DOC022.53.80319

sympHony™ Multisensor Probes

07/2012, Edition 1

User Manual

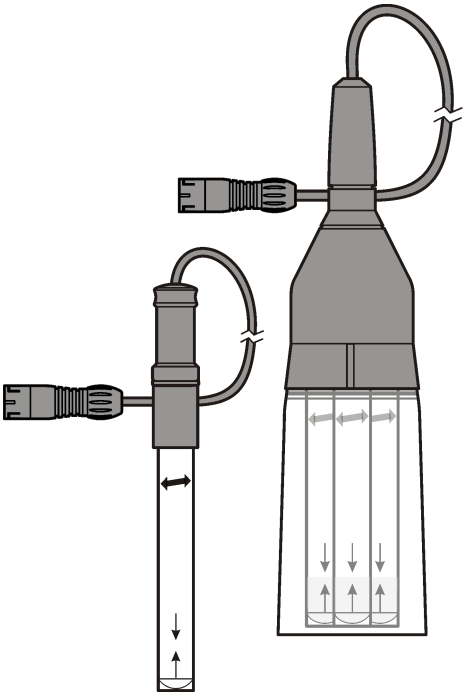


Table of contents

Safety information

Precautionary labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed. A symbol on the instrument is referenced in the manual with a precautionary statement.

Electrical equipment marked with this symbol may not be disposed of in European public disposal systems after 12 August of 2005. In conformity with European local and national regulations (EU Directive 2002/96/EC), European electrical equipment users must now return old or end-of-life equipment to the Producer for disposal at no charge to the user.
Note: *For return for recycling, please contact the equipment producer or supplier for instructions on how to return end-of-life equipment, producer-supplied electrical accessories, and all auxiliary items for proper disposal.*

Specifications

Specifications are subject to change without notice.

Specification	89231-656	89231-658	89231-660
Parameter	pH, conductivity and ORP	pH and conductivity	pH, conductivity and dissolved oxygen
Measurement range	0 to 14 pH 5 to 30,000 µS/cm ±2000 mV	0 to 14 pH 5 to 30,000 µS/cm	0 to 14 pH 5 to 30,000 µS/cm 0.03 mg/L oxygen to saturation
Temperature range	0 to 80 °C (32 to 176 °F)	0 to 80 °C (32 to 176 °F)	0 to 50 °C (32 to 122 °F)
Temperature sensor	Yes	Yes	Yes
Sensor	pH: glass (standard) Conductivity: platinum	pH: glass (standard) Conductivity: platinum	pH: glass (standard) Conductivity: platinum Dissolved oxygen: replaceable dissolved oxygen membrane
Reference type	Ag/AgCl	Ag/AgCl	Ag/AgCl
Junction type	Porous pin	Porous pin	Porous pin
Electrolyte	Non-refillable gel	Non-refillable gel	Non-refillable gel
Storage solution	KCl 0.01 M (conductivity standard 1412 µS/cm)	KCl 0.01 M (conductivity standard 1412 µS/cm)	3M KCl
Number of poles	2	2	2

Specification	89231-656	89231-658	89231-660
Conductivity cell constant (cm-1)	1.0	1.0	1.0
Platinized	No	No	No
Meter compatibility	H30PCO	H30PCO and H30PCD	H30PCD
Body material	Polycarbonate	Polycarbonate	Polycarbonate
Length	170 mm	170 mm	170 mm
Diameter	12 mm	12 mm	40 mm total diameter with 12 mm individual sensors
Cable	1 m	1 m	1 m
Connector	MP8[1]	MP8[1]	MP8[1]

