

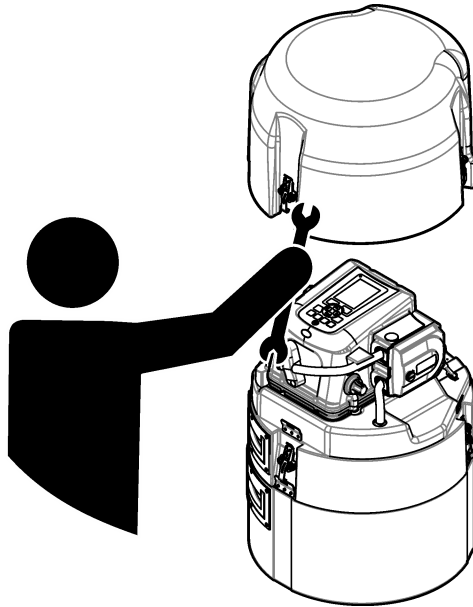


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AS950 Portable Sampler

11/2021, Edition 7

Installation and Maintenance



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Section 1 Specifications

Specifications are subject to change without notice.

1.1 AS950 portable sampler

Specification	Standard base	Compact base	Composite base
Dimensions	Diameter: 50.5 cm (19.9 in.) Height: 71.6 cm (28.2 in.)	Diameter: 44.1 cm (17.4 in.) Height: 63.8 cm (25.1 in.)	Diameter: 50.28 cm (19.9 in.) Height: 79.75 cm (31.4 in.)
Weight	15 kg (35.6 lb) with 1-L (33.8 oz) polyethylene bottles (24x) 14.8 kg (32.6 lb) with 10-L (2.5 gal) polyethylene bottle (1x)	12.2 kg (27 lb) with 575-mL (19.44 oz) polyethylene bottles (24x) 12.9 kg (28.3 lb) with 10-L (2.5 gal) polyethylene bottle (1x)	15 kg (36 lb) with 950-mL (32.12 oz) glass bottles (12x)
Enclosure	Impact-resistant ABS, 3-section construction; double-walled base with 2.54 cm (1 in.) insulation—direct bottle contact with ice.		
Sample temperature	0–60 °C (32–140 °F)		
Strainers	316 stainless steel in standard size, high velocity or low profile for shallow depth applications and Teflon® or 316 stainless steel in standard size.		
Sample bottle capacity	1-L (33.8 oz) polyethylene and/or 350-mL (11.83 oz) glass bottles (24x) 2.3-L (0.6 gal) polyethylene and/or 1.9-L (0.5 gal) glass bottles (8x) 3.8-L (1 gal) polyethylene and/or 3.8-L (1 gal) glass bottles (4x) 3.8-L (1 gal) polyethylene and/or 3.8-L (1 gal) glass bottles (2x) 21-L (5.5 gal) or 15-L (4 gal) polyethylene composite bottle or 20-L (5.25 gal) polyethylene or 10-L (2.5 gal) polyethylene or 10-L (2.5 gal) glass (1x)	575-mL (19.44 oz) polyethylene bottles (24x) 950-mL (32.12 oz) glass bottles (8x) 10-L (2.5 gal) polyethylene bottle (1x) 10-L (2.5 gal) glass bottle (1x)	21-L (5.5 gal) polyethylene bottle (1x)

1.2 AS950 controller

Specification	Details
Dimensions (W x H x D)	31.1 x 18.9 x 26.4 cm (12.3 x 7.4 x 10.4 in.)
Weight	4.6 kg (10 lb) maximum
Enclosure	PC/ABS blend, NEMA 6, IP68, corrosion and ice resistant

Specification	Details
Pollution degree/installation category	3, II
Protection class	II
Display	¼ VGA, color
Power requirements	15 VDC supplied by a 8754500 power supply (110–120 or 230 VAC, 50/60Hz); 12 VDC supplied by an external battery
Overload protection	7 A, DC line fuse for the pump
Operating temperature	0 to 50 °C (32 to 122 °F)
Storage temperature	–30 to 60 °C (–22 to 140 °F)
Storage/operating humidity	100% condensing
Pump	Peristaltic high speed with spring-mounted Nylatron rollers
Pump enclosure	Polycarbonate cover
Pump tubing	9.5 mm ID x 15.9 OD mm ($\frac{3}{8}$ -in. ID x $\frac{5}{8}$ -in. OD) silicone
Pump tubing life	20,000 sample cycles with: 1 L (0.3 gal) sample volume, 1 rinse, 6-minute pacing interval, 4.9 m (16 ft) of $\frac{3}{8}$ -in. intake tube, 4.6 m (15 ft) of vertical lift, 21 °C (70 °F) sample temperature
Vertical sample lift	8.5 m (28 ft) for 8.8 m (29 ft) maximum of $\frac{3}{8}$ -in. vinyl intake tube at sea level at 20 to 25 °C (68 to 77 °F)
Pump flow rate	4.8 L/min (1.25 gpm) at 1 m (3 ft) vertical lift with $\frac{3}{8}$ -in. intake tube typical
Sample volume	Programmable in 10-mL (0.34 oz) increments from 10 to 10,000 mL (3.38 oz to 2.6 gal)
Sample volume repeatability (typical)	±5% of 200 mL sample volume with: 4.6 m (15 ft) vertical lift, 4.9 m (16 ft) of $\frac{3}{8}$ -in. vinyl intake tube, single bottle, full bottle shut-off at room temperature and 1524 m (5000 ft) elevation
Sample volume accuracy (typical)	±5% of 200 mL sample volume with: 4.6 m (15 ft) vertical lift, 4.9 m (16 ft) of $\frac{3}{8}$ -in. vinyl intake tube, single bottle, full bottle shut-off at room temperature and 1524 m (5000 ft) elevation
Sampling modes	Pacing: Fixed Time, Fixed Flow, Variable Time, Variable Flow, Event Distribution: Samples per bottle, bottles per sample and time based (switching)
Run modes	Continuous or non-continuous
Transfer velocity (typical)	0.9 m/s (2.9 ft/s) with: 4.6 m (15 ft) vertical lift, 4.9 m (16 ft) of $\frac{3}{8}$ -in. vinyl intake tubing, 21 °C (70 °F) and 1524 m (5000 ft) elevation
Liquid detector	Ultrasonic. Body: Ultem® NSF ANSI standard 51 approved, USP Class VI compliant. Contacting liquid detector or optional non-contact liquid detector
Air purge	An air purge is done automatically before and after each sample. The sampler automatically compensates for different intake tube lengths.

Specification	Details
Tubing	Intake tubing: 1.0 to 30.0 m (3.0 to 99 ft) length, ¼-in. or ⅜-in. ID vinyl or ⅜-in. ID Teflon™-lined polyethylene with protective outer cover (black or clear)
Wetted materials	Stainless steel, polyethylene, Teflon, Ultem, silicone
Memory	Sample history: 4000 records; Data log: 325,000 records; Event log: 2000 records
Communications	USB and optional RS485 (Modbus)
Electrical connections	Power, auxiliary, optional sensors (2x), USB, distributor arm, optional rain gauge
Analog outputs	AUX port: none; optional IO9000 module: Three 0/4–20 mA outputs to supply the recorded measurements (e.g., level, velocity, flow and pH) to external instruments
Analog inputs	AUX port: One 0/4–20 mA input for flow pacing; optional IO9000 module: Two 0/4–20 mA inputs to receive measurements from external instruments (e.g., third-party ultrasonic level)
Digital outputs	AUX port: none; optional IO9000 module: Four low voltage, contact closure outputs that each supply a digital signal for an alarm event
Relays	AUX port: none; optional IO9000 module: Four relays controlled by alarm events
Certifications	CE, cETLus

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

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 on the instrument is referenced in the manual with a precautionary statement.

	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.
	This symbol indicates a potential pinch hazard.
	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.

