

5800 Refrigerated Sampler

This pocket guide is not intended to replace the instruction manual. Read the instruction manual thoroughly before operating the sampler.

COPYRIGHT © 2022 by
Teledyne ISCO
4700 Superior St.,
Lincoln, Nebraska, U.S.A. 68504
Phone: (402) 464-0231
Toll Free: (800) 228-4373
FAX: (402) 465-3022

Part #69-5803-085-WEF
Revision A, February 2022

5800 Refrigerated Sampler

Table of Contents

1. Introduction

- 1.1 Features 1-1
- 1.2 Specifications 1-6

2. Installation

- 2.1 5800 Sampler Installation Overview 2-1
- 2.2 Positioning the Sampler 2-2
- 2.3 Connecting Power 2-5
- 2.4 Installing a Bottle Kit 2-7
 - 2.4.1 Installing the Distributor Arm
and Discharge Tube 2-9
 - 2.4.2 One Bottle 2-10
- 2.5 Attaching the Suction Line 2-12
 - 2.5.1 Vinyl Suction Line 2-13
- 2.6 Attaching a Strainer 2-15
 - 2.6.1 Alternative to Strainers 2-16
 - 2.6.2 Maximum Unanchored
Length 2-16
- 2.7 Routing the Suction Line and
Strainer 2-17
- 2.8 Configuring and Programming the
Sampler 2-18
- 2.9 Locking the Sampler 2-18

3. Programming

3.1	Control Panel Description	3-1
3.2	Getting Started	3-3
3.3	Configuring the Sampler	3-4
3.3.1	Set Clock	3-5
3.3.2	Bottle and Sizes	3-6
3.3.3	Suction Line	3-7
3.3.4	Liquid Detector	3-8
3.3.5	Refrigeration	3-10
3.3.6	Tubing Life	3-10
3.3.7	Program Lock	3-13
3.3.8	Language	3-14
3.3.9	System IDs	3-15
3.3.10	Run Diagnostics	3-16
3.3.11	Exit Configuration	3-16
3.4	Sampling Program Overview	3-16
3.5	Programming Steps	3-21
3.5.1	Pacing	3-21
3.5.2	Sample Every __ Hours, __ Minutes	3-21
3.5.3	Enter Sample Volume, Use Defined Sample	3-22
3.5.4	Volumes Dependent on Flow?	3-23
3.5.5	Sample Volume __ ml	3-23
3.5.6	__ Composite Samples	3-23
3.5.7	Suction Head	3-24
3.5.8	No Delay to Start, Set Start Time	3-24
3.5.9	Auto Re-Run	3-25
3.5.10	First Sample At:	3-26
3.5.11	Select Days:	3-26
3.5.12	First Valid Day:	3-26

4. Operation

- 4.1 Start a Sampler Program 4-1
 - 4.1.1 Start Time Delay 4-2
 - 4.1.2 The Run State 4-3
 - 4.1.3 Completed Program 4-4
- 4.2 Pause or Stop a Running Program . . 4-4
- 4.3 Post Sampling Activities 4-5
 - 4.3.1 View the Log 4-5
 - 4.3.2 Remove Sample Bottles 4-11
- 4.4 Grab Samples 4-12
- 4.5 Calibrate Sample Volumes 4-13
- 4.6 Operate the Pump Manually 4-16

5. Maintenance

- 5.1 Periodic Maintenance Checklist 5-1
 - 5.1.1 Pump Inspection 5-2
 - 5.1.2 Pump Tube Replacement 5-4
 - 5.1.3 Cleaning the Pump Rollers . . 5-7
 - 5.1.4 Cleaning the Pump Housing . 5-7
 - 5.1.5 Cleaning or Replacing Wetted
Parts 5-7
 - 5.1.6 Sampler Cleaning Guidelines 5-9

5800 Refrigerated Sampler

Section 1 Introduction

1.1 Features

The 5800 Series sampler features are identified in Figures 1-1 through 1-3 and described in Table 1-1.

