SD900 Refrigerated Sampler
SD900 AWRS

User Manual

Table of Contents

Specifications

Specifications are subject to change without notice.

Refrigerated and All Weather Refrigerated Sampler (AWRS)

Specification	Refrigerated	AWRS
Dimensions (W x D x H)	61 x 61 x 112 cm (24 x 24 x 44 in.)	76 x 81 x 130 cm (30 x 32 x 51 in.)
Weight	63.3 kg (140 lb)	86 kg (190 lb)
Power requirements (includes compressor)	115 VAC, 60 Hz, 3.3 A (18 locked rotor amps) 230 VAC, 50 Hz, 1.7 A (9 locked rotor amps)	115 VAC, 60 Hz, 4.2 A or 6.4 A with controller compartment heater 230 VAC, 50 Hz, 2.7 A or 4.1 A with controller compartment heater
Overload protection	Thermal overload relay, opens at 100 to 110 °C (212 to 230 °F)	115 VAC: 7.5 A circuit breaker 230 VAC: 5.0 A circuit breaker
Compressor	$^1/_6$ HP	$^1/_5$ HP 115 VAC: 115 °C (239 °F) thermal overload protector, 7.1 locked rotor amps 230 VAC: 120 °C (248 °F) thermal overload protector, 7.6 A peak start current
Operating temperature	0 to 50 °C (32 to 122 °F)	0 to 50 °C (32 to 122 °F); with AC battery backup: 0 to 40 ºC (32 to 104 °F); with controller compartment heater: –40 to 50 °C (–40 to 122 °F); with controller compartment heater and AC battery backup: -15 to 40 ºC (5 to 104 ºF)
Storage temperature	–30 to 60 °C (–22 to 140 °F)	–30 to 60 °C (–22 to 140 °F)
Relative humidity	0–95%	0–95%
Installation category, pollution degree	II, 2	II, 2
Protection class	I	I
Temperature control	4 (±0.8) °C (39 (±1.5) °F) in ambient temperatures up to 50 °C (120 °F)	4 (±0.8) °C (39 (±1.5) °F)[1]
Maximum altitude	2000 m (6562 ft)	2000 m (6562 ft)
Enclosure	22-gauge steel (optional stainless steel) with vinyl laminate overcoat	IP24, low-density polyethylene with UV inhibitor
Certifications	AC power supply: UL/CSA/CE	**North America**: cETLus listed - Conforms to UL 61010-1, Certified to CSA C22.2 No. 61010-1 and UL 471 and CSA C22.2 No. 120 **Europe / IEC**: CE - EN / IEC 61010-1 and EN / IEC 60335-2-89 (safety), EN / IEC 61326 (EMC) and CISPR 11 (RF emissions)
Intake tubing	9.5 mm ($^3/_8$ in.) ID vinyl or Teflon®-lined polyethylene	
Sample bottle capacity	Single bottle: 10 L (2.5 gal) glass or polyethylene, or 21 L (5.5 gal) polyethylene	
	Multiple bottles: two 10 L (2.5 gal) polyethylene and/or glass, four 10 L (2.5 gal) polyethylene and/or glass, eight 2.3 L (0.6 gal) polyethylene and/or 1.9 L (0.5 gal) glass, 24 1 L (0.3 gal) polyethylene and/or 350 mL (12 oz.) glass	
Warranty	1 year	

[1] Radio frequency interference in the 30 to 50 MHz range can cause a maximum temperature change of 1.3 °C (34.3 °F). Adjust the set point temperature to 2 to 10 °C (35.6 to 50 °F) to correct this interference.

SD controller

Specification	Details
Dimensions (W x H x D)	29.2 x 17.1 x 26.4 cm (11½ x 6¾ x 10$^3/_8$ in.)
Weight	4.2 kg (9.26 lb)
Enclosure	PC/ABS blend, NEMA 4X, 6, IP 67
Power requirements	Refrigerated sampler: 15 VDC supplied by a 8754500 power supply; AWRS sampler: 15 VDC supplied by an integral power supply
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	IP37
Pump tubing	9.5 mm ID x 15.9 OD mm ($^3/_8$ in. ID x $^5/_8$ 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 $^3/_8$ in. intake tube, 4.6 m (15 ft) of vertical lift, 21 °C (70 °F) sample temperature
Vertical sample lift	Maximum 8.5 m (28 ft) for: 8.8 m (29 ft) of $^3/_8$-in. vinyl intake tube at sea level at 20–25 °C (68–77 °F)
Pump flow rate	4.8 L/min (1.25 gpm) at 1 m (3 ft) vertical lift with $^3/_8$-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 using uncalibrated liquid detect with: 4.6 m (15 ft) vertical lift, 4.9 m (16 ft) of $^3/_8$-in. vinyl intake tube, single bottle, full bottle shut-off at room temperature and 1524 m (5000 ft) elevation
Sample volume accuracy (typical)	±10% of 200 mL sample volume using uncalibrated liquid detect with: 4.6 m (15 ft) vertical lift, 4.9 m (16 ft) of $^3/_8$-in. vinyl intake tube, single bottle, full bottle shut-off at room temperature and 1524 m (5000 ft) elevation
Sampling modes	Pacing: Time-fixed, flow-fixed, time-variable, flow-variable, constant time variable volume (CTVV). Refer to Constant Time Variable Volume (CTVV) sampling on page 23. Distribution: Single bottle composite, multi-bottle composite, multi-bottle discrete, bottles per sample, samples per bottle, combination of bottles per sample, samples per bottle
Run modes	Continuous or non-continuous with user-entered number of samples
Multiple programs	Stores up to three sampling programs
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 $^3/_8$-in. vinyl intake tubing, 21 °C (70 °F) and 1524 m (5000 ft) elevation
Liquid sensor	Ultrasonic. Body: Ultem® NSF ANSI standard 51 approved, USP Class VI compliant
Sample history	Up to 510 records
Air purge	Air purged automatically before and after each sample. The duration automatically compensates for varying intake tube lengths.
Event log	510 records
Connections	Power, auxiliary, serial communications, distributor, SDI-12, thermal (AWRS)

Specification	Details
Wetted materials	Stainless steel, polyethylene, Teflon, Ultem, silicone
Communications	RS232, Modbus, SDI-12
Warranty	1 year
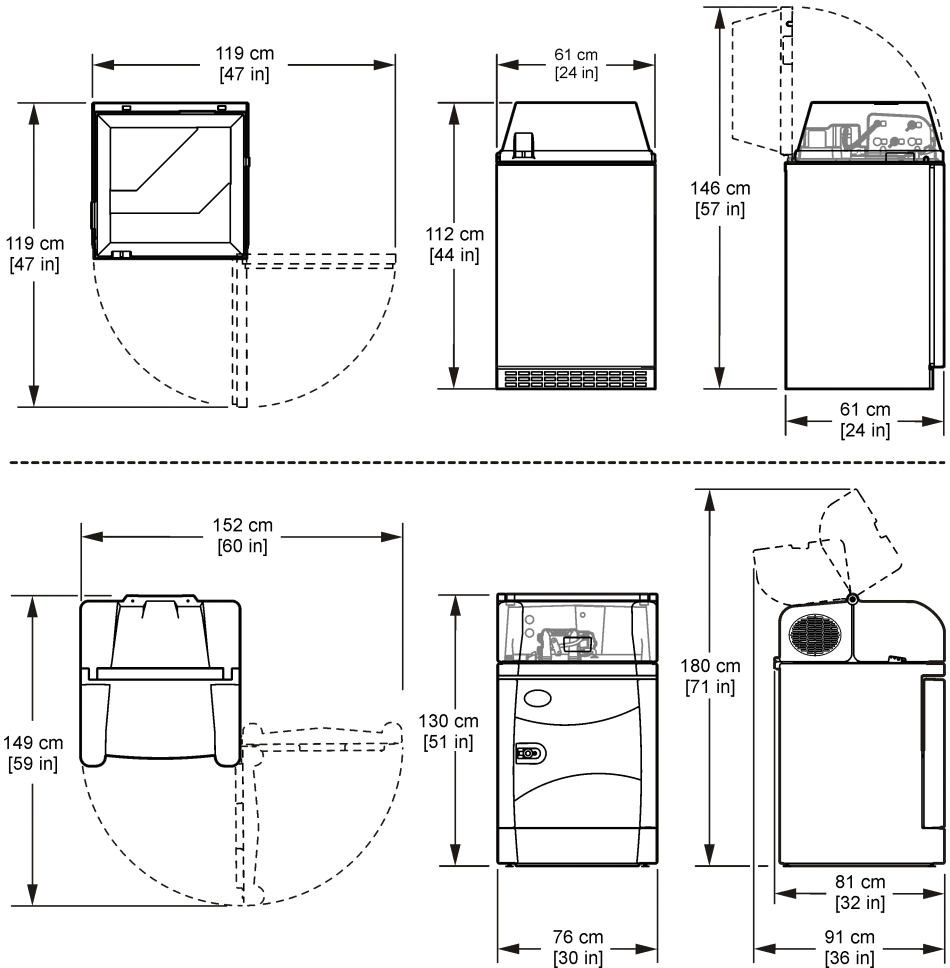
General information

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.

Safety information

N O T I C E
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.

Use of hazard information

⚠ D A N G E R
Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ W A R N I N G
Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

⚠ C A U T I O N
Indicates a potentially hazardous situation that may result in minor or moderate injury.

N O T I C E
Indicates a situation which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.

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 that a risk of electrical shock and/or electrocution exists.
🔥	This symbol indicates that a risk of fire is present.
♨	This symbol indicates that the marked item can be hot and should not be touched without care.
☣	This symbol indicates the presence of a biohazard.

	This symbol indicates that the item is to be protected from fluid entry.
	This symbol indicates that the marked item should not be touched.
	This symbol indicates a potential pinch hazard.
	This symbol indicates that the object is heavy.
	This symbol indicates that the marked item requires a protective earth connection. If the instrument is not supplied with a ground plug on a cord, make the protective earth connection to the protective conductor terminal.
	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.

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.

Product overview

<table>
<tr><td colspan="2" align="center">⚠ **D A N G E R**</td></tr>
<tr><td>⚠</td><td>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.</td></tr>
</table>

<table>
<tr><td colspan="2" align="center">⚠ **C A U T I O N**</td></tr>
<tr><td>⚠</td><td>Fire hazard. This product is not designed for use with flammable liquids.</td></tr>
</table>

The sampler collects liquid samples at specified intervals and keeps the samples in a refrigerated cabinet. The sampler can be used for a wide variety of aqueous applications and is suitable for toxic pollutants and suspended solids. Refer to Figure 1.

Lockable cabinet door (AWRS only)

Push the round button in the center of the latch to open the door. Flip the latch to close the door tight. Two keys are supplied for the door lock. Over time, it may be necessary to tighten the adjustment screw on the door latch.

Controller compartment heater (AWRS only)

The controller compartment heater is a factory-installed option. The heater prevents liquid from freezing in the tubing, extends the life of the tubing and pump components and prevents the accumulation of ice and snow on the cover.

Figure 1 Refrigerated sampler and AWRS
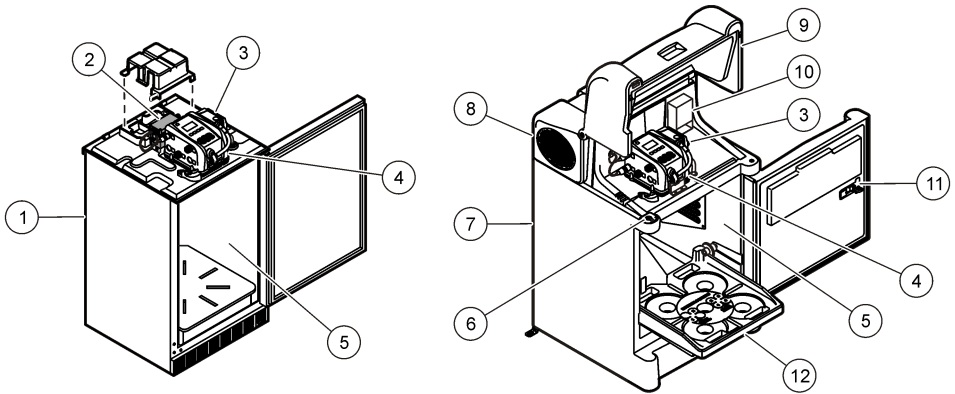
1	Refrigerated sampler	5	Refrigerated cabinet	9	Controller cover
2	Power supply	6	Cover latch	10	Compartment heater option
3	Pump	7	AWRS	11	Door latch
4	Controller	8	Access cover	12	Bottle tray

Product components

⚠ **WARNING**

Personal injury hazard. Instruments or components are heavy. Use assistance to install or move.