2.1.3 Compliance and certification

▲ CAUTION

This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

Canadian Radio Interference-Causing Equipment Regulation, ICES-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:

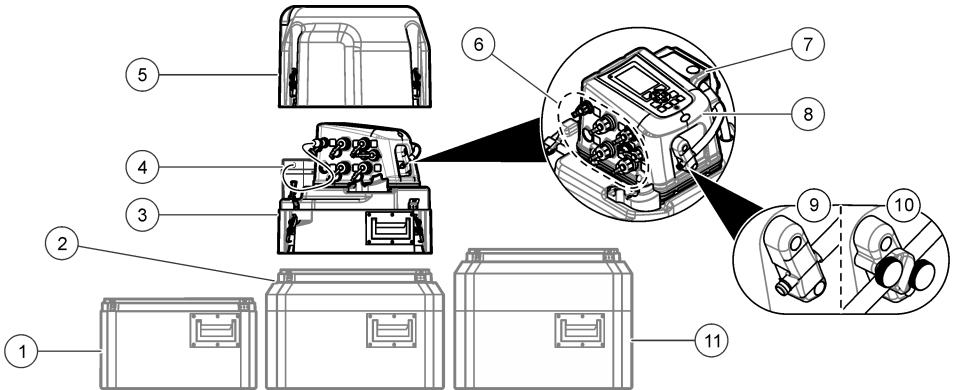
1. Disconnect the equipment from its power source to verify that it is or is not the source of the interference.
2. If the equipment is connected to the same outlet as the device experiencing interference, connect the equipment to a different outlet.
3. Move the equipment away from the device receiving 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.
⚠ CAUTION	
	Fire hazard. This product is not designed for use with flammable liquids.

The portable sampler collects liquid samples at specified intervals and keeps the samples in bottles. Use the sampler for a wide variety of aqueous sample applications and also with toxic pollutants and suspended solids. Set up the sampler with different retainers or bottles. Refer to [Figure 1](#).

Figure 1 Product overview

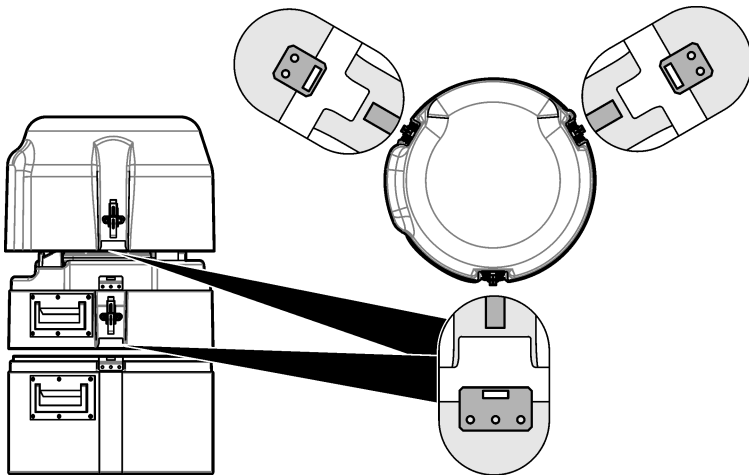


1 Compact base	7 Pump
2 Standard insulated base	8 Controller
3 Center section	9 Liquid detector
4 Power source	10 Non-contacting liquid detector
5 Top cover	11 Composite insulated base for one 21-L (5.5 gal) bottle
6 Controller connections	

2.2.1 Close the cover

To close the cover, align the latch plates as shown in [Figure 2](#) and close the latches.

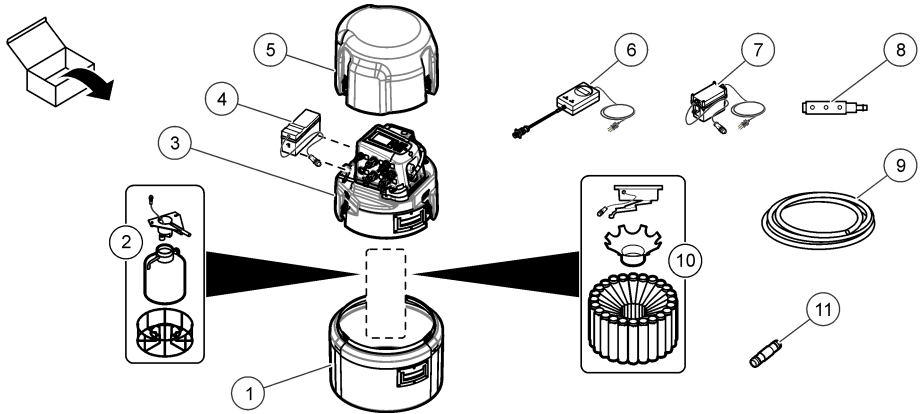
Figure 2 Latch plates alignment



2.3 Product components

Make sure that all components have been received. Refer to [Figure 3](#). If any items are missing or damaged, contact the manufacturer or a sales representative immediately.

Figure 3 Product components



1 Base (Standard, compact or composite)	7 AC power supply (optional)
2 Components for a single-bottle option (bottle and support can change)	8 Strainer
3 Center section with controller	9 Intake tubing, vinyl or Teflon-lined
4 Battery (optional)	10 Components for a multiple-bottle option (bottles and retainers can change)
5 Top cover	11 Tubing coupler (Supplied with controllers with the non-contacting liquid detector only.)
6 Battery charger (optional)	

Section 3 Installation

⚠ DANGER



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

3.1 Confined space precautions

⚠ DANGER



Explosion hazard. Training in pre-entry testing, ventilation, entry procedures, evacuation/rescue procedures and safety work practices is necessary before entering confined spaces.

The information that follows is supplied to help users understand the dangers and risks that are associated with entry into confined spaces.

On April 15, 1993, OSHA's final ruling on CFR 1910.146, Permit Required Confined Spaces, became law. This standard directly affects more than 250,000 industrial sites in the United States and was created to protect the health and safety of workers in confined spaces.

Definition of a confined space:

A confined space is any location or enclosure that has (or has the immediate potential for) one or more of the following conditions:

- An atmosphere with an oxygen concentration that is less than 19.5% or more than 23.5% and/or a hydrogen sulfide (H₂S) concentration that is more than 10 ppm.

- An atmosphere that can be flammable or explosive due to gases, vapors, mists, dusts or fibers.
- Toxic materials which upon contact or inhalation can cause injury, impairment of health or death.

Confined spaces are not designed for human occupancy. Confined spaces have a restricted entry and contain known or potential hazards. Examples of confined spaces include manholes, stacks, pipes, vats, switch vaults and other similar locations.

Standard safety procedures must always be obeyed before entry into confined spaces and/or locations where hazardous gases, vapors, mists, dusts or fibers can be present. Before entry into a confined space, find and read all procedures that are related to confined space entry.

3.2 Site installation guidelines

▲ DANGER	
	Explosion hazard. The instrument is not approved for installation in hazardous locations.

This instrument is rated for an altitude of 2000 m (6562 ft) maximum. Although the use of this equipment above the 2000 m altitude does not show any substantial safety concern, the manufacturer recommends that users with concerns contact technical support.

Refer to the guidelines that follow for the site location evaluation.

- Obey all the safety precautions if the sampler is installed in a confined space. Refer to [Confined space precautions](#) on page 9.
- Make sure that the temperature at the location is in the specification range. Refer to [Specifications](#) on page 3.
- Install the sampler on a level surface or hang the sampler with the suspension harness, the support bracket or the spanner bar. Refer to [Install the sampler in a manhole](#) on page 10 and to the applicable installation documentation.
- Install the sampler as near the sample source as possible. Refer to [Plumb the sampler](#) on page 13.
- For limitations on transport velocity and maximum vertical lift, refer to [Specifications](#) on page 3.

