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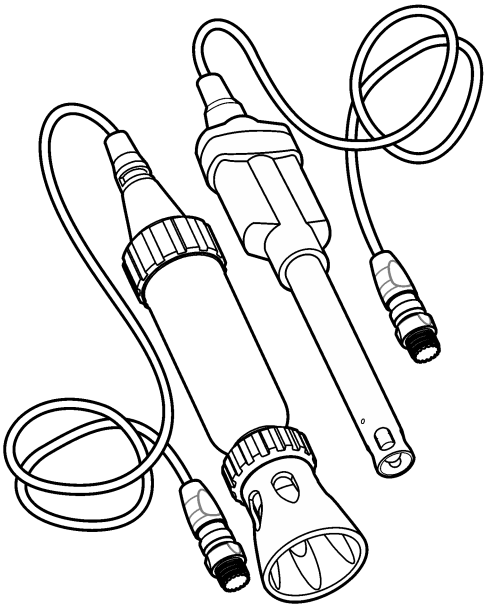
MTC101

05/2021, Edition 5

User Manual

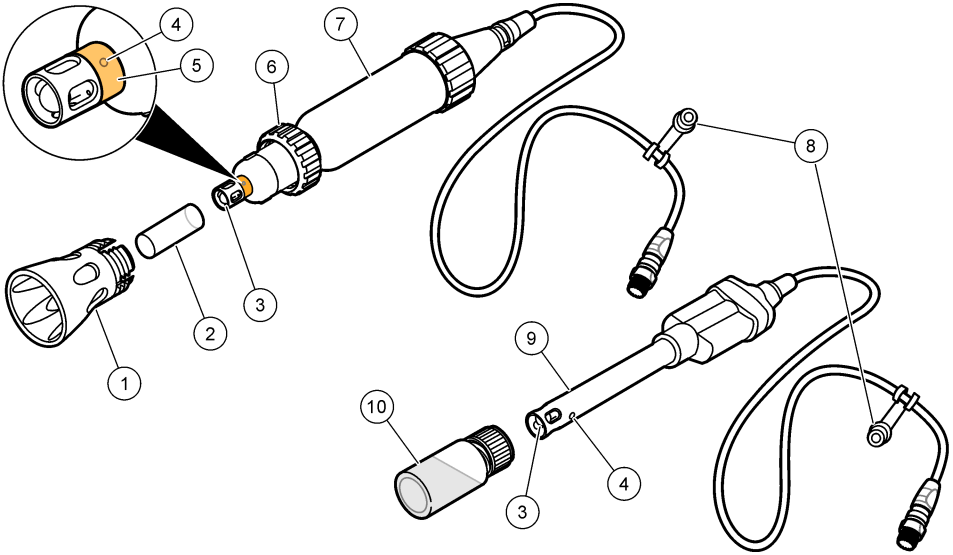


Section 1 Product overview

The Intellical MTC101 series ORP probes are digital, combination electrodes that measure the oxidation reduction potential (ORP/Redox) of wastewater, drinking water and general water samples. The probes have a non-refillable, gel-filled electrolyte and a built-in temperature sensor. The open reference junction gives an optimum electrical connection between the sample and the electrolyte and does not become clogged. The standard probes are for laboratory use. The rugged probes are for field use. Refer to Figure 1.

Note: *Do not use the probe for measurements in organic solvents.*

Figure 1 Probe overview



1 Shroud (rugged model)	**6** Locking ring (rugged model)
2 Probe storage cap	**7** Rugged probe
3 Platinum electrode and temperature sensor	**8** Probe soaker bottle holder or storage cap
4 Reference junction	**9** Standard probe
5 Protective tape (rugged model)	**10** Probe soaker bottle with storage solution

Section 2 Specifications

Specifications are subject to change without notice.

