



DOC022.53.80320

symphony™ ORP/Redox Probes

07/2012, Edition 1

User Manual

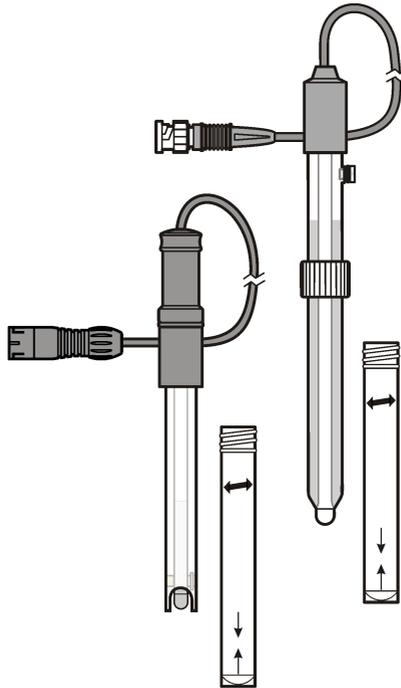


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Safety information

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 | 89231-640 | 89231-642 | 89231-644 |
|--------------------|------------------------------|------------------------------|------------------------------|
| Measurement range | ±2000 mV | ±2000 mV | ±2000 mV |
| Temperature range | 0 to 80 °C (32 to 176 °F) | 0 to 80 °C (32 to 176 °F) | 0 to 80 °C (32 to 176 °F) |
| Temperature sensor | No | No | No |
| Electrolyte | Refillable | Non-refillable gel | Non-refillable gel |
| Filling solution | 3M KCl | — | — |
| Sensor | Platinum | Platinum | Platinum |
| Reference type | Ag/AgCl | Ag/AgCl | Ag/AgCl |
| Junction type | Porous pin | Porous pin | Porous pin |
| Body material | Glass | Glass | Polycarbonate |
| Length | 130 mm | 130 mm | 170 mm |
| Diameter | 12 mm | 12 mm | 12 mm |
| Cable | 1 m | 1 m | 1 m |
| Connector | BNC | BNC | MP5 ¹ |

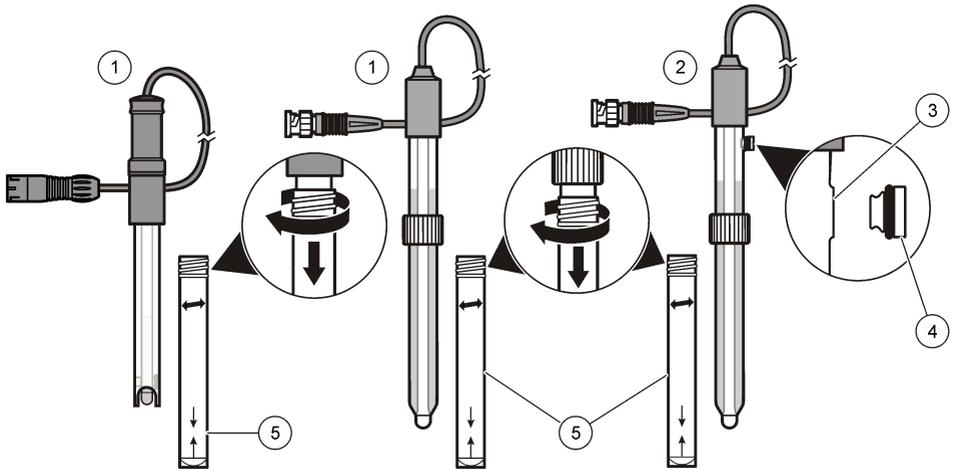
¹ For use with symphony handheld meters only

Product overview

The ORP probes are combination probes for oxidation reduction potential (ORP) measurements in general aqueous samples and galvanic baths. Refer to [Figure 1](#). Refer to [Sample requirements](#) on page 7.

These ORP probes are used with symphony meters. Refer to [Meter compatibility](#) on page 4.

Figure 1 Probe overview



| | |
|------------------------|----------------------|
| 1 Non-refillable probe | 4 Filling hole plug |
| 2 Refillable probe | 5 Probe storage tube |
| 3 Filling hole | |

Meter compatibility

The ORP probes with BNC connectors are compatible with the symphony benchtop meter model(s): B10P, B20PI, B30PCI and B40PCID.