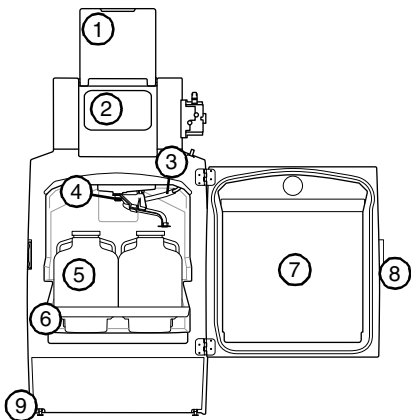


Figure 1-1 5800 Sampler features (Front)

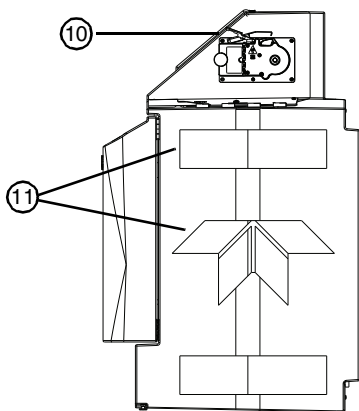


Figure 1-2 5800 Sampler features (left side)

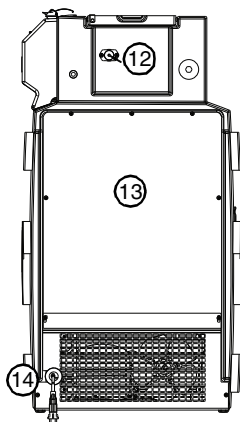


Figure 1-3 5800 Sampler features (Back)

Table 1-1 5800 Sampler Features

Item	Name	Description
1	Control Panel Cover	Protects the control panel display and keypad. Can be locked with user supplied padlock.
2	Control Panel	Supports user control and programming of sampler operation.
3	Discharge Tube	Carries liquid to the sample bottle. For 24, 4, 2, and 10 liter one-bottle configurations, the discharge tube is routed through the distributor arm. For the 20 liter one-bottle configuration the discharge tube is routed directly into the bottle.
4	Distributor Arm	Directs collected liquids to the bottle. Movement of the distributor is controlled by user-specified program settings.
5	Bottles	Hold the collected samples.
6	Bottle Locator Rack	Positions the bottles under the distributor.

**Table 1-1 5800 Sampler Features
(Continued)**

Item	Name	Description
7	Refrigerator Door	Protects the collected samples inside the refrigerated compartment.
8	Latch	Secures the door. The latch mechanism may be locked with a user-supplied padlock.
9	Level Adjustment Feet	The sampler includes two level adjustment feet at the front of the sampler. Use these to keep the bottle rack or locating deck level inside the refrigerated compartment.
10	Liquid Detector and Pump	The non-wetted liquid detector senses when the liquid is at the pump to determine head height and sample volumes. The peristaltic pump collects sample liquid and performs suction line rinses.
11	Lift Points (2 upper & 2 lower, each side)	If you must lift the sampler, it can be safely handled at these points. Lifting must be done by two people, one on each side, with the door closed and latched.

**Table 1-1 5800 Sampler Features
(Continued)**

Item	Name	Description
12	External Device Connection	Supports connections to external devices such as a flow meter for sample pacing and enable signals, and connection to a personal computer for data collection.
13	Refrigeration Assembly	Modular, corrosion-resistant refrigeration assembly cools the refrigerated compartment to a user-selected temperature of 1 to 9°C (34 to 48°F).
14	AC Mains Line Cord	Connects to AC power source.

1.2 Specifications

Table 1-2 Specifications

General	
Size (HxWxD):	132 x 73 x 84 cm 52.0 x 28.8 x 33.2 in
Weight (empty):	88.5 kg 195 lb
Bottle Configuration:	1, 10-liter PE
Refrigerator Body:	Linear low-density polyethylene (LLDPE)
Power Requirements:	100 VAC \pm 10%, 50 Hz: Running current 4 amperes 115 VAC \pm 10%, 60 Hz: Running current 4 amperes 230 VAC \pm 10%, 50 Hz: Running current 2 amperes
Installation Category:	II
Pollution Degree:	3
Maximum Altitude:	2,000 meters 6,562 feet
Humidity:	0 to 100%
Operational Temperature ^a :	-29 to 49 °C -20 to 120 °F

