OPERATIONS MANUAL

ba76138e01 02/2013

4210

ORP ELECTRODE

YSI®

a xylem brand

For the most recent version of the manual, please visit www.ysi.com.

Contact

YSI
1725 Brannum Lane
Yellow Springs, OH 45387 USA
Tel: +1 937-767-7241
800-765-4974
Email: environmental@ysi.com
Internet: www.ysi.com

Copyright

© 2013 Xylem Inc.

General information

Automatic sensor recognition

The sensor electronics with the stored sensor data is in the connecting head of the electrode. The data include, among other things, the sensor type and series number. The data is recalled by the meter when the sensor is connected and is used for measurement and for measured value documentation.

The digital transmission technique guarantees the failure-free communication with the meter even with long connection cables. If the sensor firmware is enhanced by YSI, it can be updated via the meter.

Technical data

General data

Reference electrolyte	3 mol/l KCl, Ag^+free
Junction	Ceramic
Electrode material and shape	Platinum / circle

Measurement and application characteristics

mV measuring range	- 1250.0 ... + 1250.0
Allowed temperature range	0 ... 100 °C (32 ... 212 °F)
Typical application	Laboratory

Shaft dimensions, material, electrical connection

Shaft length	120 mm
Shaft diameter	12 mm
Shaft material	Glass
Combination electrode connection	Fixed cable
Meter connection	Digital plug

Connection cable

Length	1.5 m
Diameter	4.3 mm
Smallest allowed bend radius	Fixed installation: 20 mm Flexible use: 60 mm
Plug type	Socket, 4 pins

Accuracy of the IDS measuring technique

Measured parameter	**Accuracy (± 1 digit)**
U [mV]	± 0.2

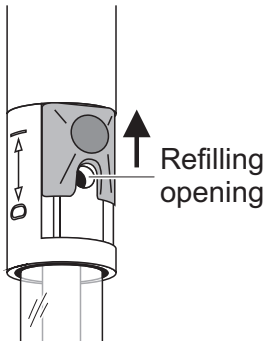
Commissioning, measuring, checking

Note
For ORP electrodes with platinum electrode, please follow the instructions in section ACTIVATING PLATINUM ELECTRODES.

Commissioning

Prepare the electrode for measuring as follows:

- Open the refilling opening for the reference electrolyte solution. Depending on the model, the stopper of the refilling opening is an elastomer stopper or a slider.
  The refilling opening must always be open during measurement!



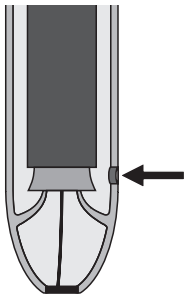
- Remove the watering cap from the electrode tip. Possible salt deposits in the area of the watering cap do not affect the measuring characteristics and can easily be removed with deionized water.

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

- Connect the combination electrode to the meter.
- Measure with the electrode according to the operating manual of the meter and observe the following rules while doing so:

General rules for measuring

- Make sure the refilling opening for the reference electrolyte solution is open.
- Avoid the carryover of sample solution from one measurement to the next as follows:
  - Shortly rinse the 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.
- Immerse the electrode in the solution in a vertical or slightly tilted position.
- Make sure the immersion depth is correct. The junction must be completely submersed in the solution. The junction is in the area of the bottom end of the shaft (see arrow).



4210

At the same time, the level of the reference electrolyte must be at least 2 cm above the level of the solution.

Conversion to normal hydrogen electrode

$U_H = U_{Meas} + U_{Ref}$

with: U_H = ORP, referring to the normal hydrogen electrode

U_{Meas} = Measured ORP

U_{Ref} = Voltage of the reference system compared to the normal hydrogen electrode

U_{Ref} is temperature dependent and can be taken from the following table (see also DIN 38404-6):

T (°C)	T (°F)	U_{Ref} [mV] **4210**	T (°C)	T (°F)	U_{Ref} [mV] **4210**
0	32	+224	35	95	+200
5	41	+221	40	104	+196
10	50	+217	45	113	+192
15	59	+214	50	122	+188
20	68	+211	55	131	+184
25	77	+207	60	140	+180
30	86	+203			

Checking with Zobell ORP buffer solution (YSI 3682)

U is temperature dependent and can be taken from the following table:

T (°C)	U [mV] 4210	T (°C)	U [mV] 4210
0	+262	30	+214
5	+254	35	+206
10	+246	40	+199
15	+238	45	+191
20	+230	50	+183
25	+222		

Storage

During short measuring breaks

Immerse the electrode in the reference electrolyte with the refilling opening open.

Electrode	Reference electrolyte	Model (see page 10)
4210	3 mol/l KCl, Ag^+free	KCl-250 (250 ml)

Prior to the next measurement, shortly rinse the electrode with the test sample or deionized water.

Overnight or longer

Insert the clean electrode into the watering cap filled with reference electrolyte and shut the refilling opening.

Note
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.

Aging

Every ORP electrode undergoes a natural aging process. 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.