3.3 Mechanical installation

3.3.1 Install the sampler in a manhole

Install the sampler above the sample water in a manhole. Install the sampler with a spanner bar or a support bracket. Install the spanner bar inside the manhole. The spanner bar is supported by pressure against the walls. The support bracket has the same width as the manhole cover. Install the support bracket directly below the cover for support. Refer to the documentation supplied with the accessories to install the sampler.

3.4 Prepare the sampler

3.4.1 Clean the sample bottles

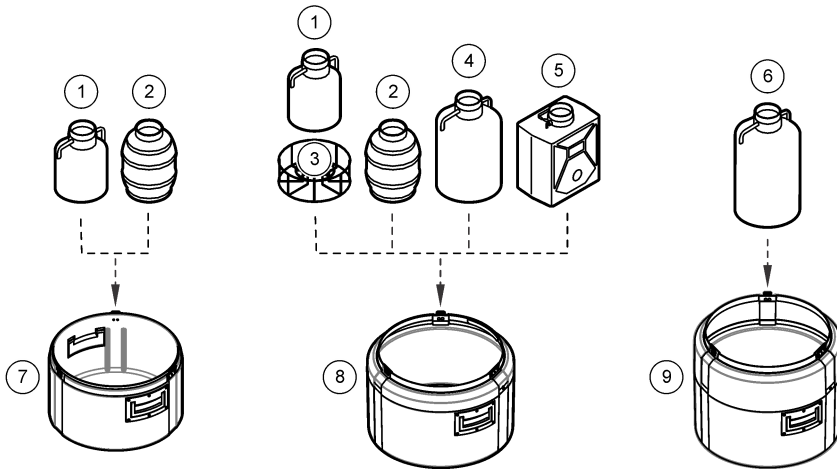
Clean the sample bottles and caps with a brush, water and a mild detergent. Flush the sample bottles with fresh water followed by a distilled water rinse.

3.4.2 Install a single bottle

When a single bottle is used to collect one composite sample, do the steps that follow. When multiple bottles are used, refer to [Install the first bottle for multiple sample collections](#) on page 11.

When the bottle is full, the full bottle shut-off stops the sample program. Install the sample bottle as shown in [Figure 4](#).

Figure 4 Single bottle installation

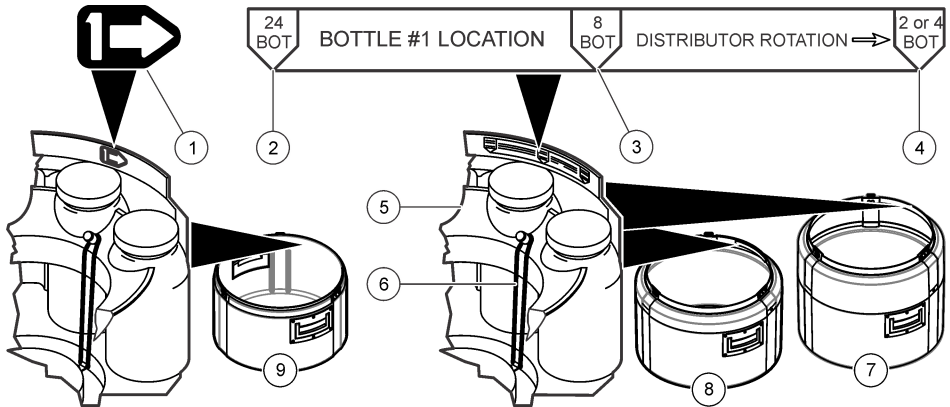


1 Polyethylene bottle, 10 L (2.6 gal)	6 Polyethylene bottle, 21 L (5.5 gal)
2 Glass bottle, 10 L (2.6 gal)	7 Compact base
3 Support for standard base and 10 L (2.6 gal) glass bottle	8 Standard insulated base
4 Polyethylene bottle, 15 L (4 gal)	9 Composite insulated base for 21 L (5.5 gal) bottle
5 Polyethylene bottle, 19 L (5 gal)	

3.4.3 Install the first bottle for multiple sample collections

Use multiple bottles to collect samples into separate bottles or into more than one bottle. The distributor moves the sample tube above each bottle. Install the bottles in the sampler base as shown in [Figure 5](#). Install the first sample bottle (number 1) below the label in the sampler base. Install the remaining bottles in increasing numbers in the direction shown by the label. Refer to [Figure 6](#) on page 13 for a diagram of necessary components.

Figure 5 Bottle number 1 installation



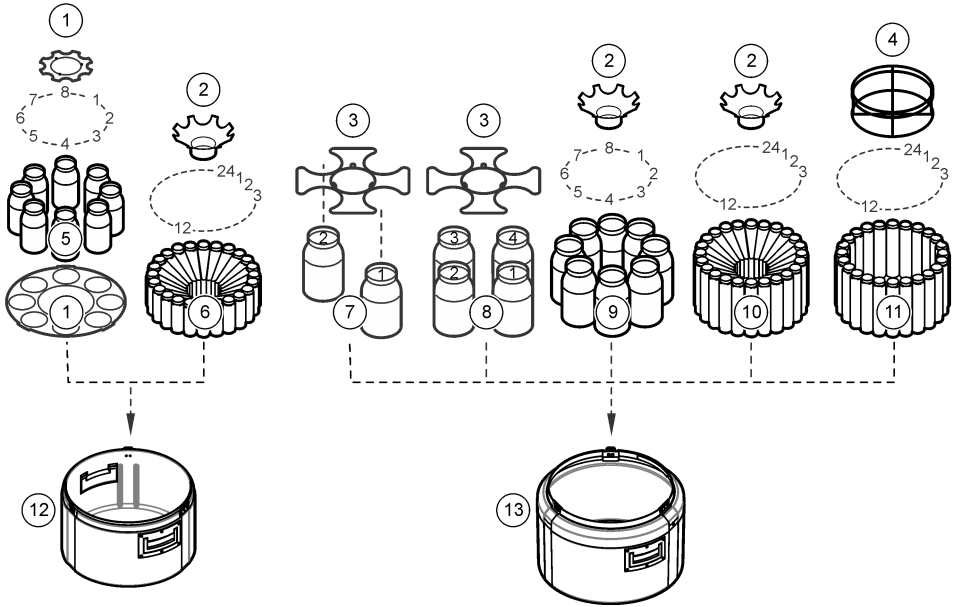
1 Bottle number 1 location (compact base)	6 Elastic straps
2 Bottle number 1 location for 24 bottles	7 Composite insulated base for 21 L (5.5 gal) bottle
3 Bottle number 1 location for 8 bottles	8 Standard insulated base
4 Bottle number 1 location for 2 or 4 bottles	9 Compact base
5 Retainer	

3.4.4 Install multiple bottles

When multiple bottles are installed, a distributor arm moves the sample tube over each bottle. Sample collection automatically stops when the specified number of samples have been collected.

1. Install the first sample bottle (number 1) below the label in the sampler base. Refer to [Install the first bottle for multiple sample collections](#) on page 11.
2. Assemble the sample bottles as shown in [Figure 6](#). For eight or more bottles, make sure that the first bottle goes next to the bottle one indicator in the clockwise direction.
3. Put the bottle assembly in the sampler. For eight or more bottles, align the wires in the slots in the bottom tray.

Figure 6 Multiple bottle installation



1 Retainer/Positioner for 8 950-mL (32.12-oz) glass bottles	8 Bottle set, 4 3.8-L (1-gal) poly or glass
2 Retainer for 8 or 24 glass or poly bottles	9 Bottle set, 8 1.9-L (0.5-gal) glass or 8 2.3-L (0.6-gal) poly
3 Retainer for 4 3.8-L (1 gal) glass or poly bottles	10 Bottle set, 24 1-L (0.26 gal) poly
4 Retainer for 24 350-mL (11.83 oz) glass bottles	11 Bottle set, 24 350-mL (11.83 oz) glass
5 Bottle set, 8 950-mL (32.12 oz) glass	12 Compact base
6 Bottle set, 24 575-mL (19.44 oz) poly	13 Standard base
7 Bottle set, 2 3.8-L (1-gal) poly or glass	

3.5 Plumb the sampler

Install the strainer in the middle of the sample stream (not near the surface or the bottom) to make sure that a representative sample is collected. Refer to [Figure 7](#).

