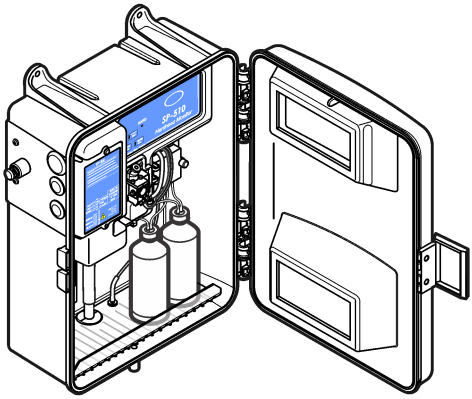
DOC023.52.80422

SP-510

03/2020, Edition 11

User Manual



Section 1 Specifications

Specifications are subject to change without notice.

General specifications

Specification	Details
Dimensions (W x D x H)	42 x 31.5 x 18 cm (16.5 x 12.5 x 7 in.)
Enclosure rating	IP62
Weight	11.3 kg (25 lbs)
Installation environment	Indoor
Mount	Wall
Pollution degree/installation category	2/II
Protection class	I
Altitude	Maximum 2000 m (6562 ft)
Light source	Class 1 LED (light emitting diode) with peak wavelength of 610 nm. Estimated 50,000 hours minimum life; hard water and soft water indicator.
Detector	Silicon photo detector
Optical path length	8.89 mm (0.35 in.)
Time delay	One reading above the trip point is necessary to trigger a soft-to-hard water alarm transition. One reading below the trip point is necessary to trigger a hard-to-soft water alarm transition.
Trip point	0.3, 1, 2, 5, 10, 20, 50 and 100 mg/L. Refer to Trip point specifications on page 4.
Reagents	Buffer and indicator solution. 500 mL of each reagent every 2 months.
Reagent shelf life	1 year
Power requirements	115/230 VAC, 70 VA, 50/60 Hz, 1.25 A Fuse
Electrical connections	Two 3-wire barrier terminal blocks. Wire range: 18–12 AWG (0.75–1.0 mm^2)
Hard water alarm relay	SPDT relay, set to on when the hard water indicator is on. The alarm can be disabled.
Contact rating	5 A resistive at 100–240 VAC
Operating temperature	5 to 40 °C (32 to 104 °F)
Storage temperature	-40 to 60 °C (-40 to 140 °F)
Operating humidity	Relative humidity: 5–95% at different temperatures, non-condensing
Sampling rate	New sample: every 1.9 minutes ±5% at 60 Hz; 2.3 minutes ±5% at 50 Hz
Sample flow rate to sample conditioning	50 to 500 mL/minute flow rate necessary (250 mL/minute recommended)
Inlet pressure to instrument	1 to 5 psig (0.07 to 0.34 bar), 1.5 psig (0.1 bar) is optimum, > 5 psig (0.34 bar) can cause sample tubing failure
Inlet pressure to sample conditioning	1.5 psig to 75 psig (0.1 to 5.2 bar)
Inlet fitting	At instrument, 6.35 mm (0.25 in.) OD polyethylene tubing with quick-disconnect fitting

Specification	Details
Drain fitting	Hose barb for 12.7 mm (0.5 in.) ID flexible tubing
Sample temperature range	5 to 40 °C (41 to 104 °F)
Certifications	CE, cETLus
Warranty	1 year (EU: 2 years)

Trip point specifications

Alarm trip point	Minimum trip value	Maximum trip value	Temperature influence on trip point
0.3 mg/L	0.22 mg/L	0.38 mg/L	–0.03 mg/L per °C
1 mg/L	0.75 mg/L	1.25 mg/L	–0.03 mg/L per °C
2 mg/L	1.5 mg/L	2.5 mg/L	–0.03 mg/L per °C
5 mg/L	3.75 mg/L	6.25 mg/L	–0.06 mg/L per °C
10 mg/L	7.5 mg/L	12.5 mg/L	–0.08 mg/L per °C
20 mg/L	15.0 mg/L	25.0 mg/L	–0.09 mg/L per °C
50 mg/L	37.5 mg/L	62.5 mg/L	–0.29 mg/L per °C
100 mg/L	75.0 mg/L	125.0 mg/L	–0.60 mg/L per °C

Section 2 General information

In no event will the manufacturer be liable for direct, indirect, special, incidental or consequential damages resulting from any defect or omission in this manual. The manufacturer reserves the right to make changes in this manual and the products it describes at any time, without notice or obligation. Revised editions are found on the manufacturer's website.

2.1 Safety information

NOTICE

The manufacturer is not responsible for any damages due to misapplication or misuse of this product including, without limitation, direct, incidental and consequential damages, and disclaims such damages to the full extent permitted under applicable law. The user is solely responsible to identify critical application risks and install appropriate mechanisms to protect processes during a possible equipment malfunction.

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in this manual.

2.1.1 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.

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

2.1.2 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, if noted on the instrument, will be included with a danger or caution statement in the manual.

	This is the safety alert symbol. Obey all safety messages that follow this symbol to avoid potential injury. If on the instrument, refer to the instruction manual for operation or safety information.
	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.
	This symbol indicates the need for protective eye wear.
	This symbol identifies a risk of chemical harm and indicates that only individuals qualified and trained to work with chemicals should handle chemicals or perform maintenance on chemical delivery systems associated with the equipment.
	This symbol indicates that a risk of electrical shock and/or electrocution exists.
	This symbol indicates that a risk of fire is present.
	This symbol, when noted on the product, identifies the location of a fuse or current limiting device.

2.1.3 Certification

Canadian Radio Interference-Causing Equipment Regulation, IECS-003, Class A:

Supporting test records reside with the manufacturer.

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de classe A répond à toutes les exigences de la réglementation canadienne sur les équipements provoquant des interférences.

FCC Part 15, Class "A" Limits

Supporting test records reside with the manufacturer. The device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

1. The equipment may not cause harmful interference.
2. The equipment must accept any interference received, including interference that may cause undesired operation.

Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the

equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their expense. The following techniques can be used to reduce interference problems:

1. Disconnect the equipment from its power source to verify that it is or is not the source of the interference.
2. If the equipment is connected to the same outlet as the device experiencing interference, connect the equipment to a different outlet.
3. Move the equipment away from the device receiving the interference.
4. Reposition the receiving antenna for the device receiving the interference.
5. Try combinations of the above.