The ORP probes with MP5 connectors are compatible with the symphony handheld meter model(s): H10P and H30PCO.

Preparation for use

⚠ CAUTION



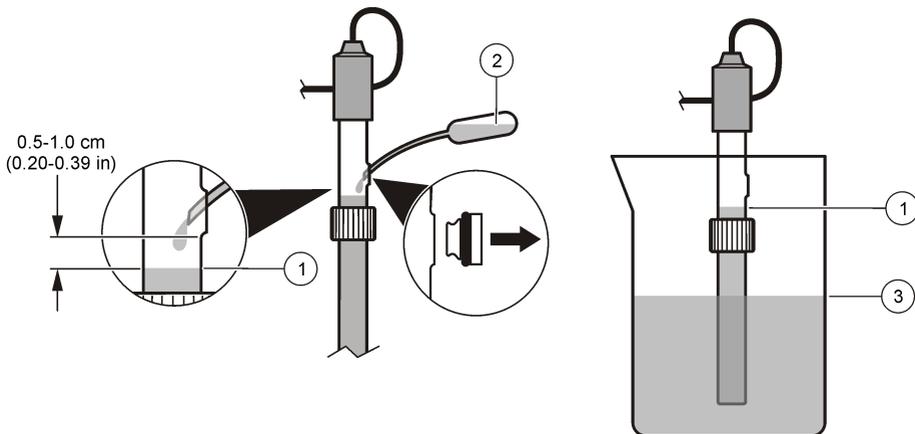
Personal injury hazard. Broken glass can cause cuts. Use tools and personal protective equipment to remove broken glass.

To prepare the probe for calibration or sample measurement:

1. Turn the probe storage tube and remove it from the probe. Keep the probe storage tube.
2. Rinse the reference junction(s) and sensor tip thoroughly with deionized water to fully remove the storage solution or any KCl salt buildup. Blot dry with a lint-free cloth.
3. For refillable probes, remove the filling hole plug and keep it for storage. The filling hole must be open when the probe is in use.
4. For refillable probes, add the applicable filling solution to the probe until the filling solution is above the standard solution or sample level when in use (approximately 0.5–1.0 cm below the filling hole). Refer to [Figure 2](#). Refer to [Fill the probe](#) on page 8.

5. Shake the probe downwards (like a thermometer) to remove any air bubbles in the bulb. Air bubbles can cause slow responses or errors in measurement.
6. Before use, condition the probe for several minutes in the sample or in a solution comparable to the sample in terms of pH and ionic strength for a faster response.

Figure 2 Filling solution level for refillable probes



| | | |
|--------------------------|--------------------|-------------------------------------|
| 1 Filling solution level | 2 Filling solution | 3 Standard solution or sample level |
|--------------------------|--------------------|-------------------------------------|

Calibration

Before calibration:

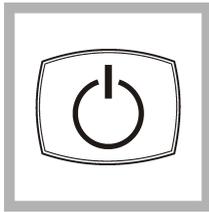
Prepare the probe for use. Refer to [Preparation for use](#) on page 4.

Prepare the meter. Refer to the meter manual.

Calibration 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).
- When the probe is submerged, make sure that there are no air bubbles under the probe tip. 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 to refresh the reference junction.
- If a calibration error occurs, refer to [Troubleshooting](#) on page 9.

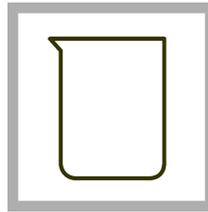
Calibration procedure



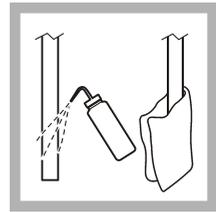
1. Connect the probe to the meter. Turn the meter on.



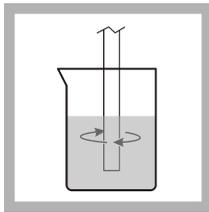
2. Push **Calibrate** and select the probe if applicable.



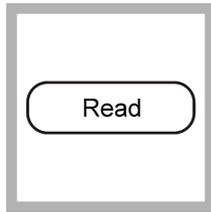
3. Prepare the standard solution in a beaker or an applicable container.