^a Optional Pump Heater suggested for ambient temperatures below 32 °F

Table 1-2 Specifications (Continued)

Pump	
Intake Suction Tubing Length:	1 to 30 m 3 to 99 feet
Material:	Vinyl
Inside Diameter:	9 mm $\frac{3}{8}$ inch
Pump Tubing Life:	Typically 1,000,000 pump counts.
Maximum Suction Lift:	8.5 m 28 feet
Typical Repeatability:	± 5 ml or $\pm 5\%$ of the average volume in a set.
Typical Line Velocity at Head Height:	0.9 m: 0.91 m/s 3.1 m: 0.87 m/s 4.6 m: 0.83 m/s 3 ft: 3.0 ft/s 10 ft: 2.9 ft/s 15 ft: 2.7 ft/s
Liquid Presence Detector:	Non-wetted, non-conductive sensor detects when liquid sample reaches the pump to automatically compensate for changes in head heights.

Table 1-2 Specifications (Continued)

Controller	
Enclosure Rating:	IP67 NEMA 4X, 6
Program Memory:	Non-volatile ROM (Flash)
Flow Meter Signal Inputs:	5 to 15 volt DC pulse or 25 millisecond isolated contact closure for ISCO flow meters. 4-20 mA input for non-ISCO flow meters.
Digital Alarms:	4 programmable outputs; 5 VDC, 100 mA
Number of Composite Samples:	Programmable from 1 to 999 samples.
Internal Clock Accuracy:	1 minute per month at 25°C
Software	
Sample Frequency:	1 minute to 99 hours 59 minutes, in 1-minute increments. 1 to 9,999 flow pulses.
Sampling Modes:	Constant Time, constant volume Variable time, constant volume Constant time, variable volume (Variable time and variable volume modes are controlled by an external flow meter signal)
Programmable Sample Volumes:	10 to 9,990 ml in 1 ml increments.

Table 1-2 Specifications (Continued)

Sample Retries:	If no sample is detected, up to 3 attempts; user selectable.
Rinse Cycles:	Automatic rinsing of suction line up to 3 rinses for each sample collection.
Controller Diagnostics:	Tests for RAM, ROM, pump, display, and electrical components.

5800 Refrigerated Sampler

Section 2 Installation

2.1 5800 Sampler Installation Overview

The following sections provide general instructions for placing the sampler into operation. In typical applications, the steps are:

1. Position the sampler. (Section 2.2)
2. Connect power. (2.3)
3. Install a bottle kit. (2.4)
4. Attach the suction line. (2.5)
5. Attach a strainer. (2.6)
6. Route the suction line and strainer. (2.7)
7. Connect external instruments. (2.8)
8. Configure and program the sampler. (2.8)
9. Lock the sampler. (2.9)

2.2 Positioning the Sampler

There are a few considerations when selecting a site for the sampler. The foremost concern should be personal safety.

The installation and use of this product may subject you to dangerous working conditions that can cause you serious or fatal injuries. Take any necessary precautions before entering the work site. Install and operate this product in accordance with all applicable safety and health regulations, and local ordinances.



WARNING

If this product is used in a manner not specified in this manual, the protection provided by the equipment may be impaired.



WARNING

This product has not been approved for use in hazardous locations as defined by the National Electrical Code.



WARNING

The sampler is heavy. When lifting, use a two-person lift at the points identified in Table 1-1. When possible, move the sampler using a two-wheeled hand cart from the back. To prevent damage to the refrigeration system, do not tip the sampler more than 45°.

Dangerous locations – If you must enter a manhole, confined space, or other dangerous location to install the suction line and strainer, observe standard safety precautions. Refer to Appendix B of the Installation and Operation guide for a discussion of safety considerations.

Support – The sampler should be installed on a surface capable of safely supporting the sampler, full liquid containers, and personnel.

AC Power – The mains line cord is the disconnect device should you need to remove power. Therefore, the electrical power outlet should be accessible.