1. Connect the tubing to the sampler as shown in [Figure 8](#).

Note: When Teflon-lined tubing is used, use the tubing connection kit for Teflon-lined PE tubing.

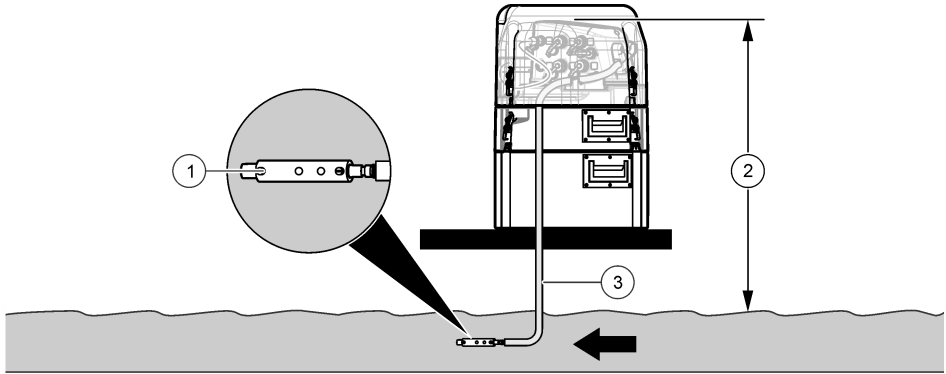
2. Install the intake tube and strainer in the main stream of the sample source where the water is turbulent and well-mixed.

- Make the intake tube as short as possible. Refer to [Specifications](#) on page 3 for the minimum intake tubing length.
- Keep the intake tube at a maximum vertical slope so that the tube drains completely between samples.

Note: If a vertical slope is not possible or if the tube is pressurized, disable the liquid sensor. Calibrate the sample volume manually.

- Make sure that the intake tube is not pinched.

Figure 7 Instrument installation

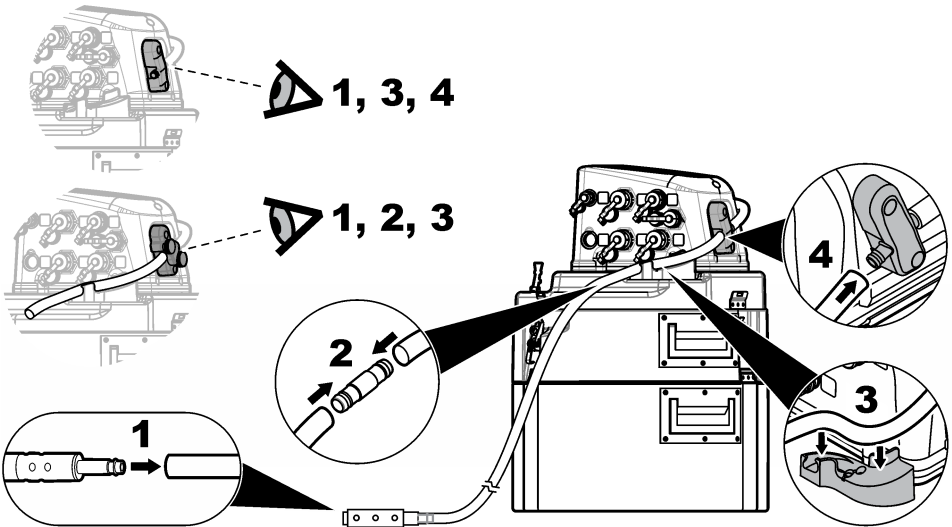


1 Strainer

2 Vertical lift

3 Intake tube

Figure 8 Intake tube installation



3.6 Electrical installation

3.6.1 Connect the sampler to power

⚠ DANGER



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

⚠ DANGER



Fire hazard. Install a 15 A circuit breaker in the power line. A circuit breaker can be the local power disconnect, if located in close proximity to the equipment.

⚠ DANGER



Electrocution hazard. Protective Earth Ground (PE) connection is required.

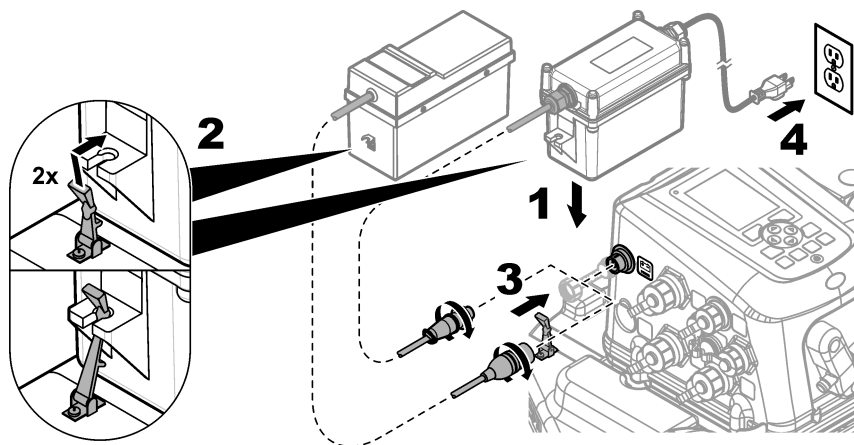
⚠ WARNING



Electrocution hazard. Make sure that there is easy access to the local power disconnect.

Connect the sampler to a battery (8754400) or an AC power supply (8754500US, 8754500EU or 8754500UK). Refer to [Figure 9](#).

Figure 9 Connect the sampler to power



3.6.2 Controller connections

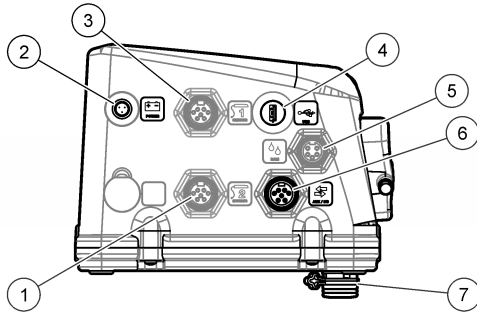
⚠ WARNING



Electrical shock hazard. Externally connected equipment must have an applicable country safety standard assessment.

[Figure 10](#) shows the electrical connectors on the controller.

Figure 10 Controller connections



1 Sensor 2 port (optional)	5 Rain gauge/RS485 port (optional)
2 Power supply port	6 Auxilliary I/O port
3 Sensor 1 port (optional)	7 Distributor arm/Full bottle shut-off port
4 USB connector	

3.6.3 Connect a Sigma 950 or FL900

If sample pacing is flow based, supply the controller with a flow input signal (pulse or 4–20 mA). Connect a Sigma 950 or an FL900 Flow Logger to the AUX I/O port.

As an alternative, connect a flow sensor to a sensor port. Refer to [Connect a sensor](#) on page 19.

Item to collect: Multi-purpose auxiliary full cable, 7 pin

1. Connect one end of the cable to the flow meter. Refer to the flow meter documentation.
2. Connect the other end of the cable to the AUX I/O port on the controller.

3.6.4 Connect a non-Hach flow meter

To connect a non-Hach flow meter to the AUX I/O port, do the steps that follow.

Items to collect: Multi-purpose auxiliary half cable, 7 pin

1. Connect one end of the cable to the AUX I/O port on the controller.
2. Connect the other end of the cable to the flow meter. Refer to [Figure 11](#) and [Table 1](#).