The instrument weighs up to 86 kg (190 lb). Do not try to unpack, carry or move the instrument without sufficient equipment and people to do so safely. Use correct lifting techniques to avoid injury. Make sure that any equipment is rated for the load, for example a hand truck must be rated for at least 90 kg (200 lb). Do not move the instrument with filled samples bottles inside.

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 Sampler components
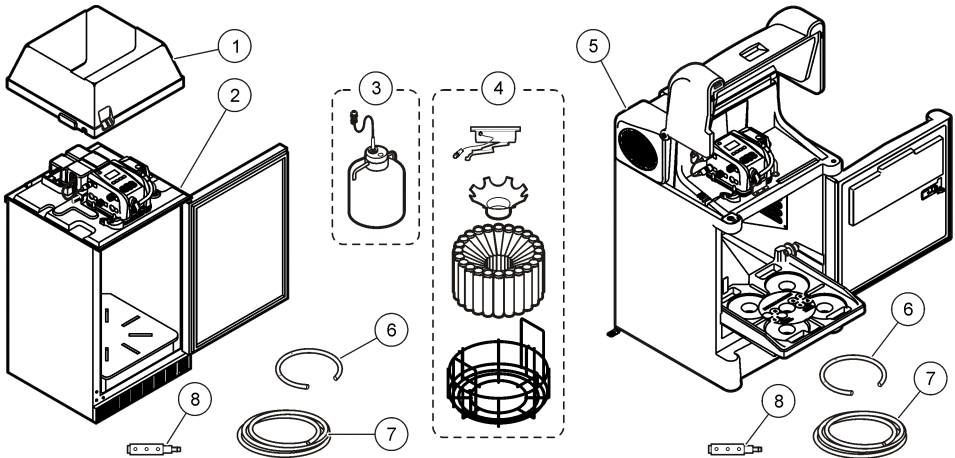
1	Optional cover (8963)	**5**	All weather refrigerated sampler
2	Refrigerated sampler	**6**	Replacement pump tubing
3	Components for single-bottle option	**7**	Intake tubing, vinyl or teflon-lined
4	Components for multiple-bottle option	**8**	Strainer

Installation

⚠ D A N G E R

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

Mechanical installation

Site installation guidelines

⚠ D A N G E R

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

- The refrigerated sampler must be installed in an indoor location. The AWRS can be installed in an outdoor location.
- Make sure that the temperature at the site location is within the specifications.
- Install the sampler on a level surface. Adjust the sampler feet to make the sampler level.
- Use the installed anchor brackets and user-supplied $^3/_8$-in. bolts for the AWRS. Refer to Figure 3.
- Plumb a drain tube to the ½ in.-14 NPT female connector on the bottom of the sampler.

Figure 3 AWRS anchor bracket locations with mounting dimensions
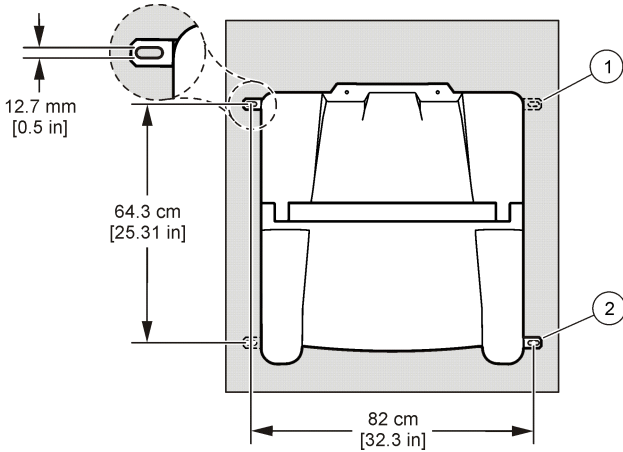
1 Optional anchor brackets	**2** Anchor brackets (2x)

Prepare the sampler

Clean the sample bottles

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

Install a single bottle

Use a single bottle to collect one composite sample. When the bottle is full, the full bottle shut-off stops the sample program.

1. Clean the sample bottles. Refer to Clean the sample bottles on page 11.
2. Install the sample bottle as shown in Figure 4.

Figure 4 Single bottle installation
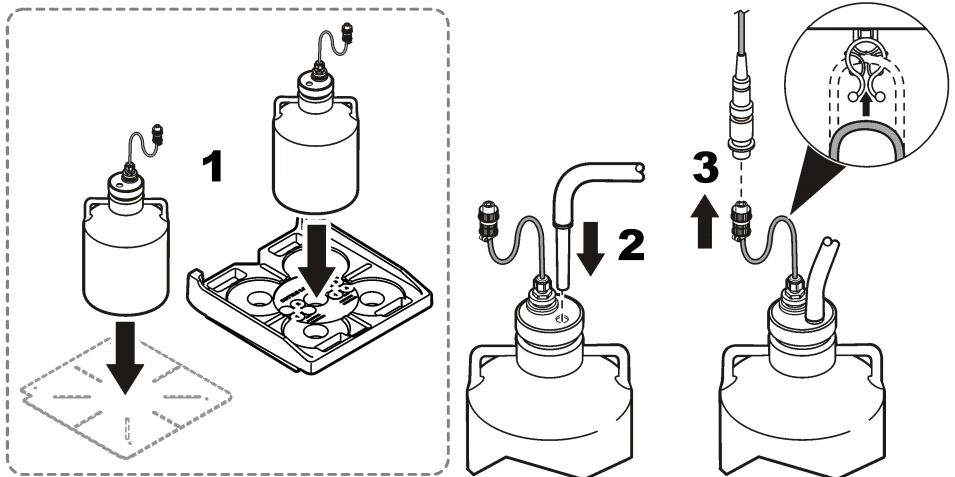
Install multiple bottles

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. Clean the sample bottles. Refer to Clean the sample bottles on page 11.
2. Assemble the sample bottles as shown in Figure 5. 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 5 Multiple bottle installation
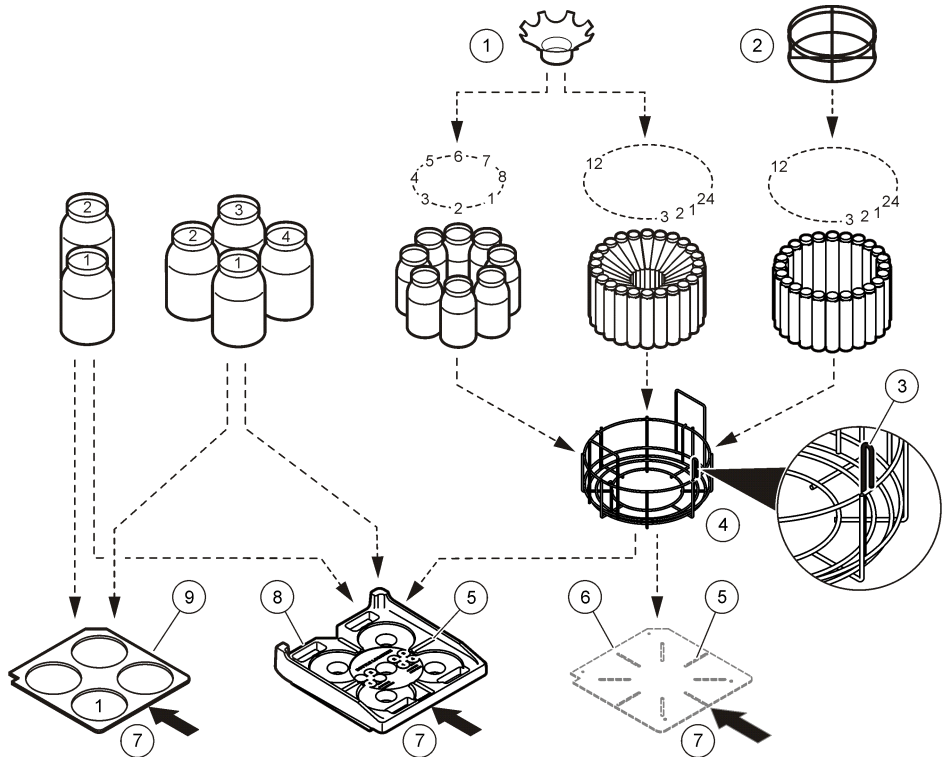
1	Retainer (1322)	**4**	8–24 bottle tray (1511)	**7**	Front of sampler
2	Retainer (1056)	**5**	Slot for bottle tray	**8**	Removable tray (AWRS) (5697600)
3	Bottle one indicator	**6**	Floor of refrigerated sampler	**9**	Insert (refrigerated sampler) (2038)

Plumb the sampler

Install the intake tube in the middle of the sample stream (not near the surface or bottom) to make sure that a representative sample is collected.

1. Connect the tubing to the sampler as shown in Figure 6.

   Note: Use connection kit 2186 if Teflon-lined tubing is used.

2. Install the intake tube and strainer in the main stream of the sample source where the water is turbulent and well-mixed. Refer to Figure 7.

   • Make the intake tube as short as possible.
   • 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 6 Intake tube installation
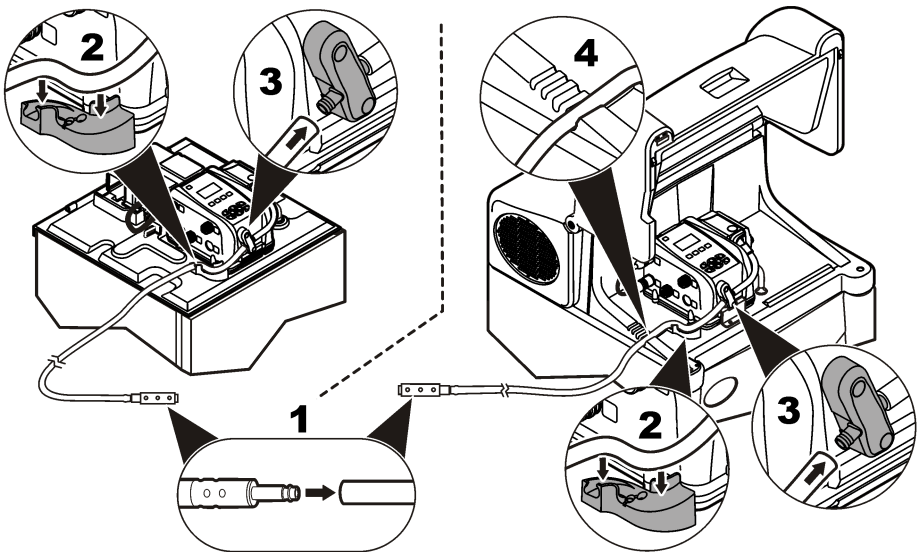
Figure 7 Site installation
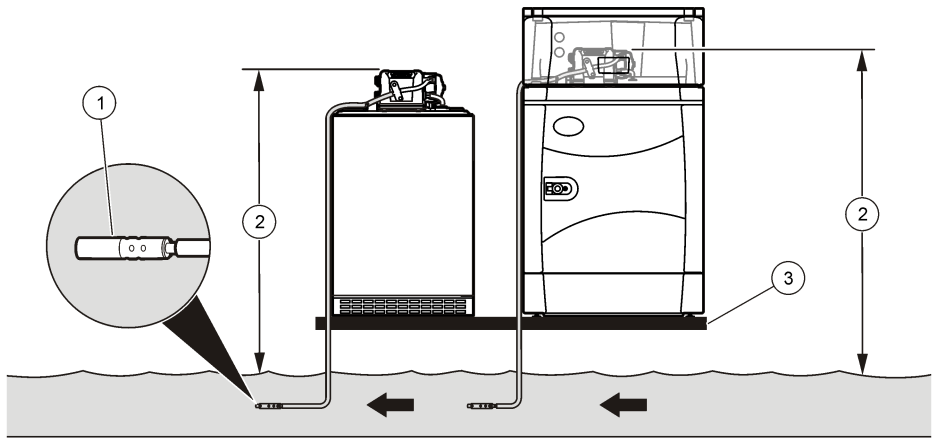
1 Strainer	**2** Vertical lift	**3** Mounting surface

Electrical installation

Controller connections

⚠ W A R N I N G

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

Figure 8 shows the connections that can be made to the controller.