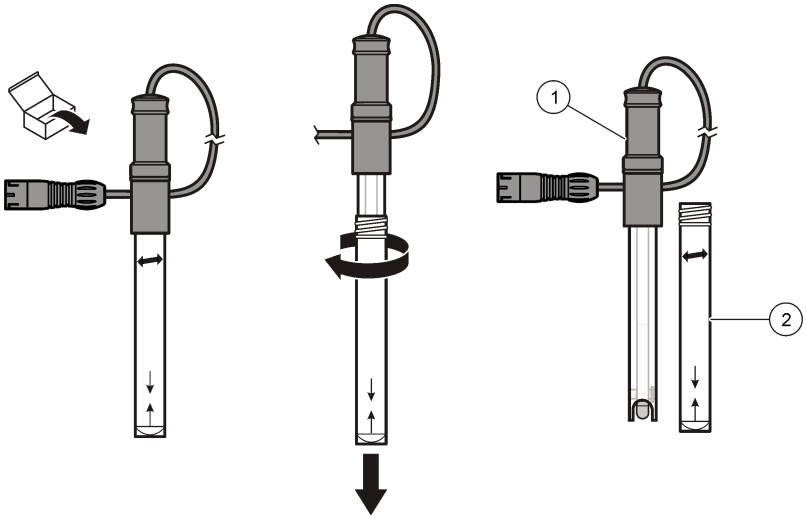
[1] For use with sympHony handheld meters only

Product overview

The multisensor probes are combination gel-filled electrodes for pH, conductivity and ORP or dissolved oxygen measurements in general aqueous samples. The multisensor probes have a built-in temperature sensor. Refer to Figure 1 and Figure 2. Refer to Specifications on page 3 for the probe parameters. Refer to Sample requirements on page 8.

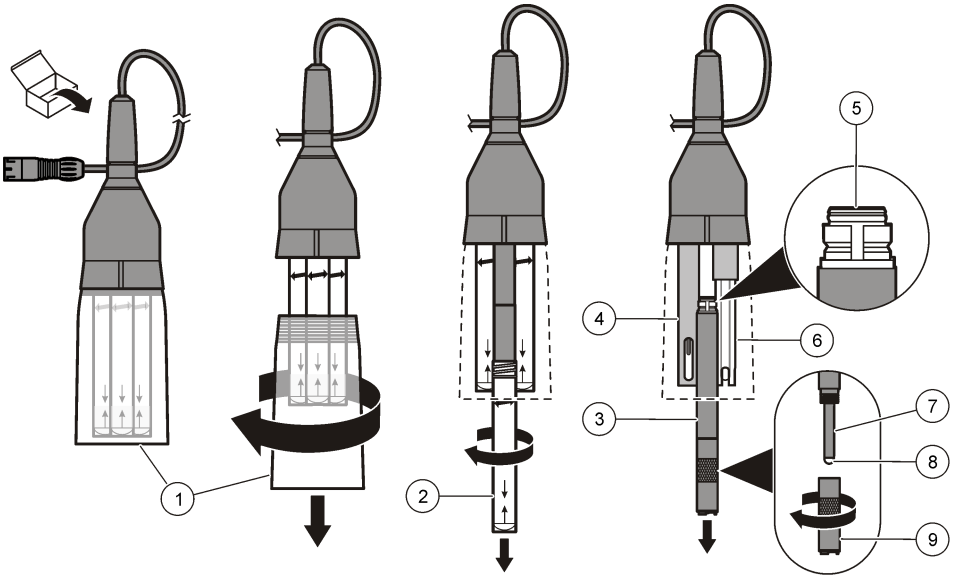
The multisensor probes are used with sympHony meters. Refer to Meter compatibility on page 5.

Figure 1 Probe overview – single-probe



1 Probe	**2** Probe storage tube

Figure 2 Probe overview – multI-probe (89231-660)



1 Protective shroud	**4** Conductivity probe	**7** Anode
2 Probe storage tube	**5** mini-MP connector[1]	**8** Cathode
3 Dissolved oxygen probe	**6** pH probe	**9** Membrane module

[1] Each probe has a unique mini-MP connector.

Meter compatibility

The multisensor probes are compatible with the sympHony handheld meter models: H30PCO and H30PCD. Refer to Specifications on page 3 for specific compatibility.