Specifications	Details
Probe type	Digital combination electrode with a non-refillable Ag/AgCl reference and a built-in temperature sensor
Range	±1200 mV
Resolution	0.1 mV
Reference type	Ag/AgCl
Reference junction	Open

Specifications	Details
Temperature accuracy	±0.3 °C (±0.54 °F)
Operating temperature	0 to 80 °C (32 to 176 °F)
Storage temperature	5 to 40 °C (41 to 104 °F)
Minimum immersion depth	20 mm (0.79 in.)
Body material (standard)	Epoxy
Body material (field rugged)	Epoxy/stainless steel
Reference potential versus Standard Hydrogen Electrode	207 mV at 25 °C
Electrolyte	Non-refillable gel reference element
Storage solution	Hach pH electrode storage solution[1] or 3 M KCl
Cable connection	M12 digital output and connector
Dimensions	Diameter: 12 mm (0.47 in.) Length: 175 mm (6.9 in.) total; 103 mm (4.1 in.) below head Cable length: MTC10101: 1 m (3.3 ft); MTC10103: 3 m (9.8 ft)
Dimensions (rugged)	Diameter: 46 mm (1.8 in.) Length: 223 mm (8.7 in.) Cable length: MTC10105: 5 m (16.4 ft); MTC10110: 10 m (32.8 ft); MTC10115: 15 m (49.2 ft); MTC10130: 30 m (98.4 ft)
Warranty	6 months on the probe. This warranty covers manufacturing defects, but not improper use or wear.
Certifications	CE, FCC/ISED

Section 3 Safety information

3.1 Intended use

The Intellical probes are intended for use by individuals who measure water quality parameters in the laboratory or in the field. The Intellical probes do not treat or alter water.

3.2 Use of hazard information

⚠ DANGER

Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a potentially hazardous situation that may result in minor or moderate injury.

[1] Use of other storage solutions can cause permanent damage to the probe.

NOTICE
Indicates a situation which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.

3.3 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 domestic or public disposal systems. Return old or end-of-life equipment to the manufacturer for disposal at no charge to the user.

3.4 Product hazards

⚠ CAUTION
 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 safety data sheets (MSDS/SDS) for safety protocols.

⚠ CAUTION
 Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.

⚠ CAUTION
 Personal injury hazard. Glass components can break. Handle with care to prevent cuts.

Section 4 Preparation for use

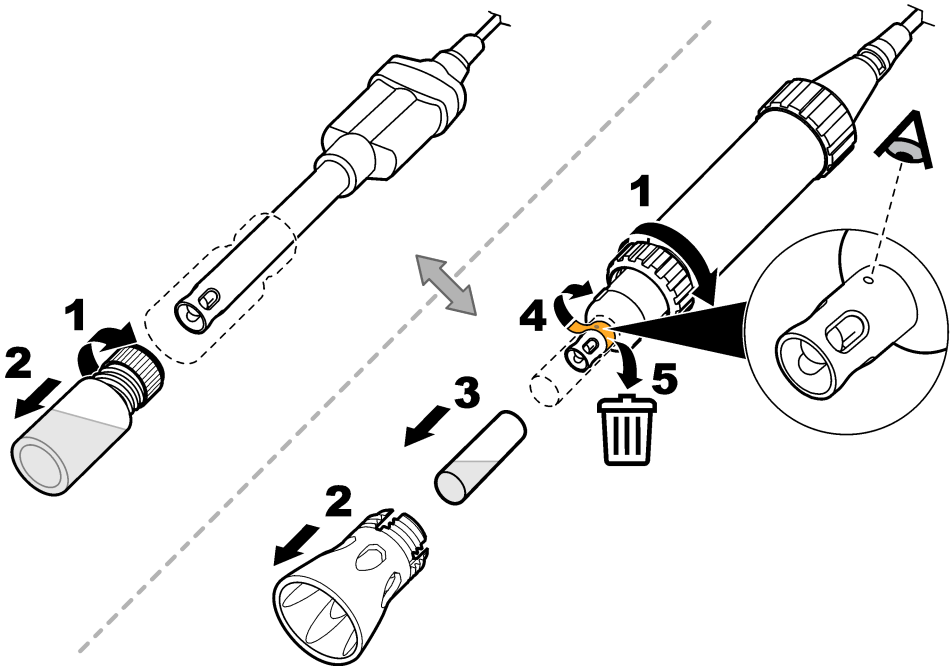
NOTICE
Make sure to remove the protective tape from the reference junction of new rugged probes. A probe with a blocked reference junction will not operate correctly.

New probes come with a soaker bottle that contains storage solution to keep the glass bulb and reference junction hydrated. New rugged probes come with protective tape over the reference junction. Prepare the probe as follows.

1. Remove the soaker bottle or probe storage cap from the probe. Refer to Figure 2.
2. If a rugged probe, remove the protective tape from the reference junction. Refer to Figure 2.
3. Rinse the probe sensors and reference junction with deionized water. Blot dry with a lint-free cloth.
4. For faster stabilization, soak the probe for 3 or more minutes in the sample before use.
5. Make sure that the meter has the correct date and time settings. The service-life time stamp in the probe comes from the date and time settings in the meter.