Figure 8 Controller connectors
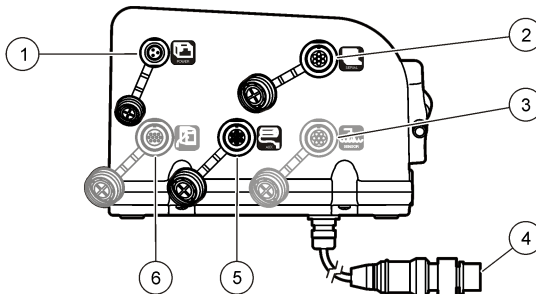
1 Power supply	**4** Distributor/full bottle shut-off
2 Serial communications	**5** Auxiliary device
3 SDI-12 device option	**6** Thermal unit (AWRS only)

Connect a flow meter

Connect a flow meter to the controller to start or stop the sampler when the sample flow goes above or below a specified value.

Items to collect:

- Multi-purpose full cable for Sigma flow meters (or 980 half cable for the model 980 flow meter).
- Optional splitter for additional connections. Two or more splitters can be connected in series.

1. Connect one end of the cable to the flow meter. For the model 980 flow meter, refer to the model 980 flow meter user manual.
2. Connect the other end of the cable to the auxiliary device connector on the controller.
   Note: If the flow meter has a 6-pin cable, use the 6-pin to 7-pin adapter cable.

Connect a PC or communications network

Connect a PC or a communications network to the controller to transfer data or to configure the sampler.

Items to collect:

- Serial cable, 7-pin RS232 to DB-9 (refer to Figure 9). Connections: B to 5 (signal ground); D to 3 (RCD); F to 2 (TXD); G (ground).

1. Connect one end of the serial cable to the communications device or network.
2. Connect the other end of the cable to the serial communications connector on the controller.

Figure 9 Serial communications cable
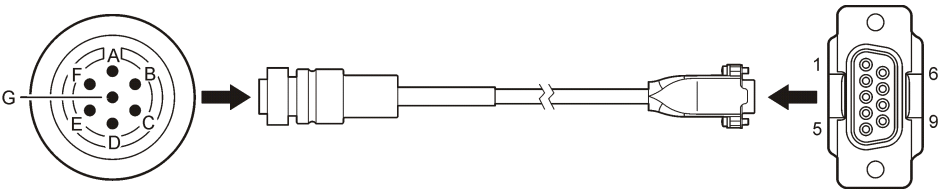
Connect an SDI-12 device

N O T I C E

Measurement errors can occur due to electrical transients from sources such as lightning or large electrical motors. These errors can cause unexpected sample acquisition or a missed sample when the controller is programmed for setpoint sampling based on sonde measurements. Use a power line filter or connect the controller to a different branch circuit to reduce the possibility of transients.

The controller supplies power to the SDI-12 device. Use the 15 m (50 ft) cable or the 30 m (100 ft) cable to connect a sonde to the controller. Refer to Figure 10.
Note: A separate power supply for the sonde is necessary for data logging by the sonde.

The SDI-12 interface is enabled only when a connected device is found by the controller. The scan for a sensor occurs automatically. The address that is assigned to the SDI-12 device is automatically detected by the controller.

Figure 10 Sonde connection
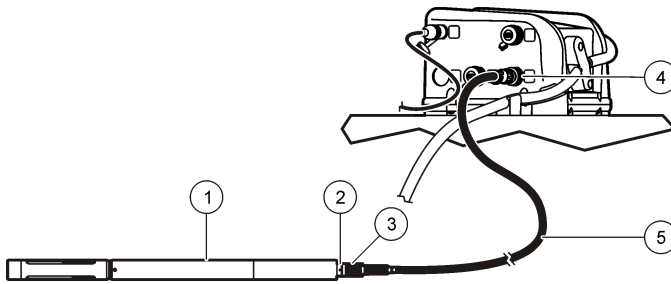
1	Sonde	4	SDI-12 connector
2	Sonde bulkhead connector	5	15 or 30 m (50 or 100 ft) cable
3	6-pin cable connector		

Connect the instrument to power

⚠ **D A N G E R**

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.

⚠ **D A N G E R**

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.

⚠ **D A N G E R**

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

⚠ **W A R N I N G**

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

The power cord is installed at the factory. Plug the power cord into an electrical outlet. The instrument starts automatically. The refrigerated sampler has a power cord for the controller and a power cord for the sampler unit. Plug both cords into the electrical outlet.

Use a power line filter or connect the controller to a different branch circuit to reduce the possibility of electrical transients.

Startup

Turn the instrument on or off

The refrigerator starts after a 5-minute delay when the equipment is plugged in. Push the **POWER** key to turn on or turn off the controller. The refrigerator continues to run when the controller power is turned off. Unplug the power cord on the AWRS or both power cords on the refrigerated sampler to turn off the entire instrument.

User interface and navigation

The controller keypad is shown in Figure 11. Use the MENU key to set up sampling programs, configure the controller settings or complete the diagnostic tests. Use the arrows, ENTER and BACK keys to scroll through the menu, make selections and enter values. Look for arrows on the bottom or side of the display screen to know when more options are available.

Figure 11 Controller keypad
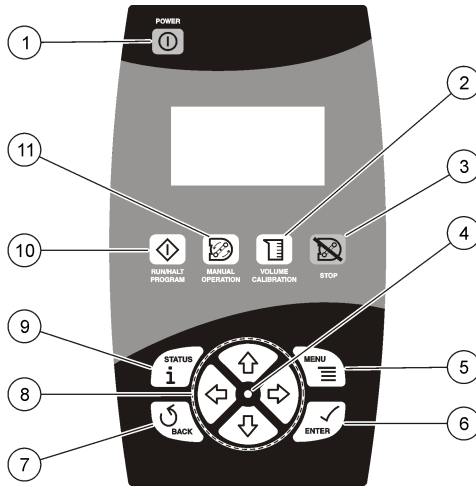
1	POWER	**5**	MENU	**9**	STATUS
2	VOLUME CALIBRATION	**6**	ENTER	**10**	RUN/HALT PROGRAM
3	STOP	**7**	BACK	**11**	MANUAL OPERATION
4	LED	**8**	ARROW KEYS		

Operation

Main menu overview

The main menu contains four options for sampler operation, monitoring or data management.

Table 1 Sampler menu overview

Menu option	Description
Program setup	Create, review or set up a sampling program
Status	Display the status of the current program
Diagnostics	Review and manage data or test the operation of components
System setup	Change the controller settings or calibrate the liquid sensor

Configure the system settings

1. Push **MENU**.
2. Go to SYSTEM SETUP.
3. Change the applicable options.

Option	Description
Time/date setup	Set the time (24-hour format) and date.
Communication	Select the baud rate (19200, 38400, 57600 or 115200) and protocol (Modbus RTU or ASCII) for the serial port.
Setup base	Select the sampler base (All weather refrigerated, refrigerated or portable).
Language	Select the language of the controller.
Liq sensor cal	Calibrate the liquid sensor.
Pump duty cycle	Change the pump duty cycle. Range: 75% to 100% (default: 100%).
Thermal setup (AWRS only)	Change the setpoint temperature inside the refrigerated compartment. Range: 2 to 10 °C (default: 4 °C).
Set contrast	Adjust the contrast of the LCD screen.
Password setup	Set up a password to control access to the program setup and the system setup menus. Select ENABLE>YES to set a new password or ENABLE>NO to activate the current password. If the password is set for the first time, use 900900 as the current password.
Tubing life	Set a reminder when the pump tubing is to be changed. Go to ENABLE>RESET CYCLES to reset the pump cycle count to 0. Go to ENABLE>CYCLE LIMIT to change the number of pump cycles that is used for the reminder. Go to ENABLE>STATUS to show the current number of pump cycle counts.
SDI–12 (optional)	Configure the operation of an SDI–12 device. This option is shown only when a device is found.

Configure the SDI-12 device

A sensor such as a sonde can connect to the optional SDI-12 interface. The controller can get up to nine measurements from one SDI-12 sensor. The sensor data can then be used as a trigger in setpoint sampling applications. Configure the parameter type and unit, and set how often the SDI-12 device is scanned for new measurement data.

1. Select Menu>System Setup>SDI-12.

   Note: The SDI-12 option is only shown when an SDI-12 device is found by the controller.
2. Select one of the options:

Option	Description
DISPLAY SONDE	Shows information about the device such as the vendor name, model name, SDI-12 address, protocol version, number of available measurements and the warm-up time.
CFG PARAMETERS	Gives a name and measurement unit to the SDI-12 channel. Each channel is initially shown with a generic reference indicator in the same order that is set in the SDI-12 device. Table 2 shows the measurements that are supported by the controller. *Note: It may be necessary to configure the SDI-12 interface for the sonde.*
SCAN INTERVAL	Sets the time interval when measurement data is refreshed in the controller. Short time intervals decrease the battery life.

Table 2 Supported measurements

Measurement	Unit	Resolution[1]
Ammonia (NH3)	mg/L-N	x.xx
Ammonium (NH4+)	mg/L-N, mV	x.xxxx
Chloride (Cl-)	mg/L-N, mV	x.xxxx
Chlorophyll	µg/L, V	x.xx
Conductivity	mS/cm, µS/cm	x.xxx
Dissolved oxygen (DO)	mg/L, % saturation	x.xx
Ext. Sonde Pwr	V, %	x.xxxx
HOCl	ppm, V	x.xxxx
Int. Sonde Pwr	V, %	x.xxxx
Level	m, ft, psi	x.xxx
NH3+NH4	mg/L-N	x.xxxx
Nitrate (NO3-)	mg/L-N, mV	x.xx
ORP	mV	x
PAR	µE/S/n2	x.xxxx
pH	pH unit	x.xx
Phycocyanin	cells/mL, mV	x.xx
Phycoerythrin	cells, mV	x.xx
raw TDG	mV	x.xxxx
ref PAR	µE/S/n2	x.xxxx
Resistivity	kΩ/cm	x.xxx
Rhodamine	ppb, V	x.xx
Salinity	ppt	x.xxxx
Total Dissolved Solids	g/L	x.xx
Temperature	C, F, K	x.xx
Total Dissolved Gas	mmHg, psi	x.xxxx
Transmission	%, V, %660 nm, v660 nm	x.xxxx
Turbidity	NTU, V	x.x

[1] The number of decimal places shown on the controller display

Set up a sampling program

A sampling program includes all of the parameters that are necessary to collect samples automatically. Collect the samples at regular intervals or when the sampling program is complete.

1. Push **MENU**.
2. Go to PROGRAM SETUP>MODIFY ALL. The first screen is shown.

3. Select or enter the values for each parameter. Use the left and right arrow keys to move left or right. Use the up and down arrow keys to change a value. Change the units if necessary (gal or mL) with the arrow keys.