Preparation for use

⚠ CAUTION

Personal injury hazard. Broken glass can cause cuts. Use tools and personal protective equipment to remove broken glass.

To prepare the probe for calibration or sample measurement:

1. Turn the probe storage tube(s) and remove from the probe. Keep the probe storage tube(s).
2. Rinse the probe with deionized water. Blot dry with a lint-free cloth.

Polarize the dissolved oxygen probe (89231-660 multisensor)

Before calibration or measurement of dissolved oxygen with the 89231-660 multisensor, polarize the dissolved oxygen probe.

The dissolved oxygen probe must be polarized every time the multisensor is disconnected from the meter or the batteries are removed from the meter. The probe is continuously polarized while it is connected to the meter.

1. Fill the dissolved oxygen probe storage tube with deionized water to the mark.

2. Attach the storage tube for the dissolved oxygen probe to the dissolved oxygen probe on the multisensor.
3. Connect the multisensor to the meter. Turn the meter on.
4. Wait for the dissolved oxygen probe to polarize. Refer to Table 1 for the amount of time.
5. Enter the atmospheric pressure and salinity on the meter.
6. Turn the storage tube for the dissolved oxygen probe and remove it from the dissolved oxygen probe on the multisensor.
7. Rinse the storage tube for the dissolved oxygen probe with deionized water.
8. Invert and shake the storage tube for the dissolved oxygen probe to remove any water droplets.

Table 1 Polarization times

Disconnect time	Polarization time
Less than 5 minutes	10 minutes
5–15 minutes	45 minutes
More than 15 minutes	6 hours

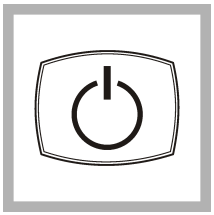
Calibration

Before calibration:
Prepare the probe for use. Refer to Preparation for use on page 5.
Prepare the meter. Refer to the meter manual.

Calibration notes

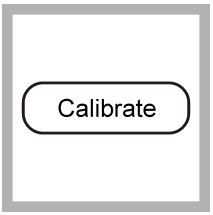
- For maximum accuracy, calibrate the probe at least once a day.
- Prepare fresh standard solutions for the calibration.
- The calibration and sample measurement conditions must be as similar as possible (e.g., the temperature of the solution, stir procedure, stir rate and position of the probe).
- For conductivity calibration, use 1-point calibration and select the standard nearest to the expected measurement range.
- Calibration of conductivity cells is important as the conductivity cell constant can change with time and calibration identifies the actual cell constant versus the nominal value.
- Do not dilute conductivity standards or samples.
- For dissolved oxygen calibration, a water-saturated air calibration is recommended. Refer to Dissolved oxygen probe calibration procedure – water-saturated (100%) air on page 7.
- When the probe is submerged, make sure that there are no air bubbles under the probe sensor tip(s). Gently shake the probe from side to side to remove any air bubbles.
- Make sure that the reference junction is fully in the solution.
- Do not put the probe on the bottom or sides of the container.
- If stabilization is slow, shake the probe from side to side in the solution.
- If a calibration error occurs, refer to Troubleshooting on page 12.

Calibration procedure

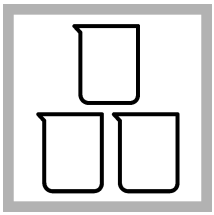


1. Connect the probe to the meter. Turn the meter on.

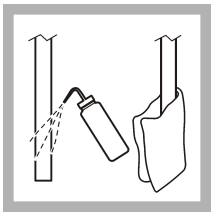
Note: *For dissolved oxygen calibration, polarize the probe. Refer to* Polarize the dissolved oxygen probe (89231-660 multisensor) *on page 5.*



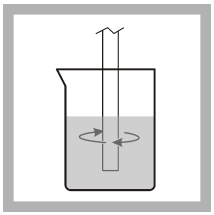
2. Push **Calibrate** and select the probe if applicable.