Environmental – The sampler is designed for outdoor use. Refer to Table 1-2 for environmental specifications. When possible, avoid subjecting the sampler to chemical attacks and direct sunlight.

Avoid submersion – Although the control panel will resist damage (rated NEMA 4x, 6; IP 67), the refrigerator system and bottle compartment cannot prevent liquid from entering. In the event of submersion, liquid entering the refrigeration system could permanently damage the sampler; liquid entering the bottle compartment could contaminate the collected samples. Liquid entering the electrical compartment for the refrigeration system could result in a short circuit and possible shock hazard.

Liquid sample collection point – It is best to keep the distance between the sampler pump and the collection point as short as possible.

The shorter distance will increase pumping efficiency and pump tubing life. Also, the pump inlet should be located above the liquid surface to be sampled with no liquid traps. Gravity will aid suction line rinses and allow the line to drain, thereby reducing the possibility of sample cross-contamination. Refer to Table 1-2 for maximum suction line lengths and suction head heights.

Security – The sample compartment and pump and control panel have a padlock feature, but the location may need additional security to prevent tampering or vandalism.

Accessibility – The sampler must be installed in a location where personnel can easily exchange bottles and perform routine service.

The sampler requires about 2600 square centimeters (925 in²) of floor space. Additional space must be allowed in front of the sampler, at its left and right sides, and above the sampler. Do not block access to these areas. Obstructions will make routine servicing activities difficult or impossible.

The back of the sampler may be placed against a wall as long as air at the top and bottom of the refrigerator can flow freely to surrounding air. Unrestricted air flow behind and around the sampler will allow the refrigeration system to work efficiently.

Level surface – The sampler should be placed on a level surface and the feet on the refrigerator body should be adjusted to prevent

tipping or spills. If the sampler is not level, the sample liquid may miss the bottle mouth.

To level the sampler, place a bubble level on the bottle rack or locating base, then adjust the feet. For one-bottle configurations, place the bubble level on the side rails of the refrigerated compartment.



CAUTION

Do not tip the sampler on its side or back. Tipping the sampler more than 45° might cause oil to run into the compressor inlet, which can permanently damage the refrigeration system.

2.3 Connecting Power



WARNING

Before connecting the sampler to an AC power source, be familiar with the Electrical Requirements listed at the front of the Installation and Operation manual.

The factory assembles the sampler for either 100VAC/50 Hz, 115 VAC/60 Hz, or 230 VAC/50 Hz. The serial number label located inside the refrigerator identifies the AC power configuration of your sampler. You cannot convert the sampler in the field without purchasing a replacement refrigeration module. The mains power cord for 115 VAC samplers is equipped with a NEMA 5-15P plug for standard North American outlets. The mains power cord for 230 VAC samplers is equipped with an

EU-16P plug for standard CEE-7 European outlets. For other types of outlets that supply compatible AC power, convert the mains power cord plug with a locally-purchased adapter.

Plug the mains power cord into the outlet. The sampler control panel will briefly show the start up displays.

Copyright 2006-2016
TELEDYNE ISCO

COMPRESSOR WARM-UP!
COOLING IN: 44:45

5800 SAMPLER

Note

The refrigeration system may not operate for 45 minutes after applying power. This delay allows time for the compressor heater to drive off any refrigerant dissolved in the compressor oil.

2.4 Installing a Bottle Kit

The 5800 sampler can hold 1, 2, 4, and 24 bottles. Each of these bottle configurations are supplied as a kit (see Table 2-1), which is normally ordered with the sampler or when you desire to change the bottle configuration.

Table 2-1 Bottle Kits

Part Number	Description
68-5800-009	1-bottle Configuration. Includes one polyethylene 2.5-gallon (10-liter) round bottle, locating base, two caps and two discharge tubes.

If you have a single (composite) bottle kit, refer to the instructions in section 2.4.6.

For first-time use of the sampler, or if you have changed the bottle kit, be sure to configure the software for the new bottle kit (section 3.3.2).

2.4.1 Installing the Distributor Arm and Discharge Tube

The distributor arm is already installed on its mounting shaft inside the refrigerator (Figure 2-1).