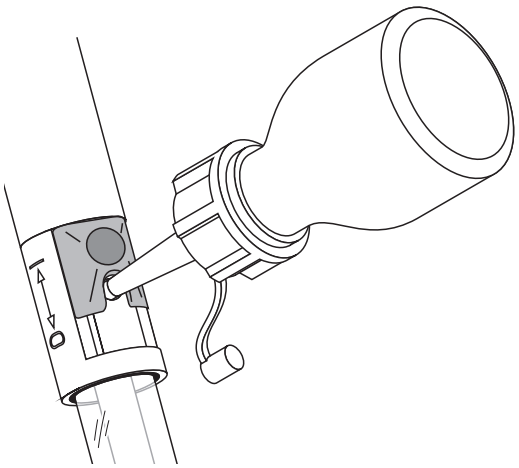
Maintenance and cleaning

During operation, a small amount of reference electrolyte leaks through the junction from the electrode into the test sample. If the level of reference electrolyte becomes too low with time, refill it through the refilling opening.

Refilling the reference electrolyte

Refilling is very easy using a dropping bottle. Proceed as follows:

- Cut off the tip of the dropping bottle at a right angle until the opening in the tip can be seen
- Open the refilling opening of the electrode
- Press the tip of the dropping bottle into the refilling opening while turning it slightly
- Pump several small quantities of the reference electrolyte into the stem using the dropper bottle
- Pull the dropping bottle out of the refilling opening while turning it slightly as necessary.



Cleaning

Remove water-soluble contamination by rinsing with deionized water. Remove other contamination as follows:

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)

After cleaning

Rinse the electrode with deionized water.

Activating platinum electrodes

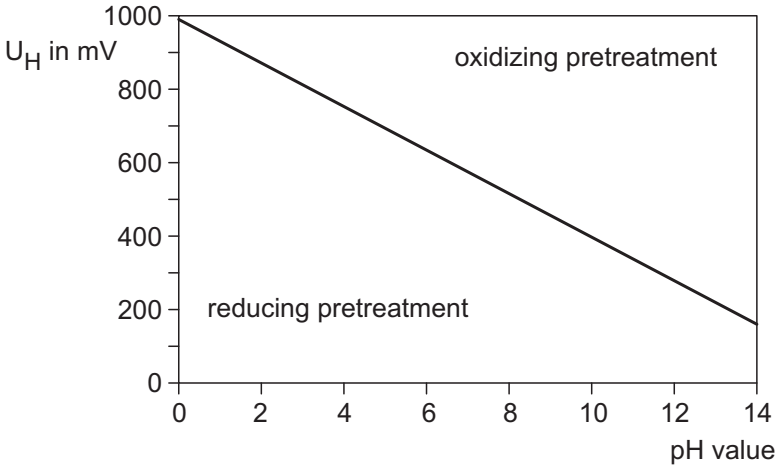
First-time activation during installation and as required

For first-time activation use the activation powder from the SORT/RH reagent set (component of the SORT/RH reagent set). Immerse the moist (but not dripping) platinum electrode into the activation powder and rotate the electrode several times in the powder. Then remove the activation powder under flowing water with a soft brush (e.g. toothbrush).

Activation during very long set-up times

When changing from oxidizing to reducing test solutions and vice versa this can result in set-up times that can take significantly more than an hour. In this case pretreatment (activation) of the platinum surface can shorten the set-up time. The type of pretreatment (reducing or oxidizing) is based on the pH value and the ORP voltage (U_H) of the test solution where the latter must be estimated for the first measurement.

The type of pretreatment can then be determined using the following diagram where U_H is based on the normal hydrogen electrode:



Oxidizing pretreatment	Immerse the platinum electrode for two to three days in a sulfuric acid clorina solution (0,5 g clorina powder, 100 ml H_2O dist., 2-3 ml 20% sulfuric acid). Clorina powder for producing the solution is included in the SORT/RH reagent set. Note: The diaphragm must not be immersed in the clorina solution!
Reducing pretreatment	When the electrode is ready for the test immerse it in the Zobell ORP buffer solution and wait for a stable measured value.

Wear parts and accessories

Description	Model	Order no.
Reference electrolyte solution 3 mol/l KCl, Ag^+ free (250 ml)	KCl-250	109 705Y
Reagent set for regenerating ORP platinum electrodes, consisting of 10 g activation powder and 30 g clorina powder	SORT/RH	109 730Y
Zobell ORP buffer solution (125 ml)	3682	061320

Contact Information

Ordering & Technical Support

Telephone: (800) 897-4151
(937) 767-7241
Monday through Friday, 8:00 AM to 5:00 PM ET

Fax: (937) 767-1058

Email: environmental@ysi.com

Mail: YSI Incorporated
1725 Brannum Lane
Yellow Springs, OH 45387
USA

Internet: www.ysi.com

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.

Xylem |'zīləm|

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.

For more information on how Xylem can help you, go to www.xyleminc.com

a xylem brand

YSI
1725 Brannum Lane
Yellow Springs, OH 45387
Tel: +1 937-767-7241; 800-765-4974
Fax: +1 937-767-1058
Email: environmental@ysi.com
Web: www.ysi.com

©Xylem Inc