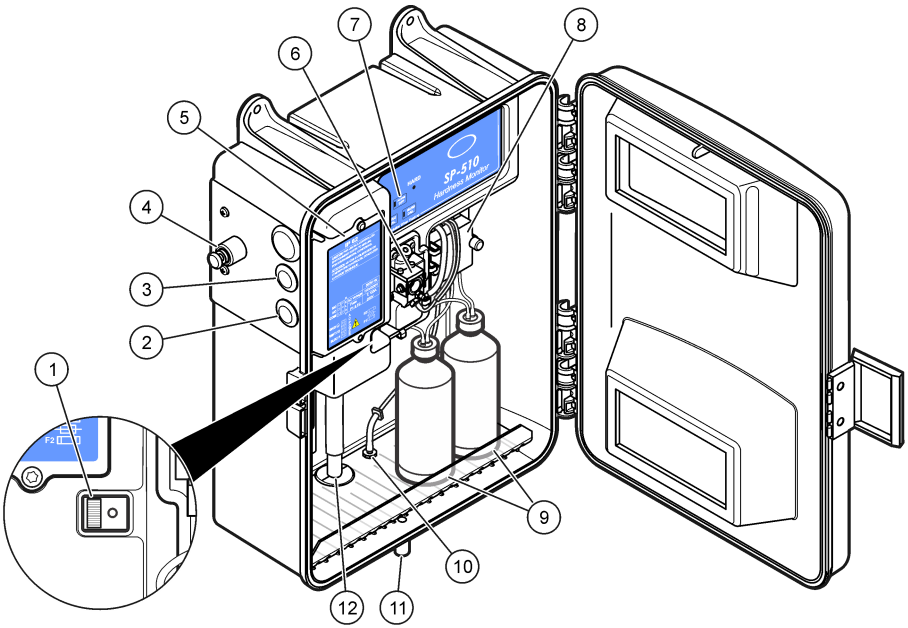
2.2 Product overview

⚠ DANGER	
	Chemical or biological hazards. If this instrument is used to monitor a treatment process and/or chemical feed system for which there are regulatory limits and monitoring requirements related to public health, public safety, food or beverage manufacture or processing, it is the responsibility of the user of this instrument to know and abide by any applicable regulation and to have sufficient and appropriate mechanisms in place for compliance with applicable regulations in the event of malfunction of the instrument.

The SP-510™ Hardness Monitor continuously measures water softener levels to find hardness breakthroughs based on softener exhaustion. The monitor is used in commercial and industrial water applications. The monitor has an automatic control system that starts regeneration sequences with the alarm circuit.

Hardness is measured at different levels as $CaCO_3$ with the applicable indicator and reagent solutions. A relay closes when the instrument measures a hardness value that is more than the trip point. Refer to Figure 1 for the product overview.

Figure 1 Product overview

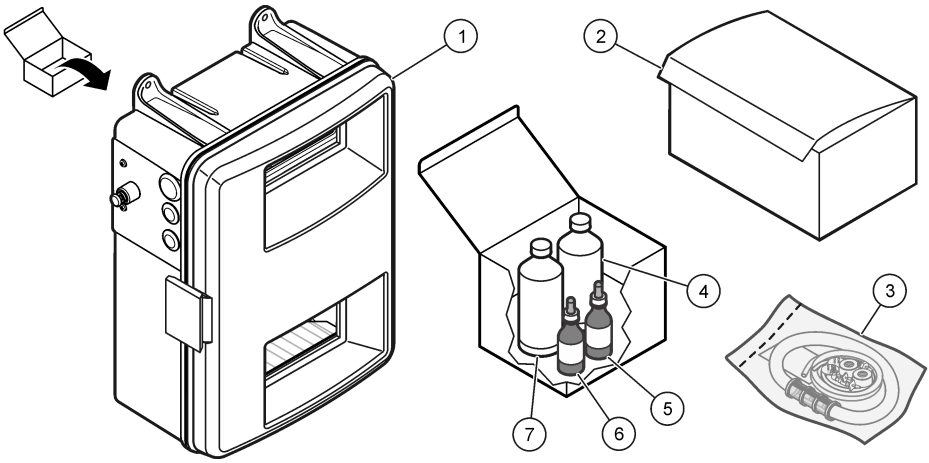


1 Power switch	**7** Keypad
2 Power access port	**8** Pump/valve module
3 Relay and alarm contact access port	**9** Indicator and reagent bottles
4 Air purge (optional)	**10** Sample inlet
5 Access cover	**11** Enclosure drain
6 Colorimeter	**12** Sample drain

2.3 Product components

Make sure that all components have been received. Refer to Figure 2. If any items are missing or damaged, contact the manufacturer or a sales representative immediately.

Figure 2 Product components



1 SP-510 Hardness Monitor	**5** Indicator solution
2 Installation kit[1]	**6** Magnesium sulfate solution
3 Maintenance kit[2]	**7** TitraVer® (EDTA) hardness titrant
4 Buffer solution	

Section 3 Installation

⚠ DANGER

Electrocution hazard. Always remove power to the instrument before making electrical connections.

⚠ DANGER

Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

3.1 Install the instrument

Install this instrument on an indoor wall, away from direct sunlight.

- For a complete purge of the sample line during each cycle, install the instrument as close to the sample point as possible.
- Leave sufficient clearance at the bottom and sides for tubing and cable connections.

Refer to Figure 3 and Figure 4.

[1] Refer to the installation kit documentation for more information.
[2] Refer to the maintenance kit documentation for more information.