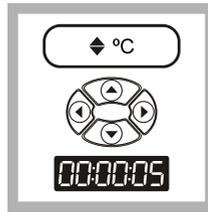
4. Rinse the probe with deionized water. Blot dry with a lint-free cloth.



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



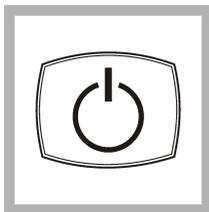
6. Push **Read**. Stir gently. The display shows "Stable" when the reading is stable.



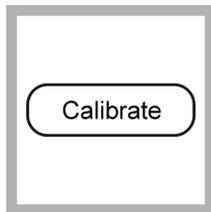
7. If a temperature sensor is not used, push °C during the measurement. Use the arrow keys to enter the standard solution temperature. The new value is set in 5 seconds.

Calibration to a specific value

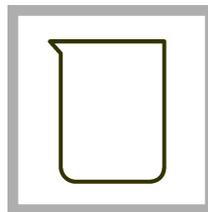
When TO A SPECIFIC VALUE is selected as the type of calibration, the probe is calibrated with a single standard solution. Select the standard solution nearest to the expected sample value.



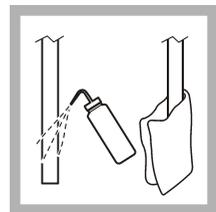
1. Connect the probe to the meter. Turn the meter on.



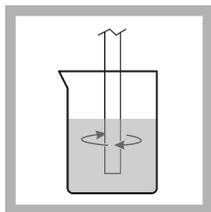
2. Push **Calibrate** and select the probe if applicable.



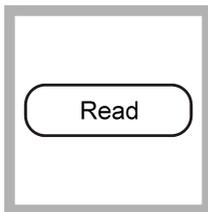
3. Prepare the standard solution in a beaker or an applicable container.



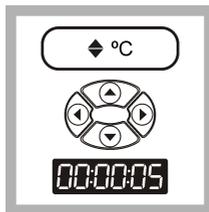
4. Rinse the probe with deionized water. Blot dry with a lint-free cloth.



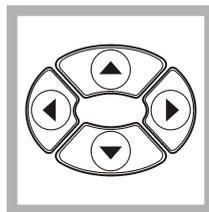
5. Put the probe in the standard solution. Stir the standard solution gently at a constant rate to prevent the formation of a vortex.



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



7. If a temperature sensor is not used, push **°C** during the measurement. Use the arrow keys to enter the standard solution temperature. The new value is set in 5 seconds.



8. 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.

- Do not use plastic body probes in sample that contain non-aqueous solutions or organic solvents.
- 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.
- 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.
- Proteins can collect on the sensing surface. 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:

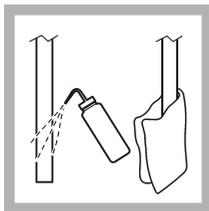
Prepare the probe for use. Refer to [Preparation for use](#) on page 4.

Calibrate the probe. Refer to [Calibration](#) on page 5. The manufacturer recommends that the probe is calibrated at least once a day for the best measurement accuracy.

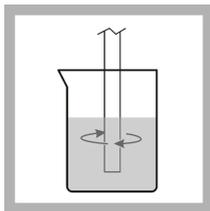
Measurement notes

- For accurate measurements, stir all samples at a constant rate.
- When the probe is submerged, make sure that there are no air bubbles under the probe tip. Gently shake the probe from side to side to remove any air bubbles.
- 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 measurement error occurs, refer to [Troubleshooting](#) on page 9.

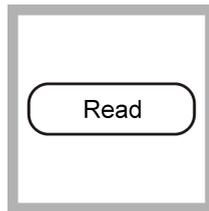
Measurement procedure



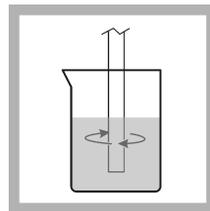
1. Rinse the probe with deionized water. Blot dry with a lint-free cloth.



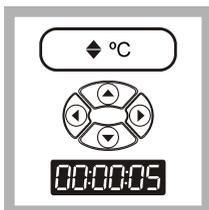
2. Put the probe in the sample and stir gently at a constant rate to prevent the formation of a vortex.