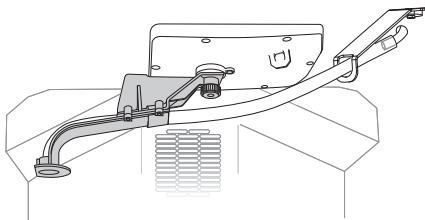


Figure 2-1 Installing the distributor arm and discharge tube

1. Thread the discharge tube through the body of the distributor arm.
2. Push the end of the discharge tube up to the outlet hole on the distributor arm. The end of the tubing should be flush with, or within 3 mm ($\frac{1}{8}$ ") of, the lower edge of the hole.



CAUTION

The discharge tube should not extend below the hole in the distributor arm. This could cause the distributor to fail if the excess tubing catches a bottle.

3. Pull on the loose end of the discharge tube to remove any slack. The tube should follow the contour of the distributor arm.
4. Push the loose end of the discharge tube through the tubing arm and onto the bulkhead fitting in the top-front corner of the refrigerator.
5. Inspect the discharge tube:



CAUTION

An incorrectly installed discharge tube can cause the distributor arm to fail. It can also cross-contaminate samples. To prevent these problems, inspect the discharge tube as described in the following steps.

- a. Manually rotate the arm to make sure that the tube does not obstruct its movement. If the tube obstructs arm movement, re-route the discharge tubing.
- b. The discharge tube must slope downward from the bulkhead fitting to the arm throughout the range of arm motion. Otherwise, liquid may pool in the tube and cross-contaminate samples. Note that the discharge tube has a natural curve. Should the tube create a low spot where liquid can pool, twist the end of the tube connected to the bulkhead fitting so that the natural curve holds the tube in a downward sloping position. Then, retest the tube at other arm positions.

2.4.2 One Bottle

If your one-bottle configuration has a 10 liter (2.5 gallon) polyethylene, glass, or ProPak bottle, use a locating base to hold and align the bottle.

Refer to the instructions for your bottle size.

10 liter bottle. To install the locating base and 10 liter bottle:

1. Insert the bottle into the hole numbered "1" in the locating base.
2. Slide the locating base into the bottom of the refrigerated compartment (Figure 2-4). Note that the arrow must be pointing toward the back of the refrigerator.

 Note

When the sampler controller is configured for a single 10 liter bottle (section 3), samples will only be distributed to bottle 1. If you place the bottle in any other position liquid will miss the bottle.

3. Store the arm in a safe location for future use.

Then install the bottle:

4. For the PE bottle screw the cap with a hole onto the bottle. For the glass bottle insert the plastic cup.
5. Place the bottle (either glass or PE) in the center of the refrigerator.
6. Feed the discharge tube into the hole (see Figure 2-2).

7. Connect the other end of the discharge tube to the bulkhead fitting at the top-front corner of the refrigerator.

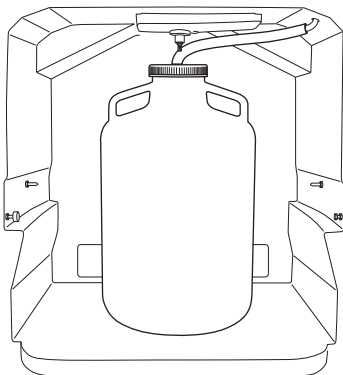


Figure 2-2 One 20 liter PE bottle configuration with discharge tube through the bottle cap

Note

The glass bottle does not have a lid; just place the discharge tube in the bottle opening.

The discharge tube must slope downward from the bulkhead fitting to the bottle. Otherwise, liquid might pool in the tube and cross-contaminate samples.

Note that the discharge tube has a natural curve. Should the tube create a low spot where liquid can pool, twist the end of the tube

connected to the bulkhead fitting so that the natural curve holds the tube in a downward sloping position.

2.5 Attaching the Suction Line

The suction line is the tubing from the sampling point to the pump tube inlet. The sampler uses a $\frac{3}{8}$ -inch ID suction line of lengths from 3 to 99 feet. Teledyne Isco offers vinyl or FEP-lined suction lines. The FEP-lined tubing has a polyethylene jacket to protect it from kinks and abrasions.