Figure 3 Dimensions for wall installation

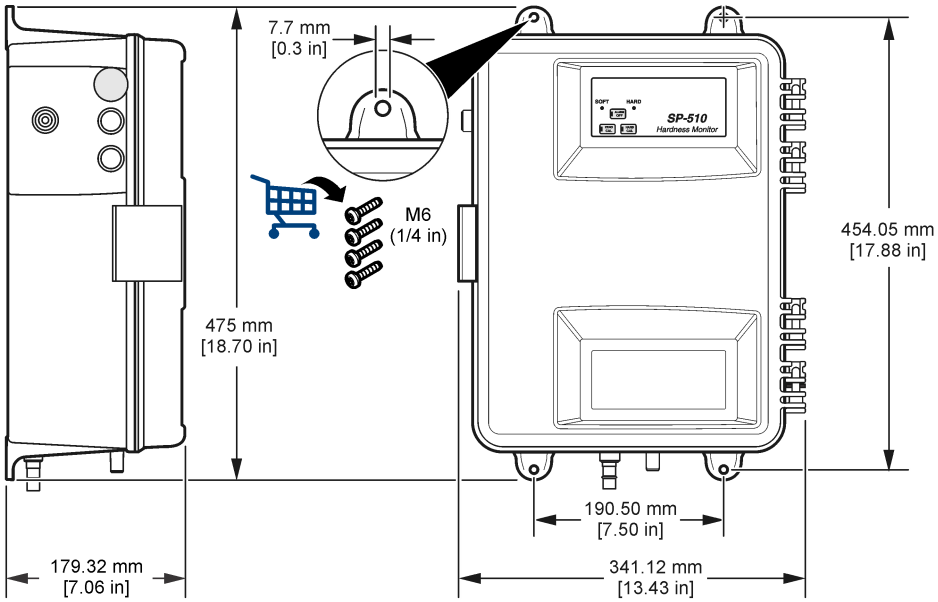
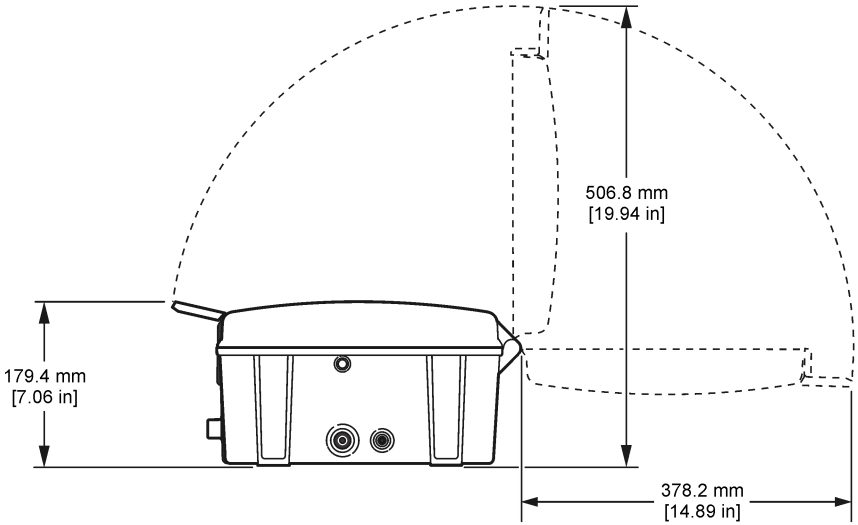


Figure 4 Door clearance



3.2 Plumb the instrument

⚠ CAUTION	
	Fire hazard. This product is not designed for use with flammable liquids.

⚠ CAUTION

Chemical hazard. If there is a leak in the fluid system, hazardous substances may leak out of the lower enclosure. Put the supplied reagent bottle tray or a bucket under the drain to catch any spills.

⚠ CAUTION

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

Use quick-connect type connectors for ¼-inch OD tubes to install the sample inlet and drain connections.

1. Install 3 feet of tubing in the ½-inch enclosure drain to keep dust out of the analyzer. Refer to Figure 1 on page 7, item 11.

   Note: *Make sure that the enclosure drain is open. The drain must be open to remove sample water if leaks occur.*
2. Push the ¼-in OD poly tube on the sample line connector. The tube will "stop" two times as it is pushed on the connector. For more information, refer to the installation kit documentation.
3. Make sure that the tubes are pushed completely on the connector. Incorrect installation can cause the tube to come off of the connector when water pressure is applied.

   Note: *The sample drain connector will install on ½-inch ID flexible tubes (customer-supplied).*

3.2.1 Connect the air purge (optional)

An air purge is necessary in an environment with high humidity or caustic vapors.

Note: *Use only dry, oil-free instrument air at 0.42 m^3 (15 standard cubic feet) per hour (scfh).*

1. Find the air purge connection on the left side of the instrument enclosure. Refer to Figure 1 on page 7.
2. Remove the plug in the quick-connect fitting.
3. Push the ¼-inch poly tubing into the fitting. Make sure to have two different "stops" so that the tubing cannot disconnect when air pressure is applied.

3.2.2 Sample line guidelines

Select a good, representative sampling point for the best instrument performance. The sample must be representative of the entire system.

To prevent erratic readings:

- Collect samples from locations that are sufficiently distant from points of chemical additions to the process stream.
- Make sure that the samples are sufficiently mixed.
- Make sure that all chemical reactions are complete.

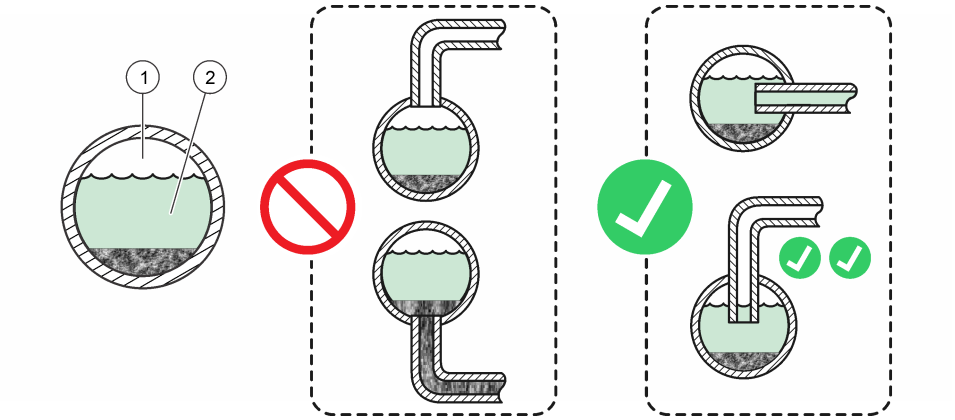
3.2.3 Connect the sample stream

Install the sample line into a larger process pipe to minimize interference from air bubbles or pipeline bottom sediment. A sample line that goes into the center of a process pipe is best.

Figure 5 shows examples of good and bad methods of sample line installation into a process pipe.

Keep the sample line as short as possible to decrease analysis delay. Sediment can collect in long sample lines.