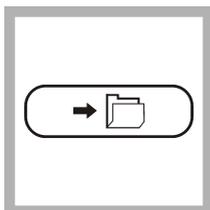
3. Push **Read**. Select the channel for the parameter to be measured if applicable.



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

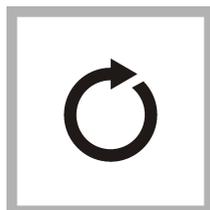


5. If a temperature sensor is not used, push °C during the measurement. Use the arrow keys to enter the standard solution temperature. The new value is set in 5 seconds.

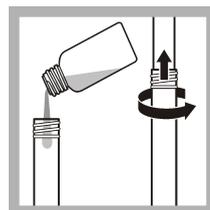


6. If the folder icon is shown, push the folder icon to save the data.

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



7. Do steps 1–6 again for additional measurements.



8. When measurements are done, prepare the probe for storage. Refer to [Storage](#) on page 9.

Maintenance

Fill the probe

Add filling solution to the refillable probe when the filling solution level is low or is replaced. Refer to [Specifications](#) on page 3 for the applicable filling solution.

1. Remove the filling hole plug from the filling hole.
2. Remove the cap from the tip of the filling solution bottle.
Note: If the tip of the filling solution bottle becomes clogged, remove the tip and soak it in warm water. Dry the tip fully.
3. Hold the bottle so that the tip is down. Put the tip of the bottle in the filling hole.
4. Slowly squeeze the bottle until the filling solution level is approximately 0.5–1.0 cm below the filling hole.
5. If the probe will not be used immediately, put the probe in storage. Refer to [Storage](#) on page 9.
6. Install the cap on the filling solution bottle.

Clean the probe

Clean the probe when there is contamination on the sensor. 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).
1. Rinse the probe with deionized water. Blot dry with a lint-free cloth.
 2. Use a small amount of a mild abrasive such as toothpaste (no teeth whiteners or abrasives) and gently rub the platinum sensor in a circular motion.
 3. Rinse the probe with deionized water. Blot dry with a lint-free cloth.

Storage

For the best performance, do not let the reference junction become dry. The probe can be kept in a sample for a maximum of 2 hours if the sample pH is not too high.

1. For refillable probes, put the filling hole plug in the filling hole.
2. Rinse the probe with deionized water. Blot dry with a lint-free cloth.
3. For refillable probes, put filling solution in the probe storage tube. Refer to [Specifications](#) on page 3 for the applicable filling solution.
4. For non-refillable probes, put 3M KCl in the probe storage tube.
5. Put the probe in the storage tube and turn to tighten.
6. Make sure that the sensor and reference junction(s) of the probe is fully in the solution in the storage tube.

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 1](#) for calibration warnings and errors. Refer to [Table 2](#) for measurement warnings and errors.

Table 1 Calibration warnings and errors

| Error/Warning | Solution |
|---|---|
| Standard or electrode in poor condition | Calibrate the probe. Refer to Calibration on page 5. Examine the probe. Refer to Examine the probe on page 10. |
| Outside allowable range | 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 5. Examine the probe. Refer to Examine the probe on page 10. Make sure that the probe is correctly immersed in the sample. |

Table 1 Calibration warnings and errors (continued)

| Error/Warning | Solution |
|-----------------------------|--|
| Electrode in poor condition | Examine the probe. Refer to Examine the probe on page 10. |
| Check the electrode | |
| SAME BUFFERS | Calibrate the probe. Refer to Calibration on page 5. Examine the probe. Refer to Examine the probe on page 10. Examine the standard solution. Use a new standard solution. |

Table 2 Measurement warnings and errors

| Error/Warning | Solution |
|-------------------------------------|---|
| Measurement out of range ("_____") | Examine the probe. Refer to Examine the probe on page 10. Calibrate the probe. Refer to Calibration on page 5. |
| Unstable reading | Examine the probe. Refer to Examine the probe on page 10. 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 10. |
| 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.

- Clean the probe.
- For refillable probes, if the filling solution is contaminated, drain and replace the filling solution with fresh filling solution.
- Rinse the reference junction diaphragm with deionized water. Then, shake the probe downwards (like a thermometer) to remove any air bubbles around the sensor.
- Turn off the meter. Disconnect and then connect the probe again.
- Connect a different probe to identify if the problem is with the probe or the meter.



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