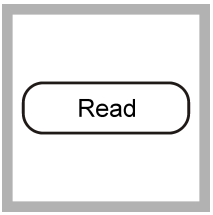
3. Prepare the standard solutions in separate beakers or applicable containers.



4. Rinse the probe with deionized water. Blot dry with a lint-free cloth.



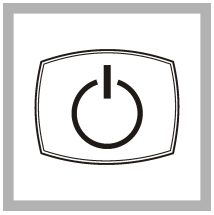
5. Put the probe in the standard solution. Stir the standard solution gently at a constant rate to prevent the formation of a vortex.



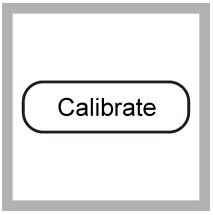
6. Push **Read**. Stir gently. The display shows "Stable" when the reading is stable.

7. When the reading is stable, the meter prompts for the next calibration point. Do steps 4–6 again for additional standard solutions. The calibration is complete when the last standard solution is read.

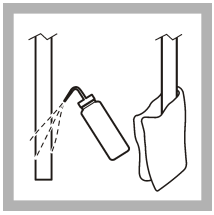
Dissolved oxygen probe calibration procedure – water-saturated (100%) air



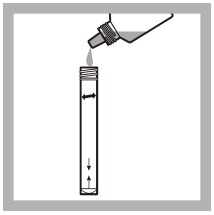
1. Turn the meter on. If the dissolved oxygen probe is not polarized, polarize the probe.



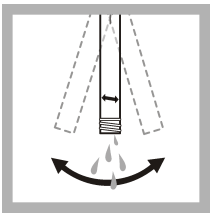
2. Push **Calibrate** and select the probe if applicable.



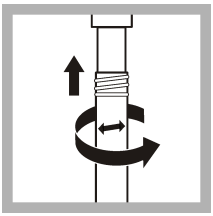
3. Rinse the probe with deionized water. Blot dry with a lint-free cloth.



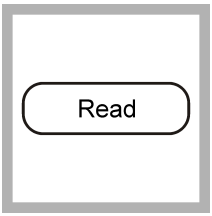
4. Add approximately ¼ inch (6.4 mm) of deionized water to the probe storage tube .



5. Invert and shake the probe storage tube to remove all water droplets.



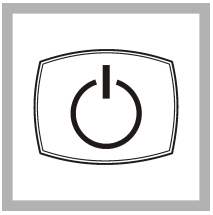
6. Immediately put the probe in the storage tube and turn to tighten.



7. Push Read. The display shows "Stable" when the reading is stable. The calibration is complete when the reading is stable.

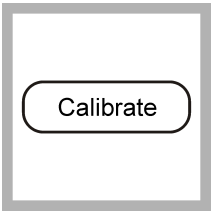
Calibration to a specific value

When TO A SPECIFIC VALUE is selected as the type of calibration, the probe is calibrated with a single standard solution. Select the standard solution nearest to the expected sample value.

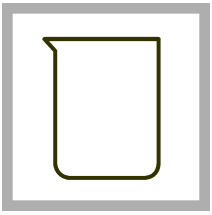


1. Connect the probe to the meter. Turn the meter on.

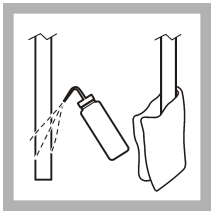
Note: *For dissolved oxygen calibration, polarize the probe. Refer to* Polarize the dissolved oxygen probe (89231-660 multisensor) *on page 5.*



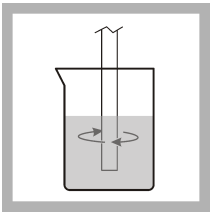
2. Push **Calibrate** and select the probe if applicable.