Figure 5 Sampling methods



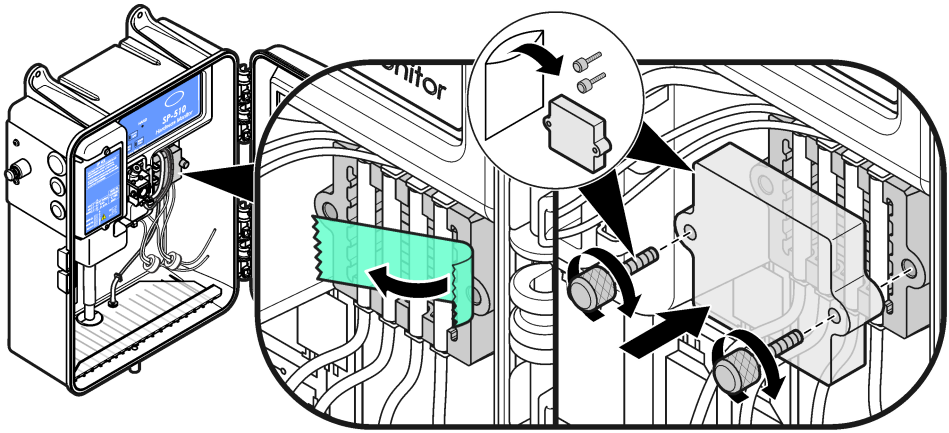
1 Air	**2** Sample flow

3.2.4 Install the pump valve pressure plate

The pressure plate and screws are supplied with the installation kit. Remove the tape from the pump tubes before installation.

Make sure to turn the screws in small increments and move from one screw to the other so that the plate is pulled down equally. Do not overtighten. To install the pressure plate, refer to Figure 6.

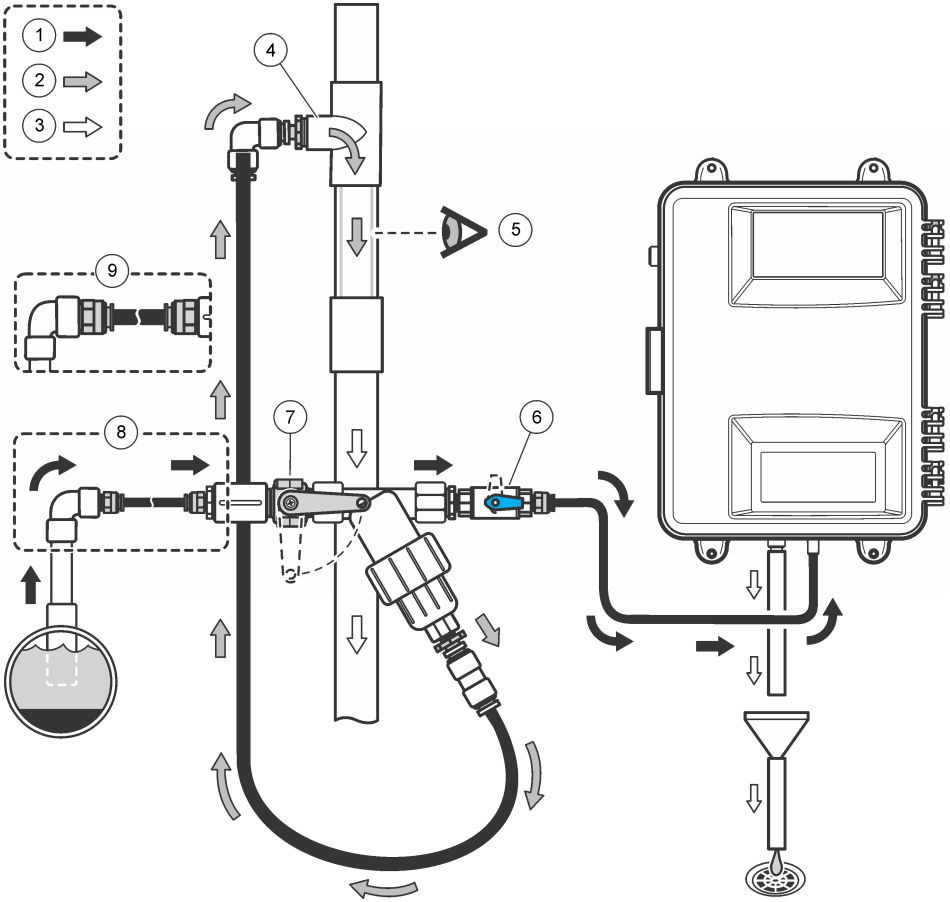
Figure 6 Install the pressure plate



3.2.5 Install the sample conditioning kit

The sample conditioning kit is supplied with the instrument. The kit removes large particles from the sample stream with a 40-mesh strainer. The ball valve on the raw sample inlet controls the flow to the filter. The ball valve on the instrument supply line controls the flow rate of filtered sample to the instrument. For complete sample conditioning installation instructions, refer to the installation kit documentation. Refer to Figure 7.

Figure 7 Sample flow through the conditioning kit



1 Sample flow	**4** Bypass tee, unfiltered sample	**7** Unfiltered-sample ball valve (shown open)
2 Bypass flow	**5** Flow observation point	**8** Low-flow valve option
3 Drainage flow	**6** Filtered-sample bypass ball valve (shown open)	**9** High-flow valve option

3.3 Electrical installation

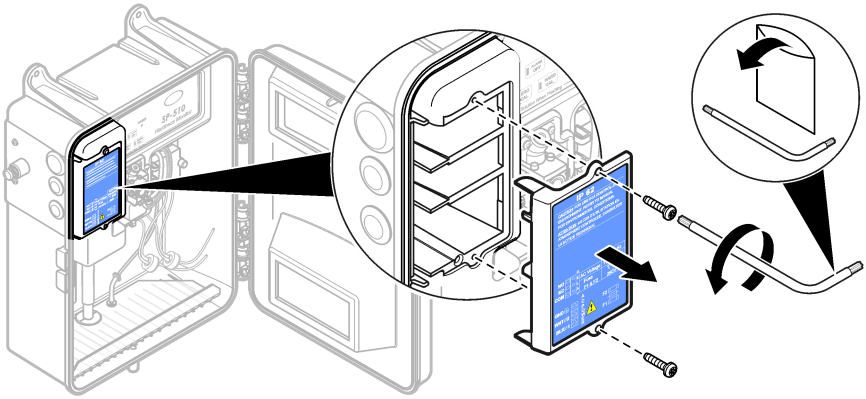
⚠ DANGER

Electrocution hazard. Always remove power to the instrument before making electrical connections.