   Note: *Some meters automatically open the date and time settings when the meter starts for the first time, or after battery replacement.*
6. Connect the probe to the meter.

Figure 2 Remove the protective tape



Section 5 Calibration

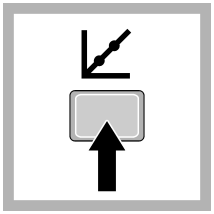
The procedure that follows is applicable to meters that can connect to Intellical ORP (MTC) probes. Refer to the applicable meter documentation for meter operation and probe-specific settings.

5.1 Calibration notes

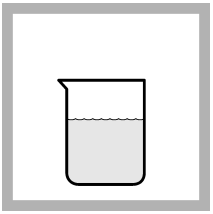
Read the notes that follow before calibration:

- The meter shows the standard solution to use for calibration. If necessary, change the standard solution in the probe settings menu.
- Do not dilute the standard solution. Discard the standard solution after each calibration.
- If the calibration standard is ZoBell's ORP/Redox standard solution, calibrate the probe at a solution temperature that is between 0 and 30 °C (32 to 86 °F). If the calibration standard is Light's solution, calibrate the probe at 25 °C (77 °F).
- Use the single display mode for calibration when more than one probe is connected to the meter (if applicable).
- Calibrate the probes and verify the calibration regularly for best results. Use the meter to set calibration reminders.
- The calibration data is stored in the probe. When a calibrated probe is connected to a different meter with the same calibration options, a new calibration is not necessary.
- Air bubbles below the sensor when in solution can cause a slow response or error in the calibration. Make sure to remove air bubbles during calibration.
- Remove the shroud before calibration. Refer to Remove or install the shroud on page 10.

5.2 Calibration procedure



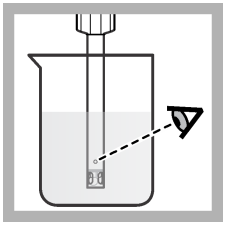
1. Go to the calibrate menu. Select the probe, if applicable. The display shows the ORP/Redox standard solution to use for calibration.



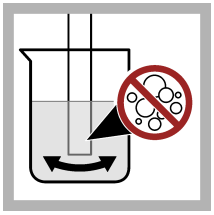
2. Pour the fresh standard solution into a beaker.

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

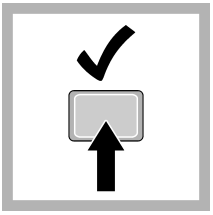
Rugged probes: install the shroud.



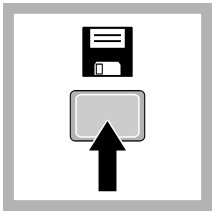
4. Put the probe in the standard solution with the sensor and reference junction fully in the solution. Do not put the probe on the bottom or sides of the beaker.



5. Shake the probe from side to side to remove air bubbles.



6. Stir gently, then read the ORP/Redox value of the standard solution. The display shows the mV value when the reading is stable.



7. Save the calibration.

Section 6 Sample measurement

The procedure that follows is applicable to meters that can connect to Intellical ORP (MTC) probes. Refer to the applicable meter documentation for meter operation and probe-specific settings.

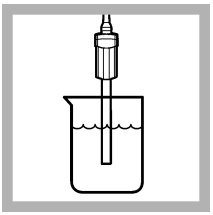
6.1 Sample measurement notes

Read the notes that follow before sample measurements.

- For measurements in reducing-type samples, soak the probe in Reducing Solution for ORP Electrodes for 3-10 minutes before the initial sample measurement. The soak time significantly decreases the stabilization time.
- Rinse the probe with deionized water and dry with a lint-free cloth between measurements to prevent contamination.
- If complete traceability is necessary, enter a sample ID and operator ID before measurement. Refer to the meter manual for instructions.
- The meter automatically saves the measurement data when the user manually reads each data point and when the meter is set to read at regular intervals. The user must manually save each data point when the meter is set to read continuously.

- Air bubbles below the sensor can cause a slow response or error in the measurement. Make sure to remove air bubbles before and during measurements.
- If the probe is a rugged type, make sure to install the shroud before field use to prevent damage to the sensing elements. Refer to Remove or install the shroud on page 10. The probe warranty does not include such damage.
- To deploy a rugged probe at a distance, toss the probe body with a slow underhand throw. Do not throw the probe by the cable to prevent damage to cable, the probe or the user.