Note: In some installations, it is necessary to connect external equipment to the Pulse input, Special output and/or Program Complete output with long cables. Since these are ground-referenced pulse interfaces, false signaling can be caused by transient ground differences between each end of the cable. High ground differentials are typical in heavy industrial environments. In such environments, it may be necessary to use third-party galvanic isolators (e.g., optocouplers) in line with the affected signal(s). For the Analog input, external ground isolation is typically not necessary because the 4–20 mA transmitter typically supplies isolation.

Figure 11 Auxiliary connector



Table 1 Half cable wiring information

Pin	Signal	Color ¹	Description	Rating
1	+12 VDC power output	White	Power supply positive output. Only use with pin 2.	Battery power to the I/O module: 12 VDC nominal; Power supply to the I/O module: 15 at 1.0 A maximum.
2	Common	Blue	Negative return of power supply. When the power supply is used, pin 2 is connected to earth ground ² .	
3	Pulse input or Analog input	Orange	This signal is a sample collection trigger from the flow logger (pulse or 4–20 mA) or a simple floating (dry) contact closure.	<p>Pulse input—Reacts to a positive pulse with respect to pin 2. Termination (pulled low): pin 2 through a series 1 kΩ resistor and 10 kΩ resistor. A 7.5 zener diode is in parallel with the 10 kΩ resistor as a protection device.</p> <p>Analog input—Reacts to the analog signal that enters pin 3 and returns on pin 2. Input burden: 100 Ω plus 0.4 V; Input current (internal limit): 40 to 50 mA maximum³</p> <p>Absolute maximum input: 0 to 15 VDC with respect to pin 2.</p> <p>Signal to make the input active: 5 to 15 V positive-going pulse⁴ with respect to pin 2, 50 millisecond minimum.</p>

¹ The wire color refers to the colors of multi-purpose cables. Refer to [Accessories](#) on page 29.

² All mains powered equipment that connects to the controller terminals must be NRTL listed.

³ Long-term operation in this state voids the warranty.

⁴ Source impedance of the driving signal must be less than 5 k Ω .

Table 1 Half cable wiring information (continued)

Pin	Signal	Color ¹	Description	Rating
4	Liquid level input or Auxiliary control input	Black	<p>Liquid level input—Start or continue the sampling program. A simple float level switch can supply input.</p> <p>Auxiliary control input—Start a sampler after the sampling program on another sampler ends. As an alternative, start a sampler when a trigger condition occurs. For example, when a high or low pH condition occurs, the sampling program starts.</p>	<p>Termination (pulled high): internal +5 V supply through an 11 kΩ resistance with a series 1 kΩ resistor and 7.5 V zener diode terminated to pin 2 for protection. Trigger: High to low voltage with a low pulse of 50 milliseconds minimum.</p> <p>Absolute maximum input: 0 to 15 VDC with respect to pin 2. Signal to make the input active: external logic signal with 5 to 15 VDC power source. The drive signal must be typically high. The external driver must be able to sink 0.5 mA at 1 VDC maximum at the logic low level.</p> <p>A logic high signal from a driver with a power source of more than 7.5 V will source current into this input at the rate of: $I = (V - 7.5)/1000$ where I is the source current and V is the power supply voltage of the driving logic.</p> <p>Dry contact (switch) closure: 50 millisecond minimum between pin 4 and pin 2. Contact resistance: 2 kΩ maximum. Contact current: 0.5 mA DC maximum</p>
5	Special output	Red	<p>This output goes from 0 to +12 VDC with respect to pin 2 after each sample cycle. Refer to the Mode setting of the hardware settings for the AUX I/O port. Refer to the AS950 operations documentation.</p>	<p>This output has protection against short circuit currents to pin 2. External load current: 0.2 A maximum</p> <p>Active high output: 15 VDC nominal with AC power to the AS950 controller or a 12 VDC nominal with battery power to the AS950 controller.</p>

¹ The wire color refers to the colors of multi-purpose cables. Refer to [Accessories](#) on page 29.

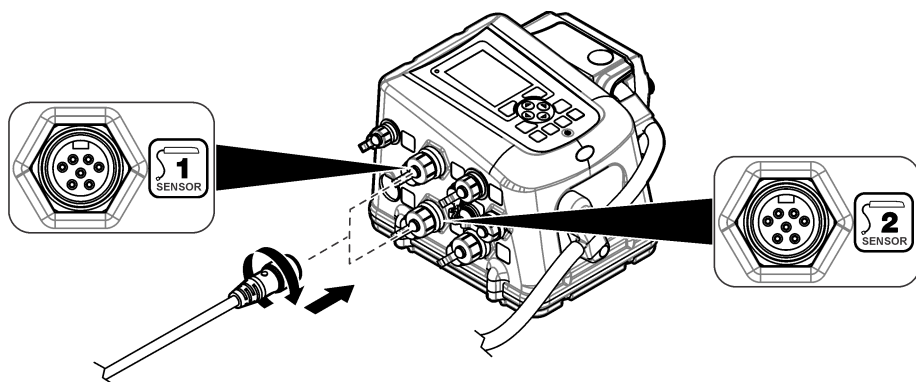
Table 1 Half cable wiring information (continued)

Pin	Signal	Color ¹	Description	Rating
6	Program Complete output	Green	<p>Typical state: open circuit. This output goes to ground for 90 seconds at the end of the sampling program.</p> <p>Use this output to start another sampler or to signal an operator or data logger at the end of the sampling program.</p>	<p>This output is an open drain output with 18 V zener clamp diode for over-voltage protection. The output is active low with respect to pin 2.</p> <p>Absolute maximum ratings for the output transistor: sink current = 200 mA DC maximum; external pull-up voltage = 18 VDC maximum</p>
7	Shield	Silver	<p>The shield is a connection to earth ground when AC power is supplied to a sampler to control RF emissions and susceptibility to RF emissions.</p>	<p>The shield is not a safety ground. Do not use the shield as a current carrying conductor.</p> <p>The shield wire of cables that are connected to the AUX I/O port and are more than 3 m (10 ft) should be connected to pin 7.</p> <p>Only connect the shield wire to earth ground at one end of the cable to prevent ground loop currents.</p>

3.6.5 Connect a sensor

To connect a sensor (e.g., pH or flow sensor) to a sensor port, refer to [Figure 12](#).

Figure 12 Connect a sensor



Section 4 Startup

4.1 Set the instrument to on

Push and hold the **Power** key on the controller to set the instrument to on.

4.2 Preparation for use

Install the analyzer bottles and stir bar. Refer to the operations manual for the startup procedure.

¹ The wire color refers to the colors of multi-purpose cables. Refer to [Accessories](#) on page 29.

Section 5 Maintenance

⚠ DANGER



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

⚠ DANGER



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

⚠ WARNING



Biohazard exposure. Obey safe handling protocols during contact with sample bottles and sampler components.

⚠ WARNING



Multiple hazards. The technician must make sure that the equipment operates safely and correctly after maintenance procedures.

NOTICE

Do not disassemble the instrument for maintenance. If the internal components must be cleaned or repaired, contact the manufacturer.

5.1 Clean the instrument

⚠ CAUTION



Fire hazard. Do not use flammable agents to clean the instrument.

If water is not sufficient to clean the controller and the pump, disconnect the controller and move the controller away from the sampler. Allow sufficient time for the controller and pump to dry before the parts are re-installed and put back into service.

Clean the sampler as follows:

- Sampler enclosure—Clean the internal and external surfaces with a damp cloth and a mild detergent. Do not use abrasive cleaners or solvents.
- Sample bottles—Clean the bottles with a brush and water and a mild detergent. Rinse with fresh water and then with distilled water. Use an autoclave to clean glass bottles if necessary.