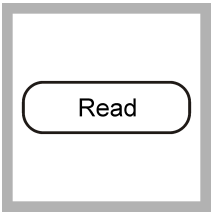
3. Prepare the standard solution in a beaker or an applicable container.



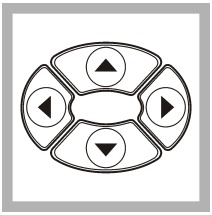
4. Rinse the probe with deionized water. Blot dry with a lint-free cloth.



5. Put the probe in the standard solution. Stir the standard solution gently at a constant rate to prevent the formation of a vortex.



6. Push **Read**. Stir gently. The display shows "Stable" when the reading is stable.



7. When the reading is stable, use the arrow keys to enter the standard solution value, then push **OK**.

Sample requirements

Some probes are not compatible with specific sample types. Probe damage can occur.

- Samples should be aqueous. Measurements may be made in partially aqueous or some water-miscible solvents. The results must be interpreted with caution as the full pH scale is shifted when the solvent system changes.
- pH probes with an Ag/AgCl reference system and a single junction are not compatible with solutions that contain silver complexing or binding agents such as TRIS, proteins and sulfides. To measure in these solutions, use a double-junction pH probe, probe with an Ag^+ (silver ion) barrier or a Red Rod pH probe. Red Rod pH probes are compatible with these types of samples as they have an encapsulated reference system.
- Proteins can collect on the sensing bulb. Make sure the probe stays clean when these types of samples are measured.
- Do not use probes in solutions that are outside the temperature range of the probe.

Sample measurement

⚠ WARNING

Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current material safety data sheets (MSDS) for safety protocols.

Before measurement:

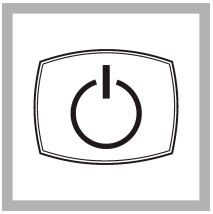
Prepare the probe for use. Refer to Preparation for use on page 5.

Calibrate the probe. Refer to Calibration on page 6. The manufacturer recommends that the probe is calibrated at least once a day for the best measurement accuracy.

Measurement notes

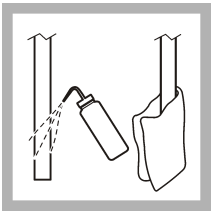
- The calibration and sample measurement conditions must be as similar as possible (e.g., the temperature of the solution, stir procedure, stir rate and position of the probe).
- Calibration of conductivity cells is important as the conductivity cell constant can change with time and calibration identifies the actual cell constant versus the nominal value.
- Do not dilute conductivity standards or samples.
- When the probe is submerged, make sure that there are no air bubbles under the probe sensor tip(s). Gently shake the probe from side to side to remove any air bubbles.
- Make sure that the reference junction is fully in the solution.
- If necessary, turn the protective shroud and remove it from the probe. The protective shroud prevents damage to the sensors.
- Do not put the probe on the bottom or sides of the container.
- If stabilization is slow, shake the probe from side to side in the solution.
- Do not use probes in areas where EMF is present (i.e., voltaic cells, thermoelectric devices, electrical generators, resistors and transformers). For use in process units (i.e., spot checking), make sure that the meter is grounded.
- If a measurement error occurs, refer to Troubleshooting on page 12.

Measurement procedure

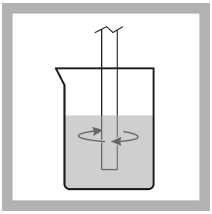


1. Connect the probe to the meter. Turn the meter on.

Note: *Before dissolved oxygen measurement, polarize the probe if the probe is not polarized.*