3.3.1 Remove the access cover

Remove the access cover to connect to the wiring terminals. Refer to Figure 8.

Figure 8 Access cover removal



3.3.2 Electrical connections for conduit

⚠ DANGER

Electrocution hazard. Use only fittings that have the specified environmental enclosure rating. Obey the requirements in the Specifications section.

⚠ DANGER

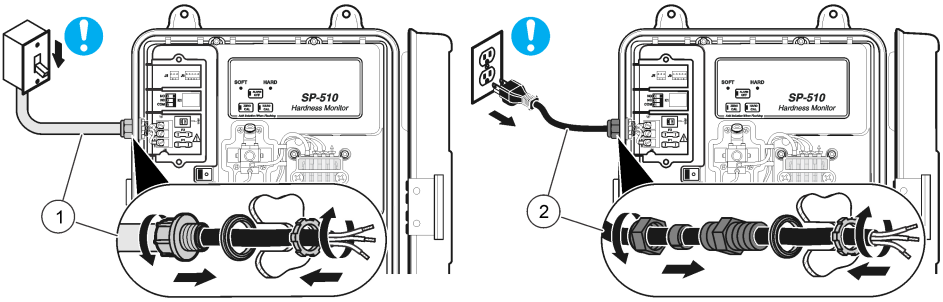
Electrocution hazard. If this equipment is used outdoors or in potentially wet locations, a Ground Fault Circuit Interrupt (GFCI/GFI) device must be used for connecting the equipment to its main power source.

⚠ WARNING

Electrocution hazard. Install a 10 A circuit breaker for mains power. Identify the circuit breaker with a label, as a local disconnect for this equipment.

The instrument has plugs in all of the conduit holes. To keep the IP62 environmental rating, use liquid-tight sealing-type conduit fittings and cord strain reliefs. Connect the equipment in accordance with local, state or national electrical codes. If connections are not made through a conduit opening, install a liquid-tight seal in place of the plugs. Refer to Figure 9.

Figure 9 Power connections

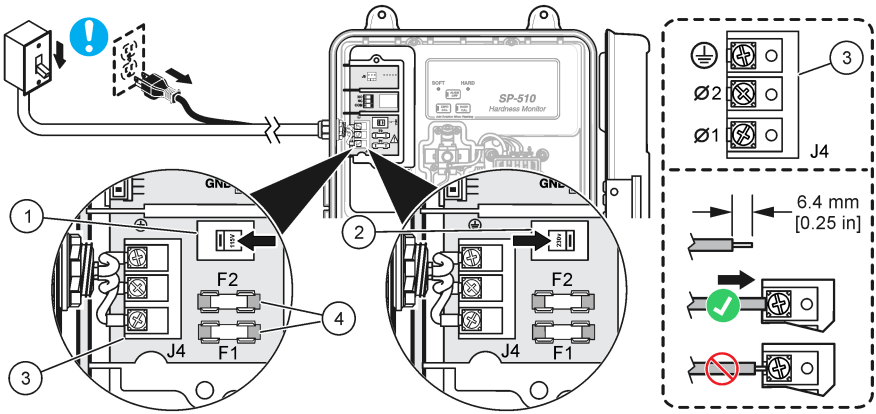


1 Conduit (preferred)	**2** Power cord (optional)

3.3.3 Wiring for power

To connect the instrument to power, refer to Figure 10 and Table 1.

Figure 10 Power connection



1 Voltage switch (in 115 V position)	**3** AC power connector
2 Voltage switch (in 230 V position)	**4** Fuses (F1 and F2)

Table 1 Terminal wiring

Wire color code	Protective earth ground	Hot or Ø1	Neutral or Ø2
North America	Green	Black	White
International electrotechnical commission (IEC)	Green with yellow line	Brown	Blue

3.3.4 Select the voltage

NOTICE

To prevent serious damage to the instrument, make sure that the line voltage is set correctly. Refer to Figure 10 on page 14.

The instrument is set to 115-volt operation at the factory. To change the line voltage to 230-volt operation, slide the voltage switch to the 230 V position. Refer to Figure 10 on page 14.

Note: *The fuses are approved for North American and European use and do not need to be changed with the voltage.*

3.3.5 Connect the alarm relays

⚠ CAUTION

Fire hazard. Relay loads must be resistive. Always limit current to the relays with an external fuse or breaker. Obey the relay ratings in the Specifications section.

The current to the relay contacts must be 5 A or less. Make sure to have a second switch available to remove power from the relays locally in case of an emergency or for maintenance. Power can be removed with an external switch and a 5 A fuse or with a switched 5 A circuit breaker.

Figure 11 shows the alarm relay contacts connected to the terminal strip with normally open and normally closed terminations. Terminals are unpowered and rated for 5 A at 100–240 VAC resistive load.

The relay connector accepts 18–12 AWG (0.75–1.0 mm^2) wire. Select the necessary wire gage that operates with the application. A wire gauge less than 18 AWG (0.75 mm^2) is not recommended.

Figure 11 Alarm connections

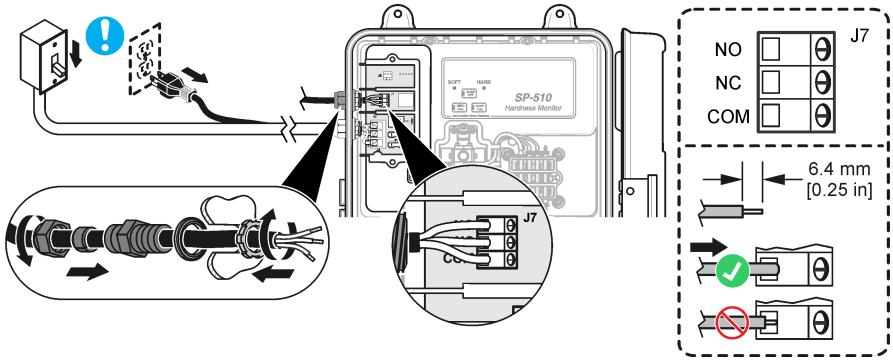


Table 2 Relay wiring

Terminal block	Terminal 1	Terminal 2	Terminal 3
J7	COM	Normally open (NO)	Normally closed (NC)