CAUTION

The 5800 sampling system is designed for operation with minimal inlet obstruction. In order to prevent pump leakage, or pump tubing breakage or separation from the coupler, ensure that the strainer remains unobstructed at all times and that the suction line cannot be kinked or collapse.



Note

The vinyl suction line contains a very low parts-per-million level of phenols. If phenol content affects your sample analysis, use the FEP-lined suction line.

Teledyne Isco ships suction line in standard lengths of 3.0 m (10 ft) or 7.6 m (25 ft). Either length should be cut to the shortest length feasible for the installation. When installed, the line should run the shortest possible distance from the collection point to the pump, preferably with a gradual upward slope. Excess

suction line should be cut, not coiled. Coiled suction line will hold liquid between sample events which could cross-contaminate samples or freeze in cold climates. If the standard lengths are too short, or if you are cutting compatible $\frac{3}{8}$ -inch ID suction line from a bulk spool, you can use lengths up to 30 m (99 ft).

When accurate, repeatable sample volumes are important, use care to cut the suction line to the correct increments:

- When the sampler is using metric units of measure, cut the line in 0.1 m increments. For instance, cut 4.2 m, not 4.26 m.
- When using English units of measure, cut the line in increments of 1 foot.

Record this cut length. Later, you will enter this value in the SUCTION LINE configuration option (section 3).

2.5.1 Vinyl Suction Line

Attach the vinyl suction line to the pump tube with the tubing coupler (part #69-4703-106). First, screw the threaded end into the suction line until the flat surface is flush against the suction line. Failure to do this will allow air to leak into the sample and adversely effect the sample volume accuracy. Then, push the other end of the coupler into the end of the pump tube until the other flat surface is flush against the tubing. Once the coupler is attached to the

pump tube, removal is difficult, and may require cutting the tube.

1.



2.



Figure 2-3 Attaching the suction line to the pump tubing

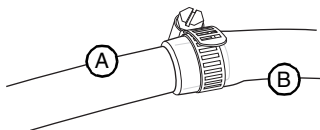


Figure 2-4 Connecting FEP-lined suction line (A) to pump tube (B)

2.6 Attaching a Strainer

To select the right strainer for your application, refer to Figure 2-5 and the table that follows.

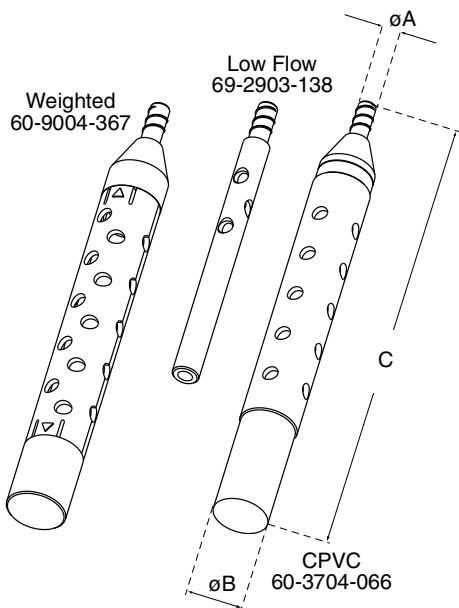


Figure 2-5 Strainers

To attach the strainer to the suction line, carefully screw the strainer's threaded connector into the suction line. If attaching the strainer to a suction line, heat the suction line end before threading the strainer into the line.

Warming tubing will make it more pliable to avoid damage.

2.6.1 Alternative to Strainers

When sampling from high velocity streams with heavy suspended solids, some field investigations suggest that more representative samples are obtained without the strainer. Consider attaching a short piece of thin walled aluminum tubing to the end of the suction line; anchor the tubing so that the inlet opens upstream. The aluminum tubing's thin wall will not disturb the flow stream, and most sample analyses disregard aluminum ions. Under most conditions, a pre-sample line rinse removes any debris over the tubing entrance.

2.6.2 Maximum Unanchored Length

During a pre- or post-sample purge or line rinse, the suction line is filled with air which might cause the suction line and strainer to float. If the length of the suction line and strainer exceeds the listed value, securely anchor the strainer.