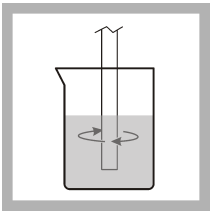


2. Rinse the probe with deionized water. Blot dry with a lint-free cloth.

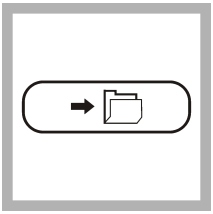


3. Put the probe in the sample and stir gently at a constant rate to prevent the formation of a vortex.

4. Push **Read**. Select the channel for the parameter to be measured if applicable.

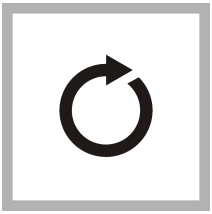


5. Stir gently. The display shows "Stable" when the reading is stable.

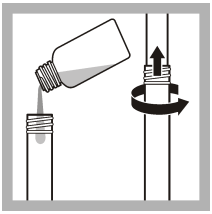


6. If the folder icon is shown, push the folder icon to save the data.

Note: *Data is automatically saved if the folder icon is not shown.*



7. Do steps 2–6 again for additional measurements.



8. When measurements are done, prepare the probe for storage. Refer to Storage on page 12.

Maintenance

Clean the probe

NOTICE
Do not rub or touch the tip of the pH or dissolved oxygen sensors.

Clean the probe when there is contamination on the sensor(s). Symptoms of contamination are:

- Readings are not accurate or consistent.
- The stabilization time is slow.
- A calibration error occurs.
- Contamination is visible on the probe (i.e., dirt).

To clean the dissolved oxygen probe of the multisensor probe, refer to Dissolved oxygen probe (89231-660 multisensor) on page 11.

1. For general contaminants, rinse the probe with deionized water. Blot dry with a lint-free cloth.
2. For other contaminants:
   a. Soak the pH and/or conductivity sensors of the probe in the applicable cleaning agent. Refer to Table 2.
   b. Rinse or soak the sensors for 1 minute in deionized water. Blot dry with a lint-free cloth.

Table 2 Cleaning agent

Contaminant	Cleaning agent	Soak time
Mineral deposits	0.1 N HCl	5 minutes (maximum)
Fats, grease and oils	Warm, mild detergent solution	2 hours (maximum)

Dissolved oxygen probe (89231-660 multisensor)

Clean the probe

NOTICE

Use only deionized water and/or the polishing cloth to clean the anode and cathode.

1. Remove the membrane module from the probe:
   a. Hold the probe so it is vertical with the tip down.
   b. Gently turn the membrane module to remove it from the probe.
2. Soak the membrane module in a mild soap solution.
3. Rinse the membrane module fully with deionized water.
4. Invert the membrane module and shake vigorously to remove any water.
5. Rinse the probe with deionized water. Blot dry with a lint-free cloth.
6. Rub the anode with the polishing cloth supplied. The anode is the outer metallic stem of the probe that is visible when the membrane module is removed. The polishing cloth removes deposits that can decrease the probe performance.
7. Fill the membrane module $^{2}/_{3}$ full with filling solution and assemble the probe. Refer to Fill the membrane module on page 11.

Replace the membrane module

NOTICE

Carefully handle the membrane modules to prevent damage.

It is necessary to replace the membrane module periodically. Replace the membrane module when it is damaged, the probe reading drifts or the probe has a slow response.

1. Remove the membrane module from the probe:
   a. Hold the probe so it is vertical with the tip down.
   b. Gently turn the membrane module to remove it from the probe.
2. Discard the used membrane module.
3. Rinse the probe with deionized water. Blot dry with a lint-free cloth.
4. Rub the anode with the polishing cloth supplied. The anode is the outer metallic stem of the probe that is visible when the membrane module is removed. The polishing cloth removes deposits that can decrease the probe performance.
5. Fill the new membrane module $^{2}/_{3}$ full with filling solution and assemble the probe. Refer to Fill the membrane module on page 11.

Fill the membrane module

Add filling solution to the membrane module if the level of filling solution in the membrane module is less than $^{2}/_{3}$ full.

1. Remove the membrane module from the probe:
   a. Hold the probe so it is vertical with the tip down.
   b. Gently turn the membrane module to remove it from the probe.