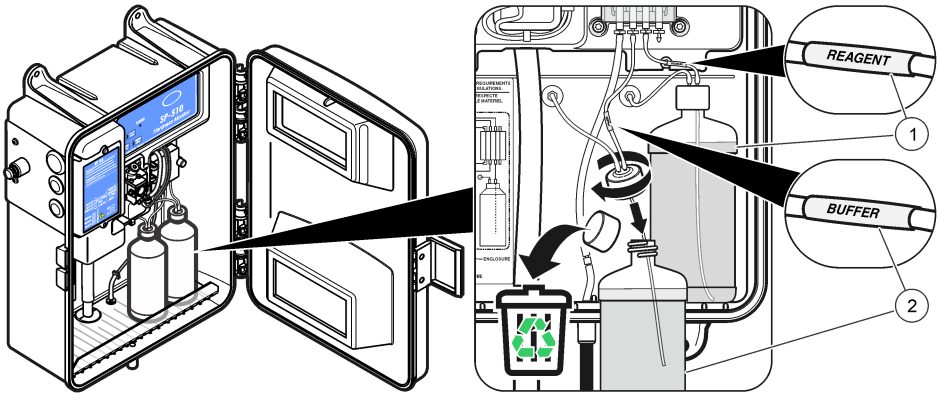
3.4 Install the buffer solution

Buffer solutions are formulated at the factory and are ready to install without preparation. Put the bottle in the instrument as shown in Figure 12 on page 15. Refer to Buffer and indicator solution for the applicable trip point on page 24.

3.5 Install the indicator solution

Indicator solutions are formulated at the factory and are ready to install without preparation. Put the bottle in the instrument as shown in Figure 12. Refer to Buffer and indicator solution for the applicable trip point on page 24.

Figure 12 Install the buffer and indicator reagents

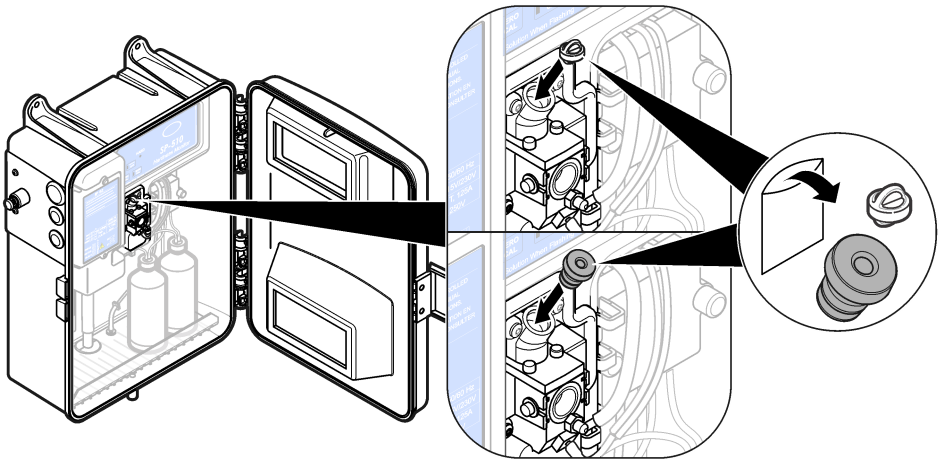


1 Indicator reagent tube label and bottle	**2** Buffer tube label and bottle

3.6 Install the stir bar

A stir bar is included in the installation kit. Install the stir bar in the colorimeter sample cell for correct operation. Refer to Figure 13.

Figure 13 Install the stir bar



Section 4 User interface and navigation

4.1 Keypad description

Refer to Figure 14 and to Table 3 for the keypad description and navigation information.

Figure 14 SP-510 keypad

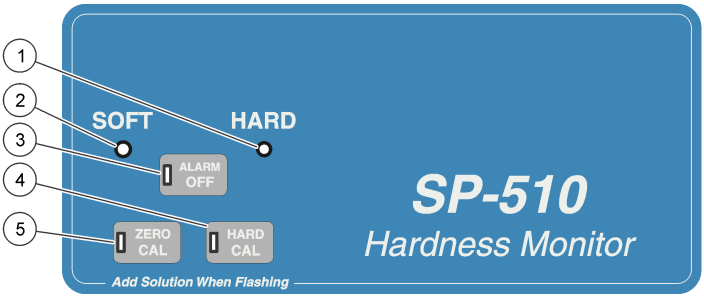


Table 3 Keypad description

Key	Function	Description
1	HARD LED	The monitor found hardness in the water. The status indicator light is red.
2	SOFT LED	The monitor is in operation and no hardness shows. The status indicator light is green.
3	ALARM OFF	Sets the alarm to off. When more cycles are necessary to examine the water, set the alarm to off. The status indicator light is yellow.

Table 3 Keypad description (continued)

Key	Function	Description
4	HARD CAL	Completes a hard calibration. Refer to Calibration on page 17. The status indicator light is yellow.
5	ZERO CAL	Completes a zero-point calibration. Refer to Calibration on page 17. The status indicator light is yellow.

Section 5 Startup

5.1 Start the instrument

Note: *Install the pressure plate correctly to prevent sample flow directly into the reagents. Refer to* Install the pump valve pressure plate *on page 11.*

1. Open the supply valve to the instrument.
2. Let the pressure in the tubes stabilize.

   Note: *If leaks occur under pressure, examine all connections. Secure connections until all leaks have stopped.*
3. Set the power to on.
4. Operate the instrument for approximately 2 hours with the sample and reagents.

   Note: *The sample cell will have bubbles on the surface until it is fully wetted. The bubbles can cause irregular readings until the sample flow stabilizes.*

5.2 Prime the reagents (optional)

Prime the reagents to decrease the start up time to 15 minutes.

1. Set the sample flow to the instrument to off.
2. Disconnect the reagent feed line after the “Y” fitting at the colorimeter.
3. Connect a syringe to the tubing that comes from the “Y” fitting.
4. Loosen the two screws on the pump pinch plate so that the reagents can be pulled through the reagent lines.
5. Use the syringe to remove the air and fill the lines with reagent.
6. Tighten the screws on the pump pinch plate. Do not overtighten.
7. Remove the syringe from the tubing and connect the fitting on the colorimeter.