Option	Description
Bottles	Bottle quantity: the number of bottles in the sampler (1, 2, 4, 8 or 24).
	Full BTL shutoff: Enabled/Disabled. If enabled, the controller checks for bottle overflow conditions.
	Bottle volume: the volume capacity of each bottle. Range: 50–65000 mL (0.01 - 17.17 gal) (1.7 - 2198 oz)
Intake tubing	Tubing length: the length of the intake tubing from the strainer to the liquid sensor. Range: 100–3000 cm or 3–99 ft. An accurate length is necessary to get an accurate sample volume.
	Intake tube type: the diameter and material of the intake tubing (¼ in. vinyl, 3/8 in. vinyl or 3/8 in. Teflon).
Program delay	Enable/disable: when enabled, the sampling program starts at a specified time or number of counts. Date and time: the date and time when the program starts (24-hour format). Counts: the number of counts or pulses from a flow meter when the program will start (1 to 9999 counts). If the sample pacing is later set to time, the program delay will be disabled.
Sample pacing/collection	Time based—Refer to Time based collection on page 21. *Note: When CTVV is used:*
	• *The liquid sensor is always enabled.*
	• *The sample distribution is composite.*
	• *The run mode is non-continuous.*
	• *The first sample is taken after the interval.*
	• *Flow source is always 4–20 mA input.*
	Flow based—Refer to Flow based collection on page 21.
Sample distribution	Deliver samples to all>YES
	Each sample is delivered to all bottles. End after last: program stops after the last sample (1–999). Continuous: program continues until it is stopped manually.
	Deliver samples to all>NO
	Samples are delivered to a subset of bottles (Figure 12). Samples/bottle: the number of samples to be collected in each bottle (1–999). Bottles/sample: The number of bottles that will contain the same sample.
Liquid sensor	Enable or disabled. If disabled, the sample volume must be calibrated by time.
Sample volume	The volume of each sample in mL (1 gal = 3785.4 mL). If bottles/sample mode is used, each bottle receives a full sample volume (10–10,000 mL). Make sure that the sample volume does not exceed the bottle volume. Sample volumes are rounded to the nearest 10 mL.
Intake rinses	The number of intake tube rinses before a sample is collected (0–3).
Sample retries	The number of sampling tries after a sampling failure occurs (0–3).
Site ID	The name for the sampling location (up to 12 characters). The site ID is used as the preset name if the program is saved.
Advanced sampling	Goes to the advanced sampling menu. If necessary, configure the options in the Advanced Sampling menu.
Run program	The creation of the basic sampling program finishes. The sampler prompts the user to start or cancel the program.

Figure 12 Two samples per bottle (left) versus two bottles per sample (right)
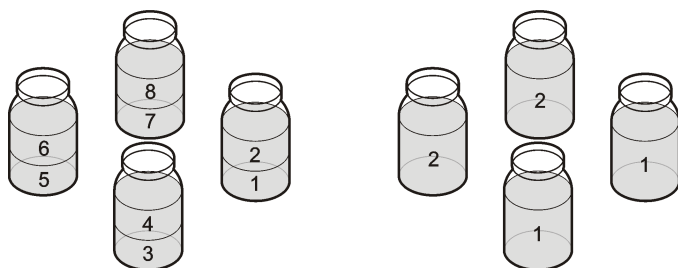
Time based collection

1. Select or enter the values for each option.

Option	Description
Pacing interval	Collect samples at regular time intervals, in hours and minutes (0:01–999:00).
Take first sample	The program starts immediately or after the first interval.
Variable volume	Specify whether the sample volumes vary (flow based). If yes, refer to Use variable volume on page 21. If no, refer to Do not use variable volume on page 21.

Use variable volume
Sample pacing is constant time variable volume (CTVV).

1. Select or enter the values for each option.

Option	Description
Select unit	Select the flow units to use.
Map 4 mA input	Enter the flow rate that agrees with 4 mA input.
Map 20 mA input	Enter the flow rate that agrees with 20 mA input.
Average flow rate	Specify the average flow rate for the site (1–999,999). The units are specified by the units selected above.
Time volume desired	Specify the total volume to be collected during the sample program (10–10,000 ml).
Collection period	Specify the total collection period in hours and minutes (0:01–999:00).
Minimum sample volume	If the flow volume is not sufficient to collect this minimum volume, the sample is skipped (10–10,000 ml).

Do not use variable volume

1. Select or enter the values for the option.

Option	Description
Take first sample	Select whether the program starts immediately or after the first time interval has passed.

Flow based collection
Specify the flow source for flow based sampling:

- Counts—Refer to Use counts for the flow source on page 22.
- 4–20 mA input—Refer to Use 4–20 mA input for the flow source on page 22.

Use counts for the flow source

1. Select or enter the values for each option.

Option	Description
Take sample every	Collect samples at regular flow intervals, in counts (1–9999 counts).
Overrride time	Collect a sample if the flow volume is very low.
Time	The maximum time between samples (0:01–999:00). The timer starts again after each sample is collected.
Take first sample	The program starts immediately or after the first time interval.

Use 4–20 mA input for the flow source

1. Select or enter the values for each option.

Option	Description
Select unit	Selects the flow units to use.
Map 4 mA input	Enter the flow rate that would agree with the 4 mA input.
Map 20 mA input	Enter the flow rate that would agree with the 20 mA input.
Take sample every	Enter the total flow after which the sample has to be drawn.
Override time	Select enable to push a sample to be collected if the flow volume is unusually low.
Time	The maximum time between samples (0:01–999:00). The timer starts again after each sample is collected.
Sample volume	Enter the volume to be collected per sample. If bottles/sample mode is selected, each bottle receives a full sample volume (100–10,000 mL). This option is skipped if variable volume is selected.

Review or modify program settings

To review or change Individual settings for an existing sampling program:

1. Push **MENU**.
2. Go to PROGRAM SETUP. Select one of the options.

Option	Description
Modify selected	Change any of the program settings.
Review	Review the program settings.

Save or load programs

Up to three sampling programs can be saved as presets for later use. If any changes are made to a preset program after it is loaded, the program must be saved again to keep the changes.

1. Push **MENU**.
2. Go to PROGRAM SETUP>PRESETS.

3. Select one of the preset numbers (P1, P2 or P3).

   Note: If a program is already stored, the site ID for that program is shown to the right of the preset number. If no program is stored, the preset field is empty.

4. Select one of the options.

Option	Description
STORE CURRENT	Store the current program as a preset.
LOAD PROGRAM	Open the selected preset program.

Restore the default settings

The restore option sets all of the program parameters to the default settings.

1. Push **MENU**.
2. Go to PROGRAM SETUP>RESTORE.
3. Select YES.

Constant Time Variable Volume (CTVV) sampling

CTVV samples are taken at user-specified constant (fixed) time intervals. However, the actual volume of each sample is based on the:

- Known average flow rate of the site
- Actual metered flow rate at the time of sampling
- Total sample volume desired
- User-specified collection period
- Specified sampling interval

The volume of individual sampling can vary and depends on the flow volumes of the stream at various intervals within the collection period. The total sample collected during the entire period can be slightly above or below the necessary total volume. For these reasons, the manufacturer recommends that a sampling container is used that has a larger volume than the necessary total volume. When CTVV is used for sampling:

- Sample distribution menus are not available when CTVV is selected, only composite sampling is supported.
- The liquid sensor is always enabled.
- The sample distribution is composite.
- The run mode is non-continuous.
- The first sample is taken after the interval.
- Flow source is always 4–20 mA input.

The instrument finds the sample volume, based on user inputs and actual metered flow volume. For example, the entered values are:

- Average flow rate (historical, site specific): 150 gph
- Sampling interval: 2 minutes
- Total sample volume desired: 1500 mL
- Collection period: 30 minutes

Calculation 1: Total number of samples

Collection period ÷ Sampling interval = 30 minutes ÷ 2 minutes = 15 samples

Calculation 2: Average sample volume

Total sample volume desired ÷ Total number of samples = 1500 mL ÷ 15 Samples = 100 mL/sample

Calculation 3: Sample volume per unit of flow rate

Average sample volume ÷ Average flow rate = (100 mL/sample) ÷ 150 gph = 0.66 mL/gph

Calculation 4: Collect actual sample volume

- If the 4–20 mA flow source is used and the flow rate measured is 140 gph, use sample volumes per unit of flow rate x actual metered flow rate.
  0.66 mL/gph x 140 gph = 92.4 mL. The sampler will pull a 90 mL sample (rounded off from 92.4 mL).
- If the flow pulses are used and every pulse count is 2 gallons and 2 counts are received in 2 minutes, the flow rate is 120 gph.
  Sample volumes per unit of flow rate x actual metered flow rate

  0.66 mL/gph x 120 gph = 79.2 mL. The sampler will pull a 80 mL sample (rounded off from 79.2 mL).

Start or stop a program

Use the RUN/HALT PROGRAM key to start or stop a program. Up to 12 user-defined start/stop times/dates can be set. A program must be stopped before the program or system setup can be changed.

The status reads RUNNING (while a program runs) or HALTED (when temporarily stopped by the user). Use the **RIGHT** arrow to get information about the program while it runs.

- Power supply voltage
- Inhibit mode (none, setpoint trigger, program delay, user start, storm trigger, full bottle and setpoint delay)
- Sample summary (number of samples tried, missed and remaining)
- Next sample information (sample number and the bottle number of the next sample)
- Flow information when variable volume is enabled (current flow and the flow since the program started)
- Time before the next sample
- Program the start time

1. Push **RUN/HALT PROGRAM**.
2. Select one of the options.

Option	Description
Start	Starts the currently loaded program. The status changes to RUNNING.
Halt	Stops the program temporarily. The status changes to HALTED.
Resume	The program resumes from the point at which it was halted. The status changes to RUNNING.
Start over	The program starts from the beginning. The status changes to RUNNING.
End program	Stops the currently running program. The status changes to COMPLETE.

View the program status

The current status of main and/or stormwater programs and of SDI-12 measurements can be shown.

1. Push **STATUS** or select STATUS from the main menu.
2. If multiple programs are in operation, select one of the programs. The program status is shown.
3. Review the program status. Push the right arrow to see additional information.

Status	Description
READY	The program is ready to start. The power supply voltage and the current time are shown.
RUNNING	The program is in operation.

Status	Description
HALTED	The program was stopped temporarily by the user.
COMPLETE	All of the programmed sample cycles are complete, or the program was stopped by the user.

Manual operation

Use manual operation to collect a grab sample, move the distributor arm or operate the pump.

Collect a grab sample

Collect a grab sample to make sure that the sample volume is correct or to bypass the sample program.

1. Put the tubing from the outlet side of the pump into a sample container.
2. Put the intake tubing into the sample water.
3. Push **MANUAL OPERATION**.
4. Select GRAB SAMPLE.
5. Enter the volume to collect and push **ENTER**.

   Note: The grab sample volume can only be changed if the liquid sensor is enabled.

   The intake tubing is purged and then the specified volume of sample is collected. The intake tube is purged again.

Move the distributor arm

Move the distributor arm manually to put a grab sample in a specific bottle or to make sure that the distributor arm position is correct.

1. Push **MANUAL OPERATION**.
2. Select MOVE DISTRIB. The current bottle number is shown.
3. Enter the number of the bottle over which the distributor arm will be moved.
4. Push **ENTER**. The distributor arm moves to the selected bottle.

   *Note: To stop the distributor arm at any time, push **STOP**.*

Start or stop the pump

The pump can be operated manually to collect a sample or purge the intake tubing.

1. Push **MANUAL OPERATION**.
2. Select OPERATE PUMP.
3. Select the direction:

Option	Description
Run forward	The pump operates in the forward direction to collect a sample and deposit the sample in a sample container.
Run backward	The pump operates in the reverse direction to purge the intake tubing.

4. Push **STOP** to stop the pump.

View data

Data can be viewed from one of the status screens or from the diagnostics menu.

View the sample history

The sample history shows the sample number, bottle number, sample volume, result and time/date for each sample. Flow information is recorded when a sampler program is run with CTVV pacing and the cabinet temperature is recorded on the all weather base. To get the additional information, download the sample history with the SampleView program. If a program is in operation or has been halted, the sample history is shown for the current program. If the program is complete, the sample history is shown for the most recently completed sampling program. The sample history is automatically erased when a new program is started.

The following results can be shown:

- Success—the sample was drawn successfully.
- Bottle full—the full bottle shut-off was activated.
- Rinse error—an error occurred during the rinse cycle.
- User abort—a user pushed the STOP key to end the sample cycle.
- Arm faulty—the distributor arm did not move correctly.
- Pump fault—a fault occurred when the pump was operating.
- Purge fail—an error occurred during the purge cycle.
- Sample time out—liquid was not detected within the timeout period.
- Power fail—a power failure occurred during sampling.
- Low flow—sample was missed due to insufficient flow.

1. Select DIAGNOSTICS>SAMPLE HISTORY from the main menu to view the sample history.
2. The sample history shows the sample numbers, bottle numbers and brief result for each sample. Select a sample from the list and push **ENTER** to view the complete details.

View the event log

View the event log to see details about the events that have been recorded.

1. Go to DIAGNOSTICS>EVENT LOG.
2. Select DISPLAY. The event log shows the date and event.
3. Select an event from the list, then push **ENTER** to see the complete details.
   The top bar shows the event number and the total number of events in the event log. For example, 01/80 will be shown for event number 1 and a total number of 80 events. The time/date, event description and any additional data for the selected event is shown.