2. Add filling solution to the membrane module until it is approximately $^{2}/_{3}$ full.
3. Install the membrane module on the probe:
   a. Carefully tilt the membrane module to remove the air bubbles in the filling solution.
   b. Hold the probe with the tip down and slightly tilted.
   c. Slowly put the membrane module on the probe. Some filling solution should come out of the threads of the membrane module. Remove any filling solution on the surface of the probe.
4. If no filling solution comes out of the threads, air may be inside the membrane module cap. Add more filling solution to the membrane module and do step 3 again.
5. If the probe will be used immedately, polarize the probe. Refer to Polarize the dissolved oxygen probe (89231-660 multisensor) on page 5.
6. If the probe will not be used immediately, put the probe in storage. Refer to Storage on page 12.

Storage

1. Fill the probe storage tube(s) with storage solution to the mark. Refer to Specifications on page 3 for the applicable storage solution.
2. Put the probe(s) in the storage tube(s) and turn to tighten.

Rehydrate the probe (conductivity and pH sensors only)

NOTICE

Do not clean the dissolved oxygen probe of the 89231-660 multisensor with HCl because damage to the membrane will occur.

If the pH or conductivity sensors of a probe become dry, rehydrate the probe. A dry probe will not operate correctly.

1. Soak the dry probe in a dilute HCl solution for several hours.
2. Rinse the probe with deionized water. Blot dry with a lint-free cloth.
3. Calibrate the probe. Refer to Calibration on page 6.

Troubleshooting

For the best performance, make sure to:

- Prepare the probe for use before calibration or measurement.
- Obey the calibration and measurement notes.
- Obey the calibration and measurement procedures.

Troubleshooting notes:

- Magnetic stirrers may supply sufficient heat to change solution temperature. Put a piece of insulating material between the stirrer and beaker.
- Protect the sensing element from direct light during measurement.

Refer to Table 3 for calibration warnings and errors. Refer to Table 4 for measurement warnings and errors.

Table 3 Calibration warnings and errors

Error/Warning	Solution
Calibration out of range	The slope is out of range. Calibrate the probe. Refer to Calibration on page 6. Connect a new probe.
Standard or electrode in poor condition	Calibrate the probe. Refer to Calibration on page 6. Examine the probe. Refer to Examine the probe on page 13.
Outside slope limits	Examine the standard solution solution. Make sure that the standard solution used is the standard solution selected in the calibration setup. Identify the temperature specification in the calibration setup. Use a new standard solution.
Standard not recognized	
Unstable reading Time t > 120 s	Calibrate the probe. Refer to Calibration on page 6. Examine the probe. Refer to Examine the probe on page 13. Make sure that the probe is correctly immersed in the sample.
Electrode in poor condition	Examine the probe. Refer to Examine the probe on page 13.
Check the electrode	
SAME BUFFERS	Calibrate the probe. Refer to Calibration on page 6. Examine the probe. Refer to Examine the probe on page 13. Examine the standard solution. Use a new standard solution.

Table 4 Measurement warnings and errors

Error/Warning	Solution
pH 12.78 19°C	Calibrate the probe. Refer to Calibration on page 6.
Measurement out of range ("_ _ _ _ _ _")	Examine the probe. Refer to Examine the probe on page 13.
Unstable reading	Examine the probe. Refer to Examine the probe on page 13. Make sure that the probe is correctly immersed in the sample.
The temperature is out of °C range.	Examine the temperature sensor. Connect a different probe to identify if the problem is with the probe or the meter.
Time > 120 s	Make sure that the probe is correctly immersed in the sample. Measure the sample temperature. Examine the probe. Refer to Examine the probe on page 13.
Time > 240 s	
Time > 300 s	

Examine the probe

Note: *The lower the sample temperature or the larger the temperature difference between the samples, the longer the stabilization time will be.*

1. Clean the probe. .
2. Turn off the meter. Disconnect and then connect the probe again.
3. Connect a different probe to identify if the problem is with the probe or the meter.

vwr.com 1.800.932.5000