Even if the maximum length is not exceeded, it is a good idea to anchor the suction line and strainer when sampling from high velocity or turbulent flow streams.

2.7 Routing the Suction Line and Strainer

Route the suction line so that it has a continuous slope from the liquid source to the sampler. This helps to drain the line during pre- and post-sample line purges and rinses. If a suction line exposed to freezing climates does not fully drain, there is a risk of liquid in the suction line becoming frozen. Frozen liquid will cause the sample collection to fail. A warm sampling source can usually prevent this, provided there are no traps or low spots in the suction line. Some extreme situations may require more protective measures, such as insulating the suction line, or applying heat tape or adding a pump heater.

For representative samples, place the strainer in the main current of the flow stream, not in an eddy or at the edge of flow. Placing a strainer at the bottom may produce samples with excess heavy solids and no floating materials, while placing it at the top may produce the opposite conditions.

2.8 Configuring and Programming the Sampler

To complete the installation, the sampler software should be configured and programmed. Refer to Section 3 for instructions.

Configure the sampler to make sure that it “knows” what bottle configuration is installed, the length of the suction line, etc. Program the sampler to specify how and when the sampler should collect liquid samples.

2.9 Locking the Sampler

Locking the sampler is an optional step that can prevent tampering with the sampler operation or collected samples.

To prevent tampering with the sampler operation, the sampler has a PROGRAM LOCK. When enabled, this software feature requires a numeric password to access most of the control panel functions. Refer to Section 3.3.10 to enable this option.

To prevent tampering with the collected samples, place a padlock on the refrigerator door latch, control panel and pump cover.

5800 Refrigerated Sampler

Section 3 Programming

3.1 Control Panel Description

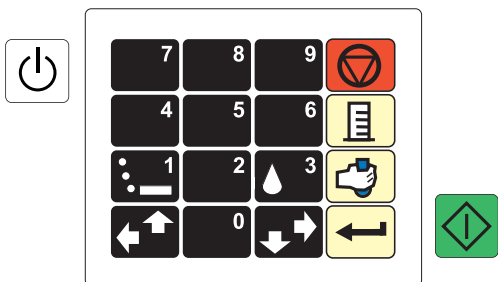


Figure 3-1 Control Panel Buttons

Table 3-1 Control Buttons


Icon	Name	Description
	Power	Places the sampler in the On or Standby modes. Note: In either mode, mains power is always connected to the refrigeration system.

Table 3-1 Control Buttons











Icon	Name	Description
	Run Program	Press this button to start the sampling program.
	Number Buttons	Types a number.
	Pump Reverse (Purge)	At the Main menu, press this button to run the pump in the reverse direction to purge the suction line. In other menus, press this button to type the number 1.
	Pump Forward (Fill)	At the Main Menu, press this button to run the pump in the forward direction to fill the suction line. In other menus, press this button to type the number 3.
	Previous	Selects the previous menu option left or above the current choice.
	Next	Selects the next menu option right or below the current choice.

Table 3-1 Control Buttons

Icon	Name	Description
	Stop, Cancel, or Exit	Stops the pump or distributor. Pauses a running sampling program. In programming screens, returns to the previous programming level.
	Calibrate	Press this button from the Main Menu to enter the Calibration mode.
	Grab Sample	Press this button from the Main Menu or the Paused state to take a grab (manual) sample.
	Enter	Accepts a menu choice or number entry and goes to next screen.

3.2 Getting Started

Apply power to the sampler (see section 2.8). The start-up screens appear on the LCD display.

Copyright 2006 - 2015
TELEDYNE ISCO

COMPRESSOR WARM-UP!
COOLING IN: 44:45

5800 SAMPLER

 **Note**

The refrigeration system may not operate for 45 minutes after applying power. This delay allows time for the compressor heater to drive off any refrigerant dissolved in the compressor oil.

After completing the start-up routine, turn the sampler on by pressing the Power button. The control panel displays the Main Menu screen and waits for your input.

PROGRAM	CONFIGURE
VIEW LOG	

The Main Menu screen displays three menu options. The active option blinks. To change the active option, use the Next and Previous buttons. Press the Enter button to choose the blinking active option.