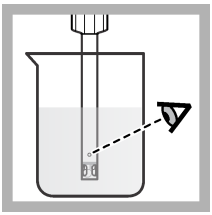
6.2 Sample measurement procedure



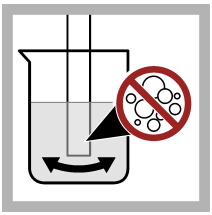
1. If the samples contain reducing agents, soak the probe in Reducing Solution for ORP Electrodes for 3 to 10 minutes.

2. Rinse the probe with the sample. Dry the probe with a lint-free cloth.

Rugged probes: install the shroud.

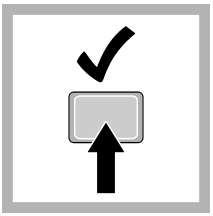


3. Put the probe in the sample with the sensor and reference junction fully in the sample. Do not put the probe on the bottom or sides of the beaker.



4. Shake the probe from side to side to refresh the reference junction and remove air bubbles.

Rugged probes: move the probe up and down to remove air bubbles.

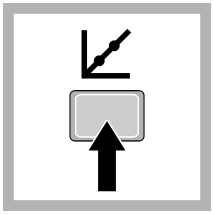


5. Stir gently, then read the ORP/Redox value of the sample. The display shows the mV value when the reading is stable.

Section 7 Verify the calibration

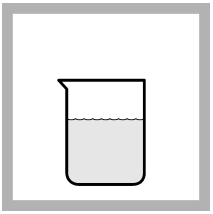
Measure the value of a fresh ORP/Redox standard solution to make sure that the result is accurate. Refer to the procedure that follows. The meter compares the selected standard solution value to the measured value and accepts or rejects the measurement. The user can change the standard solution and acceptance criteria for verification in the probe-specific settings.
Note: *Password protection may prevent access to the acceptance criteria.*

7.1 Verification procedure



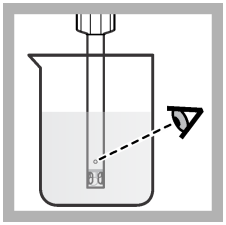
1. Go to the verification menu. The display shows the standard solution to use for verification.

Note: *Menu name for HQd meters: Run check standard.*

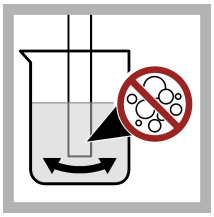


2. Pour the fresh standard solution into a beaker.

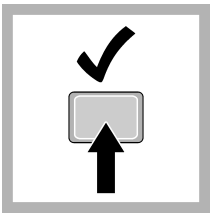
3. Rinse the probe with deionized water. Dry the probe with a lint-free cloth.



4. Put the probe in the standard solution with the sensor and reference junction fully in the solution. Do not put the probe on the bottom or sides of the beaker.



5. Shake the probe from side to side to remove air bubbles.



6. Stir gently, then read the mV value of the standard solution. The meter accepts or rejects the result.

Section 8 Maintenance

Regular maintenance is necessary for the best accuracy, stabilization time and life of the probe. Keep the probe in the recommended storage solution between measurements.

8.1 Clean the probe

Clean the probe regularly to remove contamination and to keep the reference junction open. Symptoms of contamination:

- Incorrect or irregular readings
- Slow stabilization times
- Calibration errors
- Sample material stays on the probe

1. Rinse the probe with deionized water. Blot dry with a lint-free cloth.
2. Soak the probe sensor and platinum disc in electrode cleaning solution or warm detergent solution for a maximum of 15 minutes.

   Note: *Remove the shroud on a rugged probe before cleaning. Install the shroud after the probe is clean. Refer to* Remove or install the shroud *on page 10.*
3. Rinse the probe with deionized water. Blot dry with a lint-free cloth.

4. To remove inorganic mineral deposits, soak the probe sensor and platinum disc in a solution of 0.1 M hydrochloric acid or 0.1 M nitric acid for a maximum of 15 minutes.
5. Rinse the probe with deionized water. Blot dry with a lint-free cloth.
6. If the platinum disc is dirty, polish the platinum disc with a soft cloth or cotton swab and detergent solution.
7. Condition the probe in a representative sample before use.