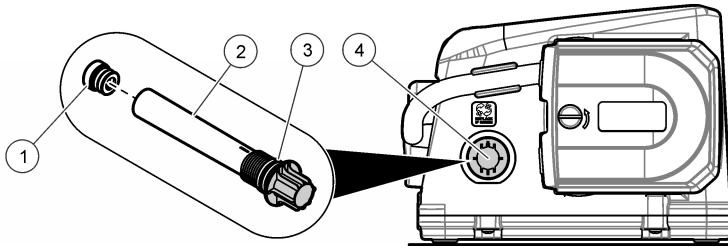
5.2 Replace the desiccant

A desiccant cartridge in the controller absorbs moisture and prevents corrosion. Monitor the desiccant color through the window. Refer to [Figure 13](#). Fresh desiccant is orange. When the color is green, replace the desiccant.

1. Unscrew and remove the desiccant cartridge. Refer to [Figure 13](#).
2. Remove the plug and discard the spent desiccant.
3. Fill the desiccant tube with fresh desiccant.
4. Install the plug.

5. Apply silicone grease to the O-ring.
6. Install the desiccant tube in the controller.

Figure 13 Desiccant cartridge



1 Plug	3 O-ring
2 Desiccant tube	4 Desiccant window

5.3 Pump maintenance

▲ CAUTION



Pinch hazard. Remove power from the instrument before maintenance or service activities are done.

5.3.1 Replace the pump tubing

NOTICE

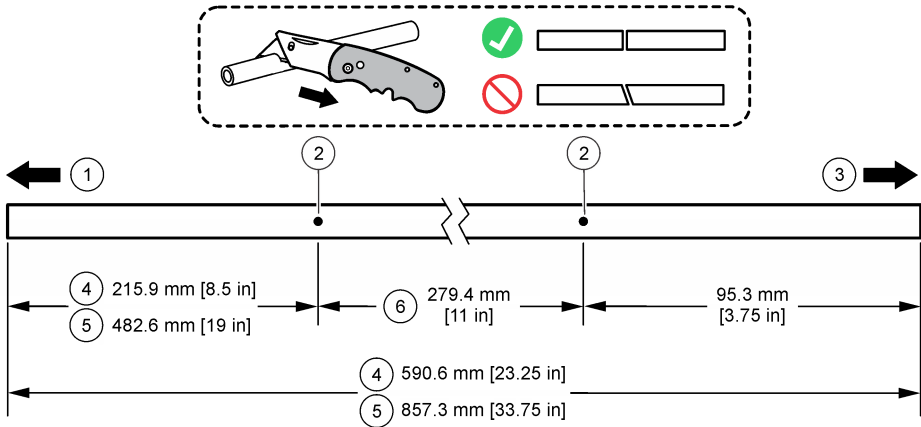
Use of tubing other than that supplied by the manufacturer can cause excessive wear on mechanical parts and/or poor pump performance.

Examine the pump tubing for wear where the rollers rub against the tubing. Replace the tubing when the tubing shows signs of wear.

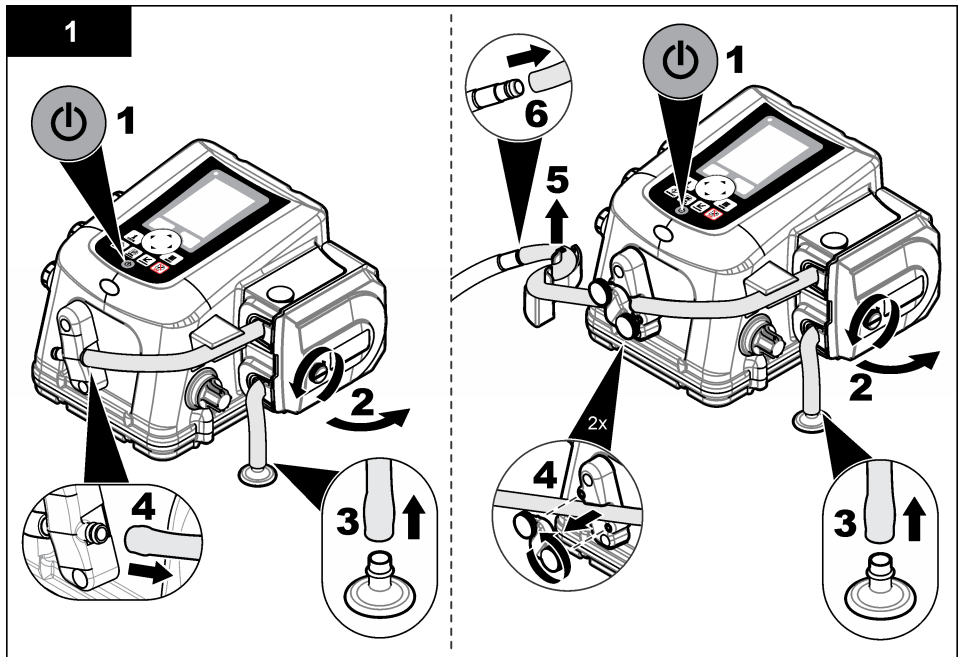
Pre-requisites:

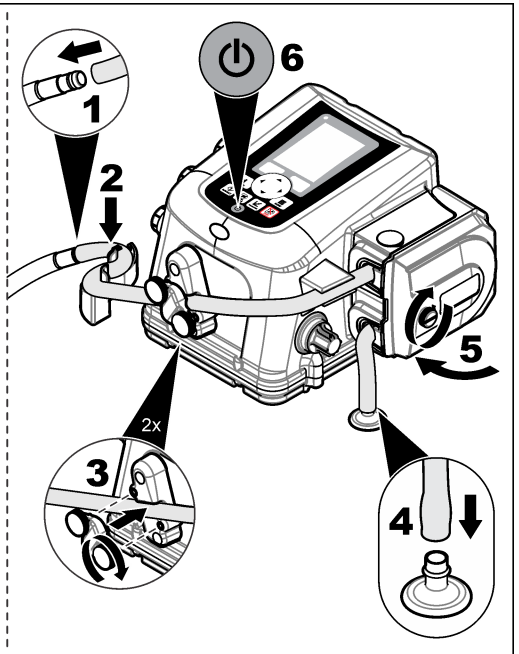
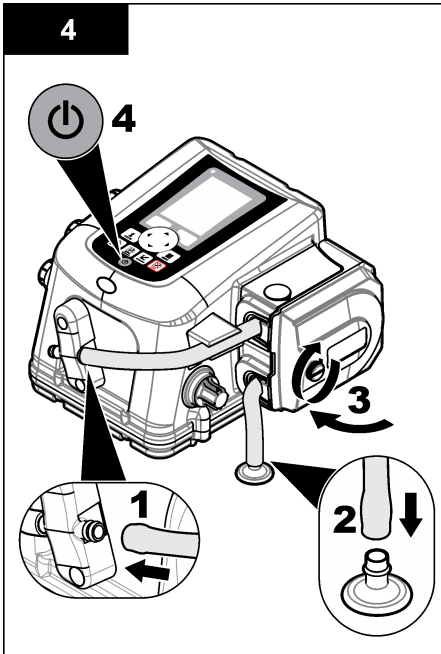
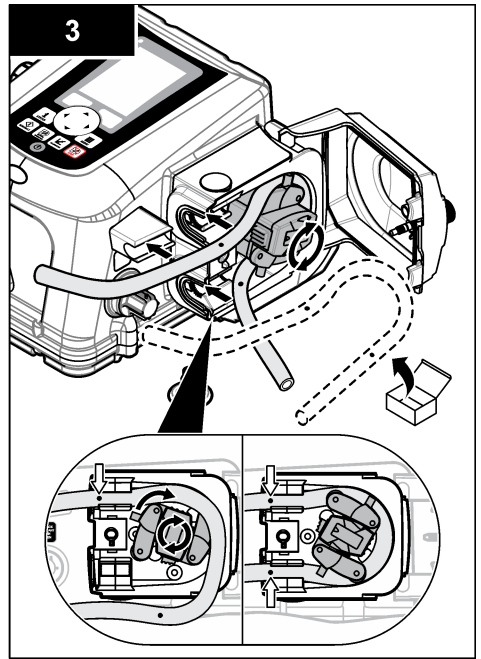
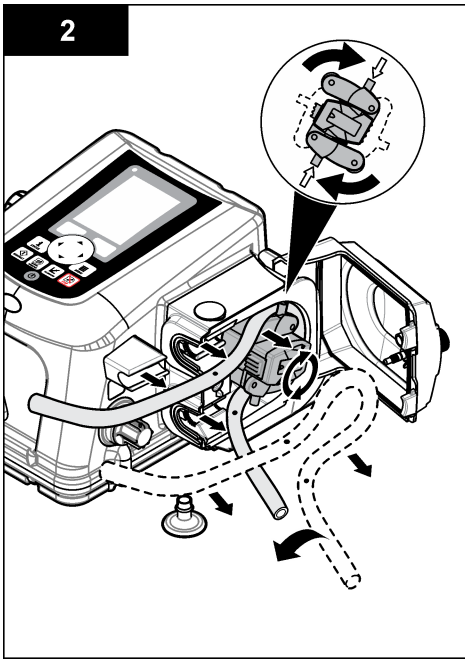
- Pump tubing—pre-cut or bulk 4.6 m or 15.2 m (15 ft or 50 ft)
1. Disconnect the power to the controller.
 2. If the bulk tubing is used, cut the tubing and add alignment dots. Refer to [Figure 14](#).
 3. Remove the pump tubing as shown in the illustrated steps that follow.
 4. Clean the silicone residue from the interior of the pump housing and from the rollers.
 5. Install the new pump tubing as shown in the illustrated steps that follow.