Section 6 Calibration

⚠ 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.

6.1 Complete a 2-point calibration

Complete a calibration after reagent installation or when an optical system component is replaced. The standardization procedure makes the sample first hard, then soft.

1. Remove the plug from the top port of the colorimeter. Refer to Figure 13 on page 16.
2. Push **HARD CAL**. The hard cal LED is on continuously.

3. When the hard cal LED flashes, add two drops of Magnesium Standard Solution into the colorimeter.
4. When the LED stops flashing and is on continuously, wait for the cycle to complete. At the end of the cycle, the LED sets to off to show a successful calibration.
5. **HARD CAL failure:** When the LED starts to flash, push **HARD CAL** to confirm a hard cal failure. Do steps 2–4 again.
6. Push **ZERO CAL**. The zero cal LED is on continuously.
7. When the zero cal LED flashes, add two drops of EDTA Solution, 10 g/L, into the colorimeter.
8. When the LED stops flashing and is on continuously, wait for the cycle to complete. At the end of the cycle, the LED is set to off to show a successful calibration.
9. **ZERO CAL failure:** When the LED starts to flash, push **ZERO CAL** to confirm a zero cal failure. Do steps 1–7 again.
10. Replace the plug in the top port of the colorimeter.

Section 7 Operation

After the instrument power is set to on, the SOFT LED flashes until the first reading cycle is completed. The cycle takes 2 minutes. Then, the SOFT LED shows a stable green light.

The HARD LED comes on with a red light when the sample reagent mixture measurement is higher than the trip point for one measurement. Push **ALARM OFF** to set the alarm relay to off. The ALARM OFF light will show a yellow light.

The instrument operates maintenance-free for a minimum of 2 months. Periodically, do a visual check to see if bubbles are in the tubing. If there are bubbles, look for an air leak. Refer to Maintenance schedule on page 18 for maintenance tasks.

Section 8 Maintenance

⚠ DANGER

Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

8.1 Maintenance schedule

Table 4 shows the recommended schedule of maintenance tasks. Facility requirements and operating conditions can increase the frequency of some tasks.

Table 4 Maintenance schedule

Task	2 months	3 months	6 months	1 year	As necessary
Replace the reagent on page 19	x				
Replace the pump tubes on page 19		x[3]	x[4]		
Replace the tubing on page 20				x	
Clean the colorimeter on page 20				x	
Replace the sample conditioning filter on page 20				x	
Replace the fuse on page 20					x

[3] Ambient operating temperatures more than 27 °C (80.6 °F)
[4] Ambient operating temperatures less than 27 °C (80.6 °F)

8.2 Clean the instrument

Clean the exterior of the instrument with a moist cloth and a mild soap solution and then wipe the instrument dry.

8.3 Clean the instrument interior

⚠ 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.

Refer to the MSDS for instructions to safely clean reagent spills and leaks. Obey all local and federal regulations to dispose of cleaning materials.

8.4 Clean spills

⚠ CAUTION

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

1. Obey all facility safety protocols for spill control.
2. Discard the waste according to applicable regulations.

8.5 Replace the reagent

⚠ CAUTION

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

Note: *Do not pour the remaining reagent into new bottles.*

One 500-mL bottle of each buffer and indicator solution can be used for approximately 2 months.

1. Discard the old containers with remaining contents in compliance with MSDS and regulatory requirements.
2. Install the new bottles. Refer to Install the buffer solution on page 15 and Install the indicator solution on page 15.

8.6 Change the alarm trip point

Install the applicable buffer and indicator solution to change the alarm trip point to a different hardness level. Let the instrument operate for 2 hours to purge the used reagents. Calibrate the instrument again. Refer to Trip point specifications on page 4 and to Calibration on page 17.

8.7 Replace the pump tubes

Over a period of time, the clamping action of the pump/valve module will soften the tubing. This causes the tubing to break and prevents liquid flow. Leaks can occur. The tubing wear is increased at high temperatures. Therefore, the pump tube replacement schedules are based on the ambient operating temperature. Refer to Maintenance schedule on page 18 for the maintenance interval. Refer to the documentation supplied with the maintenance kit.

8.8 Replace the tubing

The manufacturer recommends that one tube is replaced at a time. Refer to the documentation supplied with the maintenance kit.

8.9 Clean the colorimeter

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

The colorimeter measuring cell can collect sediment or cause layers to grow on the inside walls. Clean the cell with an acid solution and a cotton swab on a monthly basis.
Items to collect:

- Sulfuric acid standard solution, 19.2 N, 100 mL MDB
- Wooden or paper cotton-tipped swab
- Bent steel paper clip
- Stir bar (optional)

1. Remove the plug from the top port of the colorimeter. Refer to Figure 13 on page 16.
2. Remove the magnetic stir bar with a bent steel paper clip as a retrieval tool.
3. Use the pipette to add 2–3 drops of 19.2 N sulfuric acid standard solution in the colorimeter.
   Note: *Lower normality sulfuric acid is not sufficient to clean the colorimeter.*
4. Let the sulfuric acid stay in the colorimeter for 15 minutes.
5. Use a wooden or cotton-tipped swab to clean the interior surfaces of the colorimeter cell. Move the cotton-tipped swap gently up and down.
   Note: *Do not use a plastic swab to clean the colorimeter with sulfuric acid. The acid will dissolve the plastic.*
6. Make sure that the measurement cell is dry.
7. Clean the stir bar with water or alcohol or replace the stir bar.
8. Replace the plug in the top port of the colorimeter.

8.10 Replace the sample conditioning filter

Examine the sample conditioning filter regularly when lots of solids are in the sample. Replace the sample conditioning filter if necessary. Refer to Maintenance schedule on page 18 for the maintenance interval. Refer to the documentation supplied with the installation kit.

8.11 Replace the fuse

⚠ DANGER

Electrocution hazard. Remove power from the instrument before doing maintenance or service activities.

⚠ DANGER

Fire hazard. Use the same type and current rating to replace fuses.

Remove the two fuses (F1 and F2) and replace them with two new fuses with the same specifications, T, 1.25 A, 250 V. The same fuse rating is used for the 115 V and for the 230 V operation. Refer to Figure 10 on page 14.

