YSI account number (if available)	Name and Phone Number
Model number or brief description	Billing and shipping address
Quantity	Purchase Order or Credit Card

Service Information

YSI has authorized service centers throughout the United States and Internationally. For the nearest service center information, please visit www.ysi.com and click 'Support' or contact YSI Technical Support directly at 800-897-4151.

When returning a product for service, include the Product Return form with cleaning certification. The form must be completely filled out for an YSI Service Center to accept the instrument for service. The Product Return form may be downloaded at www.ysi.com and clicking on the 'Support' tab.

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- 1) The tissue in plants that brings water upward from the roots;
- 2) a leading global water technology company.

We're 12,500 people unified in a common purpose: creating innovative solutions to meet our world's water needs. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. We move, treat, analyze, and return water to the environment, and we help people use water efficiently, in their homes, buildings, factories and farms. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise, backed by a legacy of innovation.

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