Figure 14 Pump tubing preparation



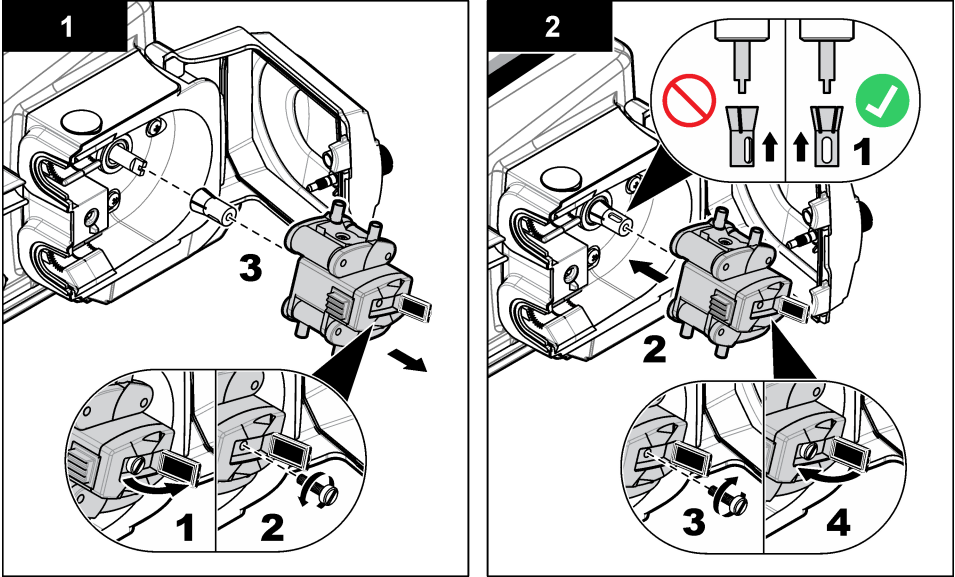
1 To intake tubing	4 Length for controller with standard liquid detector
2 Alignment dots	5 Length for controller with optional non-contacting liquid detector
3 To fitting on sampler base	6 Length inside the pump





5.3.2 Clean the rotor

Clean the rotor, pump tube tracks and pump housing with a mild detergent. Refer to [Replace the pump tubing](#) on page 21 and the illustrated steps that follow.



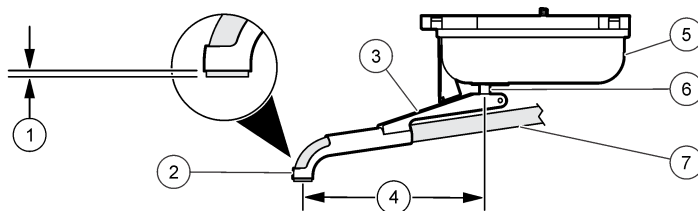
5.4 Replace the distributor arm tube

The distributor arm moves over each bottle during multiple bottle sampling. Replace the tube in the distributor arm when the tube is worn. Make sure that the correct tube is used for the correct distributor and distributor arm.

Note: The distributor tubing is not the same as the pump tubing. The pump tubing installed in the distributor assembly can damage the distributor. Also, samples can be missed because the distributor arm cannot move easily.

1. Remove the tube from the distributor arm and from the ceiling of the center section.
2. Insert the new tube into the distributor arm. Extend the tube past the end of the distributor arm 4.8 mm (3/16 in.) or 19 mm (3/4 in.) as shown in item 1 of [Figure 15](#).
3. Insert the other end of the tube into the fitting on the ceiling of the center section.
4. Complete the diagnostic test for the distributor to make sure that the operation is correct.

Figure 15 Distributor assembly



1 Tube extension	4 Distributor arm lengths: 152.4 mm (6.0 in.), 177.8 mm (7.0 in.) or 190.8 mm (7.51 in.)	7 Distributor tube
2 Nozzle	5 Distributor motor	
3 Distributor arm	6 Shaft	

5.5 Replace the power supply or battery

Refer to [Connect the sampler to power](#) on page 14 to replace the power supply or battery.

Section 6 Troubleshooting

6.1 General troubleshooting

[Table 2](#) shows causes and corrective actions for several common problems.

Table 2 General troubleshooting

Problem	Possible cause	Solution
No instrument power with AC	Problem with the main power source.	Examine the AC power at the electrical outlet.
	Defective controller.	Contact technical support.
No instrument power with DC	Battery is not charged.	Replace the battery.
	Battery does not hold the charge.	Replace the battery or use an AC power cord.
	Defective controller.	Contact technical support.
The battery life is short	Insufficient voltage.	Make sure that the lead-acid battery holds 12.6 V to 13.4 V when fully charged. Replace the battery if necessary.
	Battery power drains quickly.	Charge the battery fully and let the battery stand for 1 hour. If the voltage decreases below 12.5 V, replace the battery.

Table 2 General troubleshooting (continued)

Problem	Possible cause	Solution
Sampler does not have sufficient lift.	Strainer is not fully submerged.	Install the shallow depth strainer. Refer to Replacement parts and accessories on page 26.
	Intake tube has a leak.	Replace the intake tube.
	Pump tube is worn.	Replace the pump tubing on page 21.
	Pump roller assembly is worn.	Contact technical support.
Sample volume is not correct.	Incorrect volume calibration.	Repeat the volume calibration.
	Incorrect tube length is specified in the sampler program.	Make sure that the correct tube length is in the sampler program.
	Intake tube does not fully purge.	Make sure that the intake tube is as vertical and as short as possible.
	Strainer is not fully submerged.	Install the shallow depth strainer. Refer to Replacement parts and accessories on page 26.
	Worn pump tubing and/or roller assembly.	Replace the pump tube and/or roller assembly.
	The liquid detector is disabled.	Set the liquid detector to on and complete a volume calibration.
	Liquid detector does not operate properly.	Calibrate the liquid detector with the same liquid that is sampled.

Section 7 Replacement parts and accessories

⚠ 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.