Event log information

The event log records information on these events:

- Power on—power was connected to the controller.
- Power fail—power was intentionally or unintentionally disconnected from the controller without first turning the power off.
- Firmware update—a new version of firmware was installed.
- Pump fault—a fault occurred when the pump was operating.
- Arm faulty—the distributor arm did not move correctly.
- Low memory battery—the internal battery should be replaced.
- User on—a user turned the power on using the power key.
- User off—a user turned the power off using the power key.
- Program start—the sample program was started.
- Program resume—a program was resumed from the halt state.
- Program halt—a program was halted.
- Program complete—a program was completed.
- Grab sample—a grab sample was taken.
- Change tube—the maximum pump cycle counts have expired.

- Cooling fail—the temperature of the thermal unit has been above the setpoint continuously for more than 30 minutes.
- Heating fail—the temperature of the thermal unit has been below the setpoint continuously for more than 30 minutes.
- Thermal error clear—a Cooling Fail or Heating Fail error has been corrected.
- SDI-12 timeout—indicates a communication error on the SDI-12 interface.
- High setpoint on—indicates that a user-specified high setpoint is activated, the measurement channel of interest and the current measurement value.
- High setpoint off—indicates that a user-specified high setpoint is cleared, the measurement channel of interest and the current measurement value.
- Low setpoint on—indicates when a user-specified low setpoint is activated, the measurement channel of interest and the current measurement value.
- Low setpoint off—indicates when a user-specified low setpoint is cleared, the measurement channel of interest and the current measurement value.

Erase the event log
Erase the event log after event details have been reviewed to reduce the number of entries that are shown.

1. Select DIAGNOSTICS>EVENT LOG from the main menu to erase the event log.
2. Select ERASE.
3. Select YES to confirm the deletion.

View data from SDI-12 devices
If a sonde is detected on the SDI-12 interface and the sonde provides measurement data, the user can view the current status of these measurements. Push **STATUS** or select STATUS in the main menu.

The measurement status screen shows current measurement of each channel on the sonde which includes the measurement name and unit assigned to each specific channel. The measurements will be updated based on the user-defined scan interval. Navigation arrows on the screen indicate whether additional channel information is available. CH0..CHX indicates the current position within the available channels.

Volume calibration

The sample volume can be calibrated automatically with the liquid sensor or manually. When the liquid sensor is used for volume calibration, the sensor is adjusted to accurately measure all programmed volumes. If the liquid sensor is disabled, the volume for samples, rinses and stormwater must be calibrated manually.

For typical applications, tap water can be used for the volume calibration. If the sample composition is significantly different from typical water samples, calibrate the sampler with the liquid to be collected. All programs must be stopped before calibration.

Calibrate the liquid sensor
The accuracy of the liquid sensor varies with the type of liquid that is sampled. For example, the volume of a highly turbid sample may not be as accurate as that of clear water. The liquid sensor can be calibrated with the sample water to improve volume accuracy.

1. Put the intake tubing into the sample water.
2. Push **MENU**.
3. Go to PROGRAM SETUP>MODIFY SELECTED>LIQUID SENSOR>ENABLE to make sure that the liquid sensor is enabled.
4. Go to SYSTEM SETUP>LIQ SENSOR CAL.
5. Select PERFORM CAL.
6. Select START. The pump operates in reverse to purge the intake tube. The pump then operates in the forward direction.

7. Look at the sample flow in the intake tube to make sure that the sample goes through the liquid sensor.

8. When the sample goes through the liquid sensor and no bubbles are present, push **STOP**. The intake tube is automatically purged. The liquid sensor calibration is complete.

9. Select DONE to exit or REPEAT to do the calibration again.

Restore the default calibration

The volume calibration for the liquid sensor can be returned to the default factory settings.

1. Select PROGRAM SETUP>MODIFY SELECTED>LIQUID SENSOR>ENABLE to make sure that the liquid sensor is enabled.

2. Push **VOLUME CALIBRATION** and select RESET CAL. The volume calibration is set to the default settings. The message "value has been reset to 0" will be shown.

Calibrate the sample volume with the liquid sensor

Calibrate the sample volume with the liquid sensor enabled to adjust sample volumes slightly.

1. Go to PROGRAM SETUP>MODIFY SELECTED>LIQUID SENSOR>ENABLE to make sure that the liquid sensor is enabled.

2. Put the intake tubing into the sample water or tap water.
   Note: Use the sample water for best accuracy.

3. Put the tubing from the outlet side of the pump into a graduated cylinder.

4. Push **VOLUME CALIBRATION** and select CALIBRATION.

5. Select START. The pump operates in reverse to purge the intake tube. The pump then operates in the forward direction and collects the sample volume that is specified in the sampling program. The pump operates in reverse to purge the intake tube.

6. When the sample has been collected, select DONE. Compare the volume of the sample in the graduated cylinder with the sample volume that is entered in the program setup menu.

7. If the volume that was collected is different from the sample volume in the current program, enter the volume that was actually collected. Push **ENTER**. The sensor is adjusted to accurately measure all programmed volumes.

8. Select START to start the sampling program or CANCEL to exit the volume calibration menu.

Calibrate the sample volume manually

When the liquid sensor is disabled, all volumes must be calibrated manually by time. The sample volume is calibrated for the volume specified in the current program. If the sample volume is changed in the program, the sample volume must be calibrated again for the new volume.

1. Select PROGRAM SETUP>MODIFY SELECTED>LIQUID SENSOR>DISABLE to make sure that the liquid sensor is disabled.

2. Put the intake tubing into the sample water or tap water.

3. Put the tubing from the outlet side of the pump into a graduated cylinder.

4. Push **VOLUME CALIBRATION**. If more than one volume is shown, select one of the volumes for calibration.

5. Select START. The pump operates in reverse to purge the intake tube. The pump then operates in the forward direction and starts to collect the sample.

6. Stop the pump at the selected volume or rinse location:

   - Sample volume: push **STOP** when the volume that is specified in the main program is collected.
   - Rinse: push **STOP** when the liquid in the intake tubing gets to the liquid detector.
   - Storm volume: push **STOP** when the volume specified in the stormwater program is collected.

7. Select DONE to go to the next volume calibration or REPEAT to do the calibration again.

8. When all volumes have been calibrated, select DONE.
9. Connect the outlet tubing to the tube fitting on the sampler.
10. Select START to start the sampling program or CANCEL to exit.

Verify the sample volume

To make sure that the sample volume is accurate, take a grab sample. Do not go back into calibration to check the volume since the volume compensation is reset to zero at the start of a calibration.

1. Push **MANUAL OPERATION**.
2. Select GRAB SAMPLE.
3. Put the intake tubing into the sample water.
4. Put the tubing from the outlet side of the pump into a graduated cylinder.
5. If the liquid sensor is enabled, enter the volume to be verified.
6. If the liquid sensor is disabled, enter the volume that is specified in the program.
7. Push **ENTER**. The pump cycle starts (purge-sample-purge).
8. Compare the volume that was collected in the graduated cylinder to the expected volume. If the collected volume is not correct, do the volume calibration again.

Full bottle shutoff

Programs can sometimes cause bottles to overflow. If the full bottle shutoff option is activated and enabled, a program stops when one or more bottles is close to an overflow condition. The program will not run again until the full bottle condition is reset.

Activate the full bottle shutoff

The full bottle shutoff option must be activated before it can be enabled. After activation, the option remains available until the controller firmware is upgraded. After a firmware upgrade, the full bottle option must be activated again.

1. If necessary, push any key on the controller to take it out of sleep mode.
2. Push and hold the MENU key for more than 30 seconds. The display shows FB SHUTOFF AVAILABLE.

Enable the full bottle shutoff

1. Push **MENU.**
2. Select PROGRAM SETUP>MODIFY SELECTED>BOTTLE.
3. Select the BOTTLE QUANTITY and confirm.
4. In the list of FULL BTL SHUTOFF options, select ENABLE.
    To disable full bottle shutoff, select DISABLE.

Full bottle shutoff in non-continuous mode

In non-continuous mode, sample collection is not monitored while the program runs. The controller tries to find possible overflow conditions before the program starts. Table 3 gives the specified check criteria for different configurations.

Table 3 Configuration and controller checks

Configuration	Check criteria
Multiple composite sampling (deliver samples to all bottles)	The number of samples multiplied by the sample volume is less than the bottle volume.
Samples per bottle distribution	The number of samples per bottle multiplied by the sample volume is less than the bottle volume.

Table 3 Configuration and controller checks (continued)

Configuration	Check criteria
Storm water enabled	The first flush (FF) sample volume is less than the bottle volume.
Storm water enabled with first flush bottles set to 1	The number of FF samples to collect multiplied by the FF sample volume is less than the bottle volume.
Storm water enabled with multiple first flush bottles and distribution set to samples per bottle	The number of FF samples per bottle multiplied by the FF sample volume is less than the bottle volume.
Timed bottle (TB) set is enabled and configured to run in non-continuous mode	The number of samples per TB multiplied by the sample volume is less than the bottle volume.

If any of the checks fail, the display shows an INVALID PROGRAM message and the program will not run. Navigate to MENU>MODIFY ALL to correct the program, or disable the full bottle shutoff.

If the results of the necessary checks are satisfactory or the full bottle shutoff is disabled, the program will run.

Full bottle shut off in continuous mode

In continuous mode, sample collection is monitored while the program runs. The controller does not do any checks before the program is started.

If the bottle capacity is one sample volume less than the maximum capacity, the sample collection is halted. An event is recorded in the event log with a date and time stamp. The display shows a HALTED BOTTLE FULL? message and the program enters the PROGRAM HALT state.

Push a key on the controller to clear the warning message. The program stays in the halted state to let bottles be emptied and replaced as necessary.

Push **RUN/HALT PROGRAM** to start the program again. Select from four options:

- RESUME—Continue the program from where it halted
- START OVER—Start the program from the beginning
- END PROGRAM—Stop the program
- CANCEL—Stay in the halted state

If RESUME is selected, the display shows a BOTTLES EMPTIED? message. Select YES or NO:

- **YES**—The controller starts to monitor the sample collection again.
  Note: The controller acts as if the bottles are now empty even if they are not.
- **NO**—The program does not resume sample collection but stays in the HALTED state if the bottle full condition was detected earlier.

Full bottle shutoff and timed bottle mode

In order to use the full bottle shutoff when timed bottle is enabled, the timed bottle run mode must be set to END AFTER LAST.

If an attempt is made to run timed bottle in continuous mode, a NOT ALLOWED error screen shows TB CONTINUOUS NOT POSSIBLE WITH FULL BTL.

If this error occurs, push ENTER to acknowledge the message. In the TB MODE screen that shows, select END AFTER LAST.

If it is necessary to run timed bottle in continuous mode, disable the full bottle shutoff.

Full bottle shutoff exception conditions

Full bottle shutoff does not prevent bottles from being over or under filled when certain exception conditions occur. Such conditions can occur if:

- The liquid sensor is disabled and the manual calibration is incorrect.
- The liquid sensor is enabled but does not operate correctly or has bad calibration.

- Bottles are emptied but the program is not halted (controller does not know bottles are empty and activates full bottle shut off too soon).
- The program is halted but the user gives incorrect feedback:
  - Bottles are empty but the user selects NO in the BOTTLES EMPTIED? screen.
  - Bottles are not empty but the user selects YES in the BOTTLES EMPTIED? screen.

Note: The refrigerator compartment has a drain opening in case an overfill condition occurs.

Advanced sampling

Send output signal at program completion

A 12 VDC signal can be sent through pin F of the auxiliary connector at the completion of a sampling program or when the full bottle shut-off is activated. The signal stays on for 61 seconds.

The output signal can be used to:

- Start another sampler. Cascading samplers require a cascading cable (8757300). The slave sampler must enable setpoint sampling and start on an external trigger.
- Activate a relay or other device when the program is complete.

To transfer the sample history to an external Sigma 950 flow meter, program complete must be disabled. In addition, the special output must be enabled and configured to assert after the sample cycle is complete.