8.2 Remove or install the shroud

Remove the shroud on the rugged probe during calibration and maintenance. Refer to Figure 3. Keep the shroud installed on the rugged probe during sample measurements to prevent damage to the sensor. Refer to Figure 4.

Figure 3 Remove the shroud

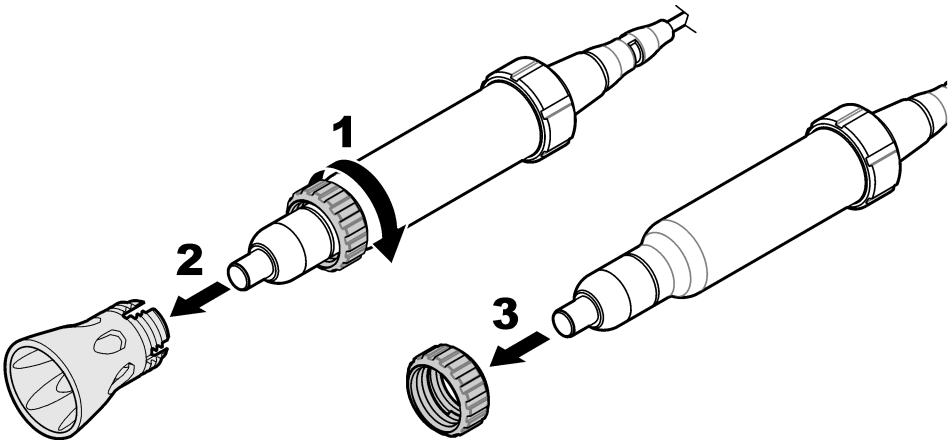
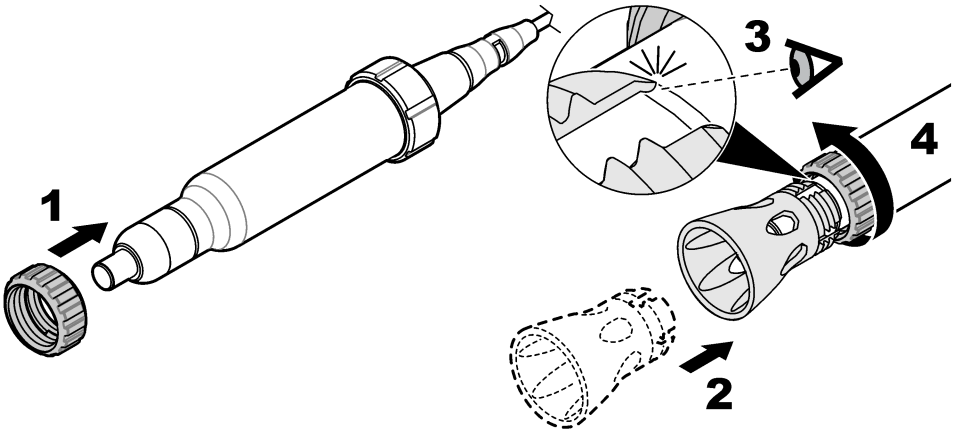