7.1 Bottle kits

Description	Quantity	Item no.
Single bottle kits (includes bottle and full bottle shut off):		
10-L (2.5-gal) glass bottle and full bottle shut off (for standard base)	1	PS010025
10-L (2.5-gal) poly bottle and full bottle shut off (for standard base)	1	PS010030
10-L (2.5-gal) glass bottle and full bottle shut off (for compact base)	1	PC010025

7.1 Bottle kits (continued)

Description	Quantity	Item no.
10-L (2.5-gal) poly bottle and full bottle shut off (for compact base)	1	PC010030
15-L (4.0-gal) poly bottle and full bottle shut off (for standard base)	1	PS010040
21-L (5.5-gal) poly bottle and full bottle shut off (for standard base)	1	PS010055
Multi-bottle kits (include bottle, retainer and distributor arm):		
350-mL (11.83 oz) glass bottles, retainer and distributor arm (for standard base)	24	PS240350
575-mL (19.44 oz) poly bottles, retainer and distributor arm (for compact base)	24	PC240575
1-L (0.26 gal) poly bottles, retainer and distributor arm (for standard base)	24	PS241000

7.2 Bottle sets

Description	Quantity	Item no.
Bottle, 10-L (2.5-gal) glass with cap	1	6559
Bottle, 10-L (2.5-gal) poly with cap	1	1918
Bottle, 15-L (4-gal) poly with cap	1	1367
Bottle, 21-L (5.5-gal) poly with cap	1	6498
Bottle, 20-L (5.25 -gal) poly with cap	1	6494
Bottle set, 1-L (0.26 gal) poly with caps	24	737
Bottle set, 350-mL (11.83 oz) glass with caps	24	732
Bottle set, 575-mL (19.44 oz) poly with caps	24	1369
Bottle set, 2.3-L (0.6-gal) poly with caps	8	657
Bottle set, 1.9-L (0.5-gal) glass with caps	8	1118
Bottle set, 950-mL (32.12 oz) glass with caps	8	2348
Bottle set, 3.8-L (1-gal) poly with caps	4	2217
Bottle set, 3.8-L (1-gal) glass with caps	4	2216
Bottle set, 3.8-L (1-gal) poly with caps	2	2215
Bottle set, 3.8-L (1-gal) glass with caps	2	2214

7.3 Replacement parts

Description	Quantity	Item no.
Base, standard assembly, insulated	1	8976
Base, compact assembly	1	8975
Base, standard, holds a 21-L (5.5-gal) poly bottle	1	8561
Battery, 12 VDC, gel electrolyte (lead acid), with 3 pin connector	1	8754400
Desiccant, refill	0.56 kg (1.5 lb)	8755500
Desiccant cap assembly	1	8754900
Desiccant tube	1	8742100
Desiccant tube assembly	1	8741500
Desiccant tube assembly with silicone grease packet	1	8755600
Distributor assembly with arm for 24 bottles, compact base	1	8580
Distributor assembly with arm for 24 bottles, standard base	1	8582
Distributor assembly with arm for 2, 4 or 8 bottles, standard base	1	8584
Distributor assembly with arm for 8 bottles, compact base	1	8584
Distributor arm for assembly 8580	1	8581
Distributor arm for assembly 8582	1	8583
Distributor arm for assembly 8584	1	8585
Distributor arm tubing, 40.64 cm (16¼-in.), for assembly 8584 (arm 8585)	1	8579
Distributor arm tubing, 43.18 cm (17 in.), for assembly 8580 (arm 8581)	1	8577
Distributor arm tubing, 45.72 cm (18¾-in.), for assembly 8582 (arm 8583)	1	8578
Full bottle shut-off	1	8996
Power supply, 3-pin connector, 100–120 VAC	1	8754500US
Power supply, 3-pin connector, 230 VAC	1	8754500EU
Power supply, 3-pin connector, 230 VAC	1	8754500UK
Pump cover	1	8755400
Pump, replacement assembly	1	6262000
Retainer for 8 or 24 poly or glass bottles	1	1422
Retainer for 24 350-mL (11.83 oz) glass bottles	1	2189

7.3 Replacement parts (continued)

Description	Quantity	Item no.
Retainer/Positioner for 8 950-mL (32.12 oz) glass bottles	1	2347
Retainer for 3.8-L (1 gal) glass or poly bottles	1	2190
Sampler locking assembly	1	1354
Support, bottle, for standard base, 2.5 gal glass and 3 gal poly	1	1502
Tubing, pump, pre-cut, contacting liquid detector	1	8753800
Tubing, pump, pre-cut, non-contacting liquid detector	1	9501400
Tubing, pump	4.6 m (15 ft)	4600-15
Tubing, pump	15.2 m (50 ft)	4600-50
Tubing, black, soft PVC, intake, 10 mm ID, 15 mm OD	7.8 m (25.5 ft)	6633500
Tubing, black, soft PVC, intake, 10 mm ID, 15 mm OD	selected when ordered	6627200
Tubing connection kit for Teflon-lined PE tubing	1	2186
Tubing, Teflon-lined intake 3/8-in.	3 m (10 ft)	921
Tubing, Teflon-lined intake 3/8-in.	7.6 m (25 ft)	922
Tubing, Teflon-lined intake 3/8-in.	30.5 m (100 ft)	925
Tubing, vinyl intake 3/8-in.	7.6 m (25 ft)	920
Tubing, vinyl intake 3/8-in.	30.5 m (100 ft)	923
Tubing, vinyl intake, 3/8-in.	152.4 m (500 ft)	924

7.4 Accessories

Description	Item no.
AC backup power, 40.64 cm (16 in.) cable	8757400
AS950 controller retrofit kit, portable sampler	9504800
AV9000S analyzer module, subAV sensor	9504600
AV9000S analyzer module installation kit	9506900
Battery charger, gel electrolyte, with 3 pin connector, 90–250 VAC	8753500US
Cable, auxiliary, cascade sampling or synchronized sampling	9505100
Cable, auxiliary, Sigma 950 to AUX port, 2.7 m (9 ft)	8528400
Cable, auxiliary, Sigma 950 to AUX port, 7.6 m (25 ft)	8528401
Cable, auxiliary, multi-purpose half, 7 pin, 2.7 m (9 ft)	8528500
Cable, auxiliary, multi-purpose half, 7 pin, 7.6 m (25 ft)	8528501

7.4 Accessories (continued)

Description	Item no.
Cable, Cascade/Syncho cable	9505100
Cable, FL900 logger to AUX port, 7 pin, 2.7 m (9 ft)	9500700
Cable, FL900 logger to AUX port, 7 pin, 2.7 m (25 ft)	9500701
Cable, pH sensor, used with DPD2P1	9501200
Cable, USB, Type A–A, 2 m (6.5 ft)	9504700
Flow-thru module	2471
IO9004 module	9494600
IO9001 module (one high voltage relay)	9494500
Junction box with auxiliary cable	9501000
Manhole spanner bar, 45.72–71.12 cm (18–28 in.)	9542
Manhole spanner bar, 71.12–121.92 cm (28–48 in.)	9557
Manhole support bracket, 45.72–68.58 cm (18–27 in.)	5713000
Rain gauge, tipping bucket, includes 30.5 m (100 ft) 7-pin cable	8542800
Sensor, pH, digital, used with 9501200	DPD2P1
Sensor, US9001, downlooking ultrasonic	9487100
Sensor, US9001B, downlooking ultrasonic	9088800
Sensor, US9003, in-pipe ultrasonic	9497300
Sensor, subAV, used with AV9000 interface	77065-030
Silicone grease, 7 g (0.25 oz)	000298HY
Strainer, all 316 stainless steel, 152 mm long x 10.3 mm OD (6.0 in. long x 0.406 in. OD)	2071
Strainer, all 316 stainless steel, 201.7 mm long x 25.4 mm OD (7.94 in. long, x 1.0 in. OD)	2070
Strainer, stainless steel, 99.1 mm long x 10.3 mm OD (3.9 in. long x 0.406 in. OD)	4652
Strainer, PTFE/stainless steel, 139.7 mm long x 22.2 mm OD (5.5 in. long x 0.875 in. OD)	926
Strainer, PTFE/stainless steel, 279.4 mm long x 22.2 mm OD (11.0 in. long x 0.875 in. OD)	903
Suspension harness	1355
Adapter fitting, tubing	9503200



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