1. Select PROGRAM SETUP>MODIFY SELECTED>ADV SAMPLING from the main menu.
2. Select PGM COMPLT O/P>ENABLE. The message "Bottle number output disabled on pin F" will be shown. The bottle number output to send sample history to a Sigma 950 flow meter will be disabled.
3. Select **ENTER** to activate the output signal.

Send output signal with sample cycle (special output)

The special output option sends a 12 VDC signal through pin E of the auxiliary connector during or after a sample cycle.
There are five possible configurations:

- After cycle—4-second pulse at the end of each sample cycle. This option is used to signal an external device that a sample cycle is complete.
- Entire cycle—during the entire sample cycle, includes all purge and rinse cycles.
- During sample—during the sample intake portion of the cycle only, ignores all purges and rinse cycles.
- Missed sample—4-second pulse in the event of a missed sample. A missed sample can be caused by a distributor error, purge fail, rinse fail, sample timeout, full bottle or pump fault.
- Trouble output—4-second pulse when a low main battery, low memory battery or cabinet temperature error occurs.

Two configurations are necessary to transfer sample history to an external flow meter:

- First, the program complete output needs to be disabled to enable the bottle number output. The bottle number output transmits whether the sample was taken successfully or not and which bottle received the sample.
- Second, the special output needs to be enabled and configured to assert "After Each Sample". The sample history will be transferred to the external Sigma 950.

1. Select PROGRAM SETUP>MODIFY SELECTED>ADV SAMPLING from the main menu.
2. Select SPECIAL OUTPUT>ENABLE.
3. Select one of the output options:

- AFTER CYCLE—at the completion of each sample cycle
- ENTIRE CYCLE—during the entire sample cycle
- DURING SAMPLE—during the sample intake
- MISSED SAMPLE—in the event of a missed sample
- TROUBLE OUTPUT—when a low main battery, low memory battery or a cabinet temperature error occurs

Operate from an external signal (setpoint sample)

The setpoint sample option starts and stops the sampler after a signal is received from an external device such as a flow meter. The current program status shows when the sample program is inhibited by an external device.
Note: Setpoint and stormwater sampling cannot be enabled at the same time.

1. Select PROGRAM SETUP>MODIFY SELECTED>ADV SAMPLING from the main menu.
2. Select SETPT SAMPLE>SETPT TRIGGER>EXT TRIGGER >ENABLE.
3. Select SETPT SAMPLE>SETPT CONTROL and select one of the setpoint options:

Option	Description
START ON SETPT	The sampling program operates until the program is complete.
START/STOP	The sampling program operates until the external signal is no longer received.

4. To use a setpoint delay, enter a delay time in hours and/or minutes. The delay time starts when the external signal is received. The program starts when the delay time expires.

Use an SDI-12 device for setpoint sampling

When an SDI-12 device is connected to the controller, the measurements can be used as setpoint sampling triggers (in addition to the external inhibit). A maximum of one measurement trigger can be enabled that is independent of the external trigger. If multiple triggers are enabled, the program starts from at least one trigger and stops when all triggers are cleared.
Each trigger can be defined as a high or low setpoint. Additionally, an optional deadband value can be set. A deadband prevents the trigger from rapidly changing between active and inactive states when the measurement value is near the setpoint. Refer to Figure 13.

1. Go to PROGRAM SETUP>MODIFY SELECTED>ADV SAMPLING>SETPT SAMPLE>SETPT TRIGGER.
2. Select a measurement channel.
   Note: A check mark is shown when a channel is enabled as a trigger.
3. Enter a setpoint trigger within the range that is shown.
4. Enter an optional deadband value.
5. Select ENABLE.
6. Select SETPT CONTROL to define how the sample program will operate.

Option	Description
START ON SETPT	The sampling program operates until the program is complete.
START/STOP	The sampling program operates until the trigger is cleared.

7. To use a setpoint delay, enter a delay time in hours and/or minutes. The delay time starts when the setpoint trigger becomes active. The program starts when the delay time expires.
   Note: Setpoint control and delay options are global settings that are applied to all triggers.

Figure 13 High setpoint example
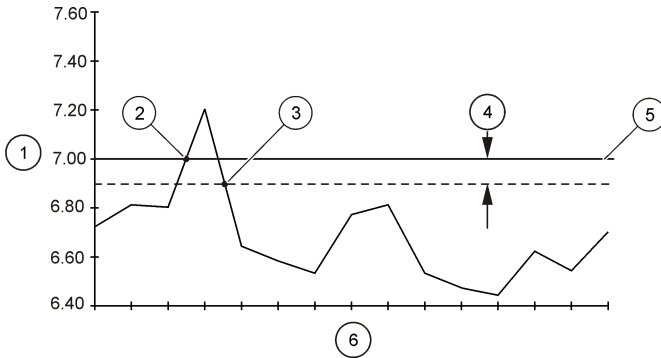
1	Channel value	**3**	Setpoint trigger off	**5**	Setpoint value
2	Setpoint trigger on	**4**	Deadband	**6**	Scan intervals

Set multiple start and stop times

A sampling schedule can be set up to start sampling at a specified start time and stop at a specified stop time. Up to twelve start and stop times can be specified.

1. Select PROGRAM SETUP>MODIFY SELECTED>ADV SAMPLING from the main menu.
2. Select STRT/STOP TIME>ENABLE.
3. If the sample program is configured for multiple bottles, select the distribution option.

Option	Description
ENABLE	Put the first sample in bottle 1 at each start time.
DISABLE	Continue the distribution sequence from the last stop time.

4. Enter the time (24-hour format) and date for the first start time.
5. Enter the time (24-hour format) and date for the first stop time.
6. Continue to add start and stop times as necessary.

Collect first flush stormwater samples

The stormwater option collects first flush (FF) samples or initial runoff during storm conditions when pollutants are typically at high concentrations. The first flush samples are collected at timed intervals and can be started by an external device. A stormwater program can operate at the same time as the main program. First flush samples are usually collected within 30 minutes of a storm. The stormwater program has these capabilities:

- Collect grab samples at up to 24 different time intervals. First flush and main program flow-weighted composite samples are automatically segregated. The first flush sample volume may be set independently of the sample volume for the flow-weighted composite.
- Initiation by an external device. A dry contact closure across pins B and D on the auxiliary connector, held closed for at least 61 seconds, is necessary.
- For multiple bottles, the sampler can be programmed to collect one large "first flush" sample (or small multiple samples) at timed interval(s). The number of bottles segregated for the first flush sample is selectable. Concurrently, flow-weighted samples are collected from the beginning of the storm until all remaining bottle(s) are filled, or after a specified time has elapsed.

Note: NPDES requirements typically requests that the first three hours of a storm be monitored. If the flow volume is lower than expected, flow-weighted sampling can continue for a long time as the flow rates decrease and the sample intervals become longer.

1. Go to PROGRAM SETUP>MODIFY SELECTED>ADV SAMPLING.
2. Select STORMWATER>ENABLE.
3. Select how the program will start.

Option	Description
Immediate	The user starts the sampling program.
External	The sampling program starts when a signal is received by an external device.

4. If configured for a single bottle, enter the number of first flush (FF) samples to collect.
5. If configured for multiple bottles, enter the number of bottles to be used for first flush collection.
6. Enter the multi-bottle distribution mode.

   • Samples per bottle—more than one sample is collected in each bottle
   • Bottles per sample—more than one bottle is used to collect each sample.
7. Enter the number of samples per bottle or bottles per sample.
8. Enter the time interval between each first flush sample cycle. The intervals can be different. The sum of the intervals is equal to the total length of the stormwater collection period.
   Note: The number of intervals is determined by the number of bottles and the distribution mode.
9. Enter the volume of each first flush sample.
10. Select whether a time limit will be used.

Option	Description
ENABLE	The sampling program stops after a specified time. Enter the time.
DISABLE	The sampling program operates until the program is complete.

Set variable intervals

Variable time intervals (hours and minutes) or flow intervals (counts) can be set for sample cycles. Variable intervals cannot be enabled when CTVV is enabled.

1. Select PROGRAM SETUP>MODIFY SELECTED>ADV SAMPLING from the main menu.
2. Select VARIABLE INTVL>ENABLE.
3. Enter the time or count interval between each sample cycle and push **ENTER** to save the interval. Up to 99 intervals can be entered.

Timed bottle sets

The timed bottle option makes a single sampler operate like multiple samplers. This option is useful for situations such as high flow versus low flow days. The sampler is configured to start a sampling program in multiple parts. The first part of the program starts for a user-specified time interval. The second part then operates for a user-specified time interval, followed by the third part, etc.

The sample bottles are also divided into multiple sets. The first set of bottles is assigned to part one of the sampling program. The second set of bottles is assigned to part two of the sampling program, etc.

A timed bottle program can run at the same time as the storm program, setpoint sampling and variable intervals.

When enabled with variable intervals, the timed bottle option will collect samples in each timed bottle set based on the specified variable intervals. When a timed bottle set switch occurs upon expiration of the trigger time, the variable interval index is reset.

Note: Timed bottle can be enabled only if the sampler is configured with multiple bottles, non-composite mode and the distribution mode is set to Bottles/Sample.

1. Go to PROGRAM SETUP>MODIFY SELECTED>ADVANCED SAMPLING.
2. Select TIME BOTTLE>ENABLE.

3. Enter the number of samples to be collected in each timed bottle set.

4. Select one of the timed bottle trigger time methods.

Option	Description
24 HR FORMAT	The time that must expire every day before one bottle set switches to the next bottle set.
DURATION	As long as the controller is not inhibited, the trigger timer starts when RUN is pushed and START is selected.

The bottle set size is shown.

5. Select when the program will stop.

Option	Description
CONTINUOUS	The program must be stopped manually.
END AFTER LAST	The program stops when the last sample is collected in the last bottle of the last timed bottle set.

Note: If Take 1st Sample is set to IMMEDIATE on the controller, the first sample of every timed bottle set is taken immediately. If Take 1st Sample is set to AFTER THE INTERVAL, the first sample of every timed bottle set is taken after the first interval.

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.

Clean the instrument

⚠ CAUTION

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

NOTICE

Do not attempt to clean the controller compartment heater with liquids of any kind.

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:

- Refrigerator—clean the condenser fins and coils as needed with a brush or vacuum.
- Sampler cabinet and tray—clean the internal and external surfaces of the sampler cabinet with a damp cloth and mild detergent. Do not use abrasive cleaners or solvents.

Replace the desiccant

A desiccant cartridge in the controller absorbs moisture and prevents corrosion. Monitor the desiccant color through the window (Figure 14). Fresh desiccant is yellow. When the color is green, replace the desiccant.

1. Unscrew and remove the desiccant cartridge (Figure 14).
2. Remove the plug and discard the spent desiccant.
3. Fill the desiccant tube with fresh desiccant.
4. Install the plug.
5. Apply grease to the O-ring.
6. Install the desiccant tube in the controller.