Figure 4 Install the shroud



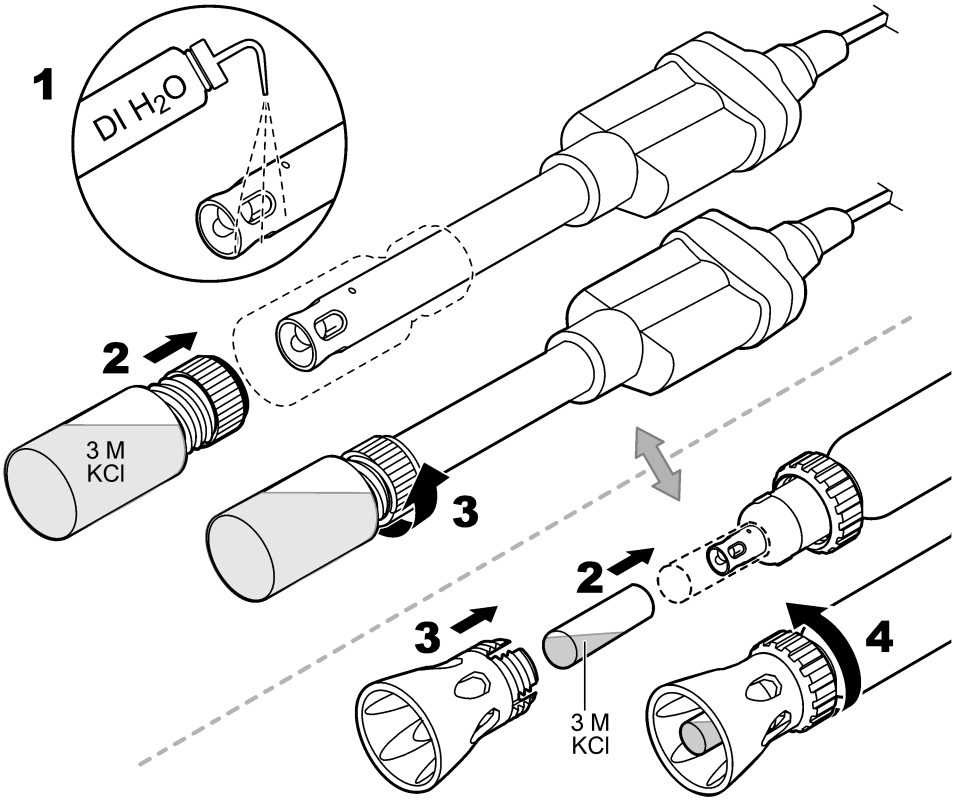
8.3 Storage

NOTICE

Probes can become permanently damaged if kept in a storage solution that is not specified by the manufacturer. Use only the specified storage solution (Hach pH electrode storage solution or 3 M KCl).

Do not store the probe in deionized water or in samples of low ionic strength. For short-term storage, the probe can stay in the sample for a maximum of 2 hours if the sample pH is not high. Put the soaker bottle that contains the storage solution on the probe when not in use. Refer to Figure 5. Keep the probe in a vertical position with the sensor and reference junction below the liquid level in the soaker bottle. Add storage solution to the soaker bottle if necessary.

Figure 5 Probe storage



Section 9 Troubleshooting

Problem	Possible cause	Solution
Decreased probe performance causes slow stabilization and prevents accurate calibrations or measurements.	The platinum sensor is dirty.	Clean the probe. Refer to Clean the probe on page 9.
	The sensor has become dry.	Clean and condition the probe. Refer to Clean the probe on page 9.

Problem	Possible cause	Solution
Sample properties cause slow stabilization or inaccurate measurements.	The sample temperature is low, or there is a large temperature difference between samples.	Increase the sample temperature or adjust the temperature of different samples to be the same (within 2 °C (3.6 °F)).
Procedure problem causes slow stabilization and prevents accurate calibrations or measurements.	Air bubbles are around or below the probe tip.	Carefully tap or shake the probe to remove air bubbles.
	The probe is not conditioned for reducing samples.	Soak the probe in Reducing solution for ORP electrodes for 3 to 10 minutes before sample measurement.
	The electrical connection through the reference junction is not sufficient.	Shake the probe in the solution from side to side to refresh the reference junction.
	An incorrect standard solution was used or the standard solution has contamination.	Use the specified standard solution of good quality.

Section 10 Consumables

Note: *Product and Article numbers may vary for some selling regions. Contact the appropriate distributor or refer to the company website for contact information.*

Description	Quantity	Item no.
Hach pH electrode storage solution	500 mL	2756549
3 M KCl solution	50 mL[2]	2756559
Electrode cleaning solution for regular maintenance	500 mL	2965249
Electrode cleaning solution for minerals/inorganic contamination	500 mL	2975149
Electrode cleaning solution for fats, oils and grease contamination	500 mL	2964449
Electrode cleaning solution for porous pin/diaphragm reference junctions	250 mL	C20C380
Reducing solution for ORP electrodes	500 mL	2965349
ORP standard solution, Light's solution, 20-mL ampules	25/pkg	2612520
ORP standard solution, ZoBell's solution	500 mL	2316949
Beaker, 30 mL, plastic, colorless	80/pkg	SM5010
Beaker, 100 mL, polypropylene	1	108042
Disposable wipes, 11 x 22 cm	280/pkg	2097000
Wash bottle, polyethylene, 500 mL	1	62011
Probe cable depth markers for rugged Intellical probes	5/pkg	5828610
Probe stand for standard Intellical probes	1	8508850

[2] Larger quantities are available.

Section 10 Consumables (continued)

Description	Quantity	Item no.
Shroud kit for rugged probes	1	5825900
Soaker bottle for probe storage	1	5192900
Storage caps for rugged PHC and MTC probes	5/pkg	5857305

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