Section 9 Troubleshooting

Problem	Possible cause	Solution
The SOFT LED light is not on and the pump motor does not operate.	No power	• Make sure that the power switch is set to on. • Connect the power cord. • Replace the fuses if necessary.
The SOFT LED light is not on and the pump motor does operate.	Problem with the power supply	Replace the main circuit board. Contact technical support.
The SOFT LED light is on but the pump motor does not operate.	Operation power is low	Make sure that the line voltage is within specification.
	Voltage selector setting is not correct	Set the line voltage selector switch to the correct voltage.
	Motor cable is not connected	Connect the motor cable connection.
	Motor does not operate	Replace the motor.
The reading is continually high. The HARD LED is on.	• No stir bar • LED is not connected • No sample flow • Out of reagents	Refer to Troubleshooting for a hard reading on page 21. If the problem continues, cycle power to the instrument, examine all power connections and fuses, replace the circuit board or contact technical support.
The HARD LED is flashing.	The instrument could not save the calibration information.	Contact technical support.
	The instrument could not save the disabled alarm status.	
The SOFT LED is flashing continuously for more than 5 minutes after the power is set to on.	The optical path has a blockage or the optical switch does not work.	• Let the instrument complete the cycle. • Make sure that the motor operates. • Set the power to off and then to on and wait for 5 minutes. • Contact technical support.

9.1 Troubleshooting for a hard reading

When the red LED is on continuously and the instrument measures hard water, do the steps that follow.

Cause	Solution
If the flow is too low, the sample cell does not flush completely all the color out of the colorimeter. This causes a zero reading. If the flow is too high, some of the water will bypass the pinch block and cause the color to be diluted.	Make sure to set the flow rate to 200 mL/minute.
The sample line is pinched off in the pinch block.	• Pull the sample line from the colorimeter. Water that is already in the line could leak out. Examine and adjust the flow rate when a steady water stream comes out while the line is pinched. Set the flow rate to 200 mL/minute. • Make sure that the pressure plate of the pinch block is not overtightened. • Examine the back of the pinch blocks and make sure that they do not have grooves.
No stir bar is installed or more than one stir bar is installed.	• Make sure that a stir bar is installed. • Use a paper clip to retrieve the stir bar from the colorimeter and make sure that multiple stir bars are not installed. • If the stir bar does not operate, mix the sample manually after the reagents have been added. Use the end of a wooden Q-tip and mix the reagents approximately for 10 seconds. If the instrument gets a reading, the mixing is not sufficient. Replace the stir coil. Refer to Replacement parts and consumables on page 22.
The instrument does not receive any buffer or indicator solution.	Remove the two reagent lines from the Y connector. Only one drop of reagent comes out per cycle. If no reagent comes out, examine the pressure plate. Make sure that the pinch block is not overtightened and the reagent lines are not pinched. Examine the back of the pinch block for grooves. Replace the pinch block if necessary.
The chemistry does not operate correctly.	Mix 1-mL of each reagent and 80-mL of sample. A color change must show. If no color change shows, replace the reagents.
The instrument does not operate correctly.	Pinch the sample inlet line to stop the sample flow. The next cycle reads soft. If it does not read soft, examine the LED if it shows an orange light. Examine the photocell and clean if necessary. After this cycle, the instrument reads hard again.

Section 10 Replacement parts and consumables

⚠ WARNING

Personal injury hazard. Use of non-approved parts may cause personal injury, damage to the instrument or equipment malfunction. The replacement parts in this section are approved by the manufacturer.

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

Refer to the installation kit and maintenance kit documentation for more information.

Replacement parts

Description	Item no.
Cam/coupler assembly	5410500
Circuit board assembly	5694800
Colorimeter flow-cell assembly	5516200

Replacement parts (continued)

Description	Item no.
Colorimeter drain plug	5103600
Follower block, reagent	4274100
Follower block, sample	4274200
Fuse (T, 1.25 A, 250 V) UL/CSA/CE accepted	5516700
LED	4350800
LED housing, lower	5412700
LED housing, upper	5412800
Maintenance kit	5516500
Installation kit	5516400
Motor assembly	5411900
Photo detector	5411300
Pressure plate	5411800
Stir bar, micro, 3 x 8 mm	5412900
Stir coil	5411100
Thumb screw to hold pressure plate (2x)	5410100
Tubing, 0.16 cm (0.0625 in.) ID, white	4271700
Tubing, 0.11 cm (0.043 in.) ID, brown	5412100
Y fitting/strainer, 40 mesh	4661600

Accessories

Description	Item no.
Seal, oil-tight	4221000
Power cord kit for 115 V North American operation	4630600
Power cord kit for 230 V European operation	4630800

Consumables

Description	Quantity	Item no.
EDTA solution, dropping bottle	10 g/L, 1 oz.	102133
Magnesium standard solution, dropping bottle	10 g/L, 1 oz.	102233
SP510 Hardness Monitor indicator solution for 25 ppm	500 mL	2502749
SP510 Hardness Monitor indicator solution for 50 ppm	500 mL	2502849
SP510 Hardness Monitor indicator solution for 100 ppm	500 mL	2502949
Sulfuric acid standard solution, 19.2 N, MDB	100 mL	203832

Buffer and indicator solution for the applicable trip point

Trip point	Buffer[5] item no.	Indicator item no.
0.3 mg/L	2768549	2794649
1 mg/L	2768549	2769049
2 mg/L	2768549	2769149
5 mg/L	2768549	2769249
10 mg/L	2768649	2769249
20 mg/L	2768749	2769249
50 mg/L	2768849	2769249
100 mg/L	2768949	2769249

[5] 500 mL bottle

HACH COMPANY World Headquarters
P.O. Box 389, Loveland, CO 80539-0389 U.S.A.
Tel. (970) 669-3050
(800) 227-4224 (U.S.A. only)
Fax (970) 669-2932
orders@hach.com
www.hach.com

HACH LANGE GMBH
Willstätterstraße 11
D-40549 Düsseldorf, Germany
Tel. +49 (0) 2 11 52 88-320
Fax +49 (0) 2 11 52 88-210
info-de@hach.com
www.de.hach.com

HACH LANGE Sàrl
6, route de Compois
1222 Vésenaz
SWITZERLAND
Tel. +41 22 594 6400
Fax +41 22 594 6499

© Hach Company/Hach Lange GmbH, 2013, 2014, 2016–2018, 2020.
All rights reserved. Printed in U.S.A.