Figure 14 Desiccant cartridge
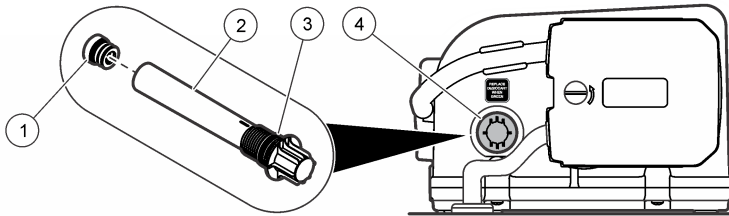
1 Plug	**3** O-ring
2 Desiccant tube	**4** Desiccant window

Pump maintenance

⚠ C A U T I O N

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

Replace the pump tubing

N O T I C E

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 reminder message is shown or 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 15.
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 15 Pump tubing preparation
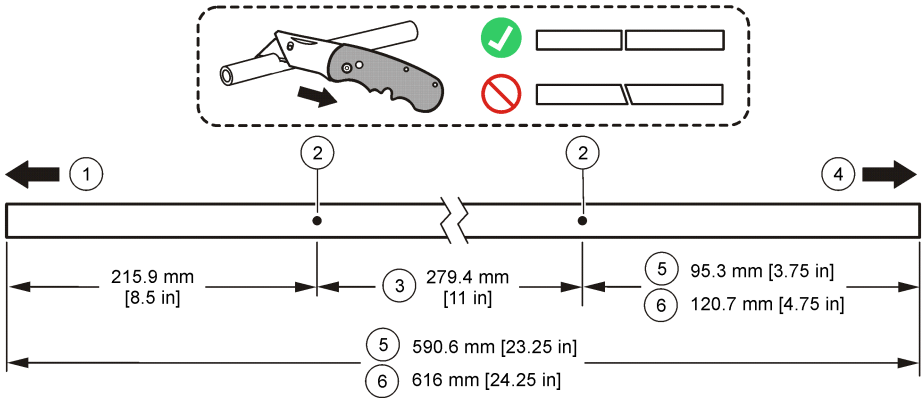
1	To controller fitting	**4**	To sampler fitting
2	Alignment dots	**5**	Length for the refrigerated sampler
3	Length inside the pump	**6**	Length for the AWRS
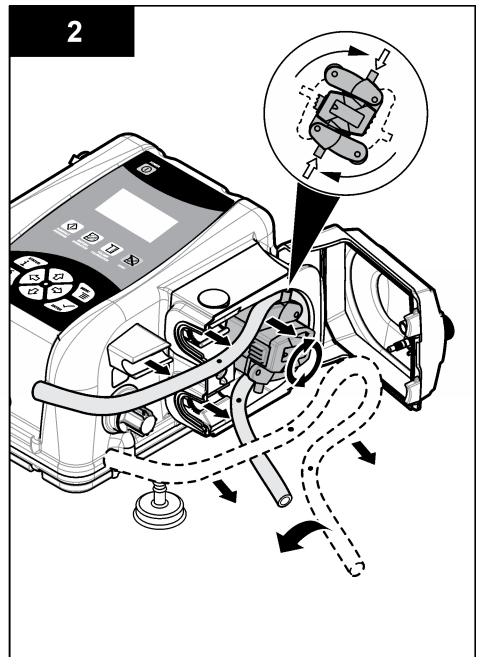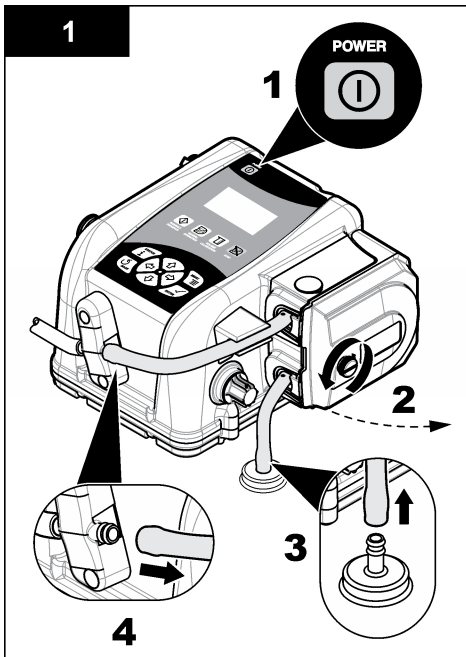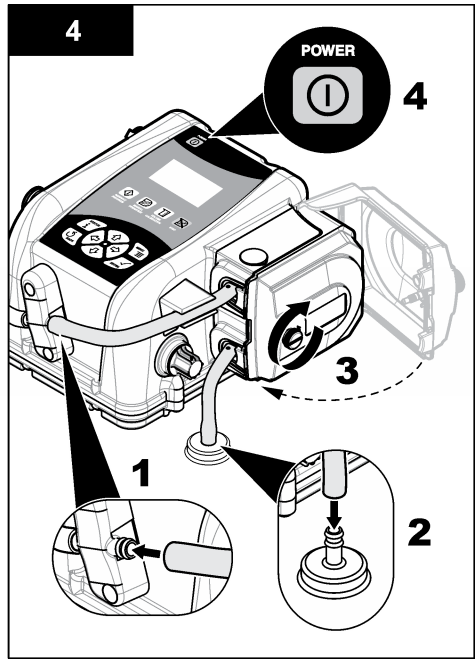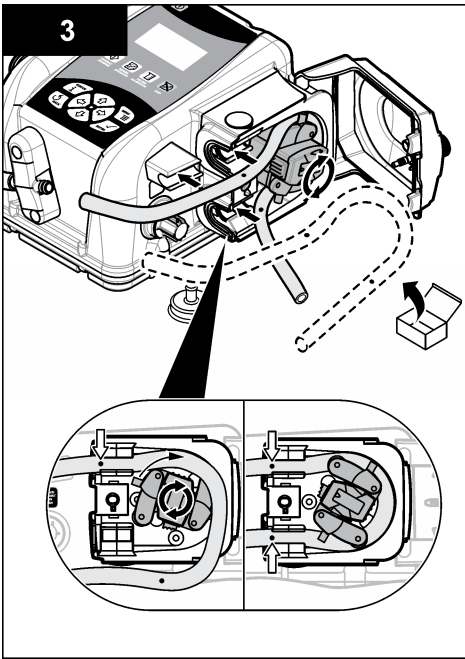
Clean the rotor

Clean the rotor, pump tube tracks and pump housing with a mild detergent. Refer to Replace the pump tubing on page 36 and the illustrated steps that follow.
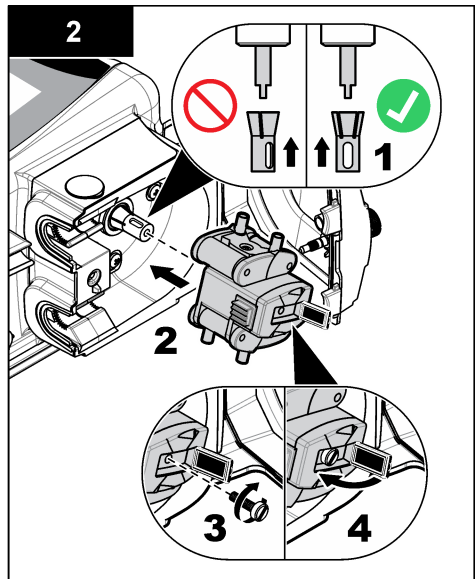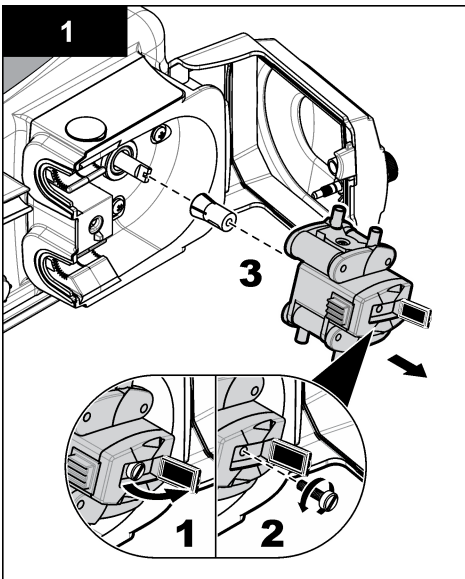
Replace the distributor arm tube

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.

1. Remove the tube from the distributor arm and from the ceiling of the sampler cabinet.
2. Insert the new tube into the distributor arm. Make sure that the tube does not extend out of the nozzle more than 0.3 cm ($^1/_8$ in.). Refer to Figure 16.
3. Insert the other end of the tube into the fitting on the ceiling of the sampler cabinet.
4. Complete the diagnostic test for the distributor to make sure that the operation is correct.

Figure 16 Distributor assembly
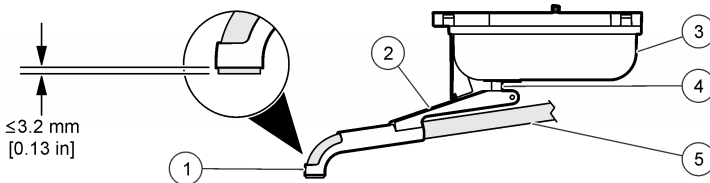
1	Nozzle	3	Distributor motor	5	Distributor tube
2	Distributor arm	4	Shaft		

Replace the power supply—refrigerated sampler

⚠ W A R N I N G

Fire hazard. Use only the power supply that is specified for this instrument.

To replace the power supply for the refrigerated sampler, refer to Figure 17.

Figure 17 Power supply replacement
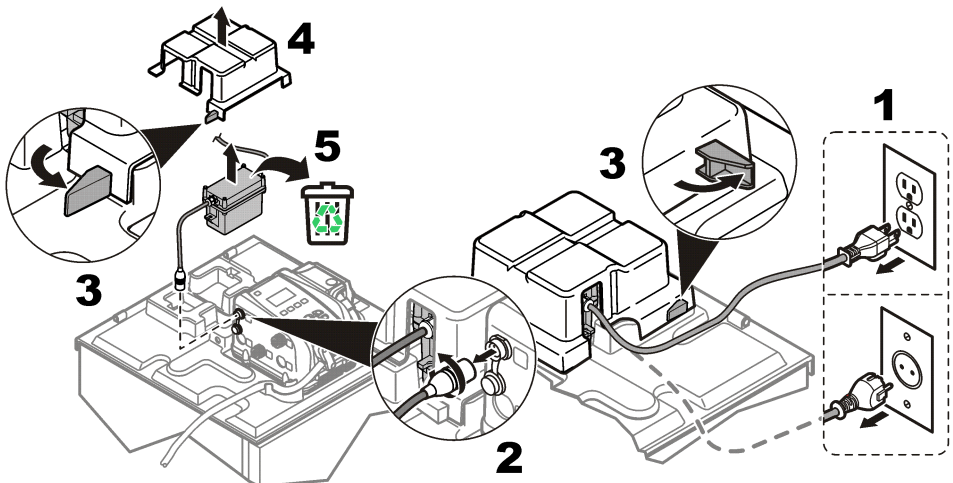
Fuse replacement

Fuses are not user-serviceable items. The need for fuse replacement in controllers indicates severe technical failure and is therefore considered to be a service activity. If a blown fuse is suspected, contact Technical Support.

Disposal

⚠ **D A N G E R**
⚠ Child entrapment hazard. Remove the doors on the refrigerated cabinet before disposal.

⚠ **C A U T I O N**
⚠ Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.

Troubleshooting

General troubleshooting

Table 4 shows causes and corrective actions for several common problems.

Table 4 Troubleshooting table

| Problem	Possible cause	Solution
No instrument power	Problem with the main power source.	Make sure that AC power gets to the electrical outlet.
	Defective power supply (refrigerated sampler only)	Replace the power supply.
	Defective controller	Contact technical support.
Sampler does not have sufficient lift.	Strainer is not completely submerged.	Install the shallow depth strainer (2071 or 4652).
	Intake tube has a leak.	Replace the intake tube.
	Pump tube is worn.	Replace the pump tube.
	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 purge completely.	Make sure that the intake tube is as vertical and as short as possible.
	Strainer is not completely submerged.	Install the shallow depth strainer (2071 or 4652).
	Worn pump tubing and/or roller assembly.	Replace the pump tube and/or roller assembly.
	The liquid sensor is disabled.	Turn the liquid sensor on and complete a volume calibration.
	Liquid sensor does not operate properly.	Calibrate the liquid sensor with the same liquid that is sampled.

Error messages

Table 5 shows the possible error messages.

Table 5 Error messages

Message	Description	Solution
ERROR WRONG RANGE	The value that was entered is outside of the acceptable range.	Enter a number that is within the range on the bottom of the screen.
BOTTLE NUMBER OUTPUT DISABLED ON PIN F	When program complete output is enabled, the bottle number output on the auxiliary port is disabled.	To change to bottle number output, disable the program complete output.
NOT ALLOWED CANNOT ENABLE SETPOINT SAMPLING AND STORM WATER	Setpoint and stormwater sampling cannot be enabled at the same time.	Enable the correct option.
NOT PERMITTED END THE PROGRAM FIRST TO ACCESS THIS FEATURE	The menu is not accessible during a sampling program.	Select End Program or Cancel to continue the program.
NEED TO CAL LIQUID SENSOR IS DISABLED. CAL IS REQUIRED!	The liquid sensor was disabled and a manual volume calibration is required.	Calibrate all volumes or enable the liquid sensor.
NEED TO CAL LIQUID SENSOR IS ENABLED. SENSOR REQUIRES CAL	The liquid sensor must be calibrated.	Calibrate the liquid sensor.
NOT ALLOWED 1 BTL CONFIGURED DISTRIBUTOR NOT RELEVANT	The distributor cannot be moved when the program is set to a single bottle.	Change the bottle number configuration in the program setup menu.
NOT ALLOWED ENABLE LIQUID SENSOR TO PERFORM CAL	The liquid sensor cannot be calibrated when the liquid sensor is disabled.	Enable the liquid sensor in the program setup menu.
CANNOT ENABLE PGM START/STOP AND STORM WATER AT SAME TIME	The start/stop time and stormwater cannot be enabled at the same time.	Enable the correct option.
FAULT. PUMP FAULT	The pump failed to operate correctly.	Examine the pump for obstructions.
ALARM CHANGE TUBE	The pump has operated for the maximum number of pump cycles.	Change the pump tube and reset the maximum number of pump cycles.
FAULT ARM FAULTY	The distributor arm failed to operate correctly.	Make sure that the distributor arm is connected correctly and can move in both directions.
ERROR. WRONG PWD	The password is not correct.	Enter the correct password.
PGM DELAY DISABLED	The program delay cannot be set in counts when sample pacing/collection is set in time.	Set the sample pacing/collection to flow based.
NO SDI-12 DEVICE WAITING TO DETECT SDI-12 SENSOR	There is a connection or communication problem with the SDI-12 device.	Make sure that the cable connection is good. When the problem is corrected, the sensor will be found during the next scan interval.
ALARM LOW BATTERY	The main battery power is low.	Replace the battery with a fully-charged battery.

Table 5 Error messages (continued)

Message	Description	Solution
ALARM LOW MEMORY BATTERY	The internal memory battery is low.	Contact technical support.
ERROR INVALID SELECTION	The selection is not compatible with the program setup.	Make sure that the selection agrees with the configuration in the program setup menu.
CANNOT ENABLE TB SET IN 1 BOTTLE CONFIG	Timed Bottle cannot be set for one bottle.	Set the bottle quantity to two or more.
CANNOT ENABLE TB SET IN SAMP/BOT CONFIG	Timed Bottle cannot be set for the sample per bottle configuration.	Set the distribution mode to bottles per sample.
CANNOT ENABLE TB SET IN COMPOSITE MODE	Timed Bottle cannot be set for Deliver to All Bottles (Composite Mode).	Set the composite mode to OPT_NO.
ERROR WRONG RANGE	The bottles per sample exceeds the total number of bottles. The total bottle quantity is not equally divisible or is out of range.	Make another selection.
VAR INTERVAL NOT POSSIBLE WITH VAR VOLUME	An attempt was made to enable variable interval with variable volumes (CTVV) enabled.	Disable the variable volumes in the program setup menu, then enable the variable interval from the advanced sampling menu.

Diagnostic tests

Use the diagnostic tests to validate the operation of individual components.

1. Select DIAGNOSTICS from the main menu.
2. Select the component.

Option	Description
DISTRIB DIAG	The distributor arm moves to all 24 bottle positions regardless of the number of bottles that are specified in the program. *Note: The sample program must be configured for multiple bottles.*
KEYPAD DIAG	Push each key on the keypad (except BACK). The display shows the name of the key. Push BACK to exit.
LCD DIAG	Each row shows the controller name and then each pixel darkens.
LIQ SENSE DIAG	Shows the current calibration information for the liquid sensor: input frequency (MHz), output voltage (VDC) and signal-to-noise ratio.
THERMAL DIAG	Shows the parameters for the AWRS thermal control unit: cabinet temperature, evaporator heater temperature, thermal setpoint and calibration offset. Push UP and DOWN to view all parameters. *Note: AWRS Inhibit must be disabled in the setpoint sampling menu.*
SDI-12	Shows the number of signals sent (TX) by the controller and the number of signals received (RX) from the SDI-12 device. If all transmissions are good, the TX number and the RX number will be the same. If the TX and RX numbers are not the same, examine the event log to find the reasons for the failed transmissions.

Replacement parts and accessories

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

Bottle kits—refrigerated sampler

Description	Quantity	Item no.
Single bottle kits (includes container and full bottle shut off):		
10 L (2.5 gal) poly bottle and full bottle shut off	1	RF010030
21 L (5.5 gal) poly bottle and full bottle shut off	1	RF010060
Multi-bottle kits (include container, retainer and distributor arm):		
10 L (2.5 gal) poly bottles, retainer and distributor arm	4	RF040030
350-mL (11.8-oz) glass bottles, retainer and distributor arm	24	RF240350
1 L (33.8-oz) poly bottles, retainer and distributor arm	24	RF241000

Bottle kits—AWRS

Description	Quantity	Item no.
Single bottle kits (includes container and full bottle shut off):		
21 L (5.5 gal) poly bottle and full bottle shut off	1	AW010060
Multi-bottle kits (include container, retainer and distributor arm):		
10 L (2.5 gal) poly bottles, retainer and distributor arm	4	AW040030
350-mL (11.8-oz) glass bottles, retainer and distributor arm	24	AW240350
1 L (33.8-oz) poly bottles, retainer and distributor arm	24	AW241000

Containers and bottle sets

Description	Quantity	Item no.
Container, 10 L (2.5 gal) glass with cap	1	6559
Container, 10 L (2.5 gal) poly with cap	1	1918
Container, 21 L (5.5 gal) poly with cap	1	6498
Bottle set, 1 L (33.8-oz) poly with caps	24	737
Bottle set, 350-mL (11.8-oz) glass with caps	24	732
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, 10 L (2.5 gal) glass with caps	4	2317
Bottle set, 10 L (2.5 gal). poly with caps	4	2315
Bottle set, 10 L (2.5 gal) glass with caps	2	2318
Bottle set, 10 L (2.5 gal) poly with caps	2	2316

AWRS accessories

Description	Quantity	Item no.
Assembly, A/C Power Backup, 3P, 736.6 mm (29 in.) CBL	1	5698200
All Weather Refrigerated Cabinet, 115 VAC	1	3548R

AWRS accessories (continued)

Description	Quantity	Item no.
All Weather Refrigerated Cabinet, 230 VAC	1	3550R
Controller compartment lock	1	5697700
Anchor mounting bracket kit	1	6613100
Distributor assembly with arm for 24 bottles	1	8841
Distributor assembly with arm for 8 bottles	1	8842
Distributor assembly with arm for 2 or 4 bottles	1	8843
Distributor arm for assembly 8841, with tubing	1	8844
Distributor arm for assembly 8842, with tubing	1	8845
Distributor arm for assembly 8843, with tubing	1	8846
Distributor arm for assembly 8841	1	8822
Distributor arm for assembly 8842	1	1785
Distributor arm for assembly 8843	1	1789
Distributor arm tubing, 546.1 mm (21.5-in.), for assembly 8841 (arm 8822)	1	8579
Distributor arm tubing, 546.1 mm (21.5-in.), for assembly 8842 (arm 1785)	1	8850
Distributor arm tubing, 5.8 mm (20-in.), for assembly 8843 (arm 1789)	1	8852
Pull-out tray	1	5697600
Tubing for peristaltic pump, pre-cut for all weather refrigerated sampler	1	8753900
Door assembly	1	6607700
Front lid assembly	1	6607500
Rear lid assembly	1	6607600
Replacement gasket for lid (fits front and back lids)	1	6611600
Replacement gasket for door	1	6611500
Tube support with tube	1	8838

Replacement parts

Description	Quantity	Item no.
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 grease packet	1	8755600
Grease, silicone (for desiccant tube threads)	7 grams (0.25 oz)	000298HY
Pump cover	1	8755400
Pump replacement assembly	1	6262000
Tubing for peristaltic pump	4.6 m (15 ft)	4600-15

Replacement parts (continued)

Description	Quantity	Item no.
Tubing for peristaltic pump	15.2 m (50 ft)	4600-50
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
Tubing connection kit for Teflon Lined PE tubing		2186

Refrigerated sampler accessories

Description	Quantity	Item no.
Assembly, A/C Power Backup, 3P, 406.4 mm (16 in.) CBL	1	8757400
Cover	1	8963
Distributor assembly with arm for 24 bottles	1	8562
Distributor assembly with arm for 8 bottles	1	8565
Distributor assembly with arm for 2 or 4 bottles	1	8568
Distributor arm for assembly 8562, with tubing	1	8563
Distributor arm for assembly 8565, with tubing	1	8566
Distributor arm for assembly 8568, with tubing	1	8569
Distributor arm for assembly 8562	1	1782
Distributor arm for assembly 8565	1	1785
Distributor arm for assembly 8568	1	1789
Distributor arm tubing, 571.5 mm (22.5-in.), for assembly 8562 (arm 1782)	1	8564
Distributor arm tubing, 571.5 mm (22.5-in.), for assembly 8565 (arm 1785)	1	8564
Distributor arm tubing, 520.7 mm (20.5-in.), for assembly 8568 (arm 1789)	1	8570
Lockable hasp on refrigerator door	1	2143S
Power Supply, 3 pin connector, 100-120 VAC	1	8754500US
Retainer for 2 or 4 10 L (2.5 gal) glass/poly bottles	1	2038
Retrofit Kit (U.S.)	1	8759600US
Tubing for peristaltic pump, pre-cut for refrigerated sampler	1	8753800
Tubing Extension	1	3527
Tubing Support	1	8986

Accessories

Description	Quantity	Item no.
3-way splitter assembly	1	939
Bottle tray	1	1511
Cable, multi-purpose full, 7 pin, 3 m (10 ft)	1	8757100
Cable, multi-purpose full, 7 pin, 7.6 m (25 ft)	1	8757000
Cable, multi-purpose half, 7 pin, 3 m (10 ft)	1	8756900
Cable, multi-purpose half, 7 pin, 7.6 m (25 ft)	1	8756800
Cable for cascade sampling, 7 pin, 7.6 m (25 ft)	1	8757300
Cable, half, for 980 instrument 7 pin, 3 m (10 ft)	1	8758100
Cable, half, for 980 Instrument, 7 pin, 7.6 m (25 ft)	1	8757200
Cable, auxiliary adaptor (6 to 7 pin)	1	8758000
Cable, RS232 (DB9 to 7 pin), 3 m (10 ft)	1	8758200
Cable, Hydrolab DS5/MS5 SDI-12, 15.2 m (50 ft)	1	8762400
Cable, Hydrolab DS5/MS5 SDI-12, 30. 4 m (100 ft)	1	8762500
Flow-thru Module	1	2471
Full Bottle Shut-off	1	8847
Retainer for 24 350-mL (11.8-oz) glass bottles	1	1056
Retainer for 24 1-L (33.8-oz) poly bottles	1	1322
SampleView CD with RS232 Cable	1	8757500
SD900 junction box auxiliary (for 4-20 mA input)	1	8760600
Strainer, all 316 stainless steel, 152 mm long x 10.3 mm OD (6.0 in. long x 0.406 in. OD)	1	2071
Strainer, all 316 stainless steel, 201.7 mm long x 25.4 mm OD (7.94 in. long, x 1.0 in. OD)	1	2070
Strainer, stainless steel, 99.1 mm long x 10.3 mm OD (3.9 in. long x 0.406 in. OD)	1	4652
Strainer, Teflon®/stainless steel, 139.7 mm long x 22.2 mm OD (5.5 in. long x 0.875 in. OD)	1	926
Strainer, Teflon/stainless steel, 279.4 mm long x 22.2 mm OD (11.0 in. long x 0.875 in. OD)	1	903

U.S. and countries other than EU	Marsh-McBirney and Sigma Flow	France and UK
HACH COMPANY	Products (except Sigma Flow	(Sigma Flow Products Only)
4539 Metropolitan Court	Products in France and the UK)	**HACH LANGE GmbH**
Frederick, MD, 21704-9452, U.S.A.	**FLOWTRONIC, SA.**	Willstätterstraße 11
Tel. (800) 368-2723	Rue J.H. Cool 19a	D-40549 Düsseldorf, Germany
Fax (301) 874-8459	B-4840 Welkenraedt, Belgium	Tel. +49 (0) 211 5288-0
hachflowsales@hach.com	Tel. +32 (0) 87 899 799	Fax +49 (0) 211 5288-143
www.hachflow.com	Fax +32 (0) 87 899 790	E-mail: info@hach-lange.de
	www.flow-tronic.com	www.hach-lange.com