If you have just installed the sampler, you will first need to configure the sampler (section 3.3). Next, you will need to program it for operation (section 3.5). The View Log option (section 4.3.1) will not contain meaningful data until you have run a sampling program.

3.3 Configuring the Sampler

Before operating the 5800 Sampler, configure the sampler software. Doing so will set the time and date, and allow the sampler controller to correctly use the hardware and external connections.

To begin from the Main Menu, press the Next or Previous button until the CONFIGURE option blinks. Then, press the Enter button. The sampler displays the first configuration setting.

You can step through the Configure options using the Next or Previous buttons. To review or change the settings for the displayed option, press the Enter button.

The sampler will return to the SELECT OPTION <--> screen when there are no more settings for the selected option. To return to the SELECT OPTION <--> screen sooner, press the Stop button. Pressing the Stop button at any input screen will exit the current screen without saving changes. You can press the Stop button again to exit the sampler configuration screens and return to the Main Menu screen.

3.3.1 Set Clock

Select this option to set the sampler's internal clock to your local time and date. The sampler uses this internal clock to start and stop sample programs, and to time stamp events in the log.

1.

SELECT OPTION: (<-->) SET CLOCK

Press Enter.

2.

ENTER TIME AND DATE: HH:MM DD-MON-YY

Press the Number buttons to type the hours (using 24-hour format). Then, press Enter to accept the hours and move to the minutes. Repeat for all settings and the display will return to the SELECT OPTION <--> screen.

3.3.2 Bottle and Sizes

Select this option to specify the installed bottle configuration (section 2.3). The sampler uses this setting to determine available bottle options and control the operation of the distributor.

1.

SELECT OPTION: (<-->) BOTTLES AND SIZES
--

Select the BOTTLES AND SIZES option and press Enter.

2.

NUMBER OF BOTTLES: 1 2 4 24

Press the Previous or Next buttons to highlight the installed bottle configuration. Press Enter to select it.

3.

BOTTLE VOLUME IS: ___ ml (300-65500)

Press the Number buttons to enter the bottle volume in milliliters. For multi-bottle samplers, enter the bottle volume of one bottle, not the total volume of all bottles.

If you enter a non-standard bottle volume, the sampler will ask “ARE YOU SURE?”. Answer

NO to re-enter a standard volume or answer YES to confirm the non-standard volume.

3.3.3 Suction Line

Select this option to enter the suction line length (section 2.4). The sampler uses this input along with the pump tables it creates to determine the duration of the pump fill and purge cycles and to calculate sample volumes.

To set the suction line length:

1.

SELECT OPTION: (<-->) SUCTION LINE

Select the SUCTION LINE option and press Enter.

2.

SUCTION LINE LENGTH: ___ ft (3-99)

Press the Number buttons to enter the suction line length.

3.

PLEASE WAIT! CREATING PUMP TABLES

The sampler creates pump tables before returning to the SELECT OPTION <--> screen.

When accurate, repeatable sample volumes are important, use care to cut the suction line and enter the correct measurement.

If using English units of measure, cut the suction line to the nearest whole foot. When using metric units of measure, cut the suction line to the nearest 0.1 meter. The sampler

displays units of measure appropriate for the selected language (see section 3.3.8).

3.3.4 Liquid Detector

Select this option to turn liquid detection on or off. This setting also allows you to configure suction line rinses and sample retries.

1.

SELECT OPTION: (<-->) LIQUID DETECTOR
--

Select the LIQUID DETECTOR option and press Enter.

2.

USE LIQUID DETECTOR? YES NO

Select YES (the factory default) for improved sample volume accuracy, and to enable Rinse Cycles and Sampling Retries. Select NO to turn off all of these features and return to the SELECT OPTION <- -> screen.

3.

__ RINSE CYCLES (0-3)

Press a Number button to specify how many rinse cycles should be performed before collecting a sample.

4.

RETRY UP TO __ TIMES WHEN SAMPLING (0-3)

If the sampler fails to detect liquid, it can try again to collect the sample. Press a Number button to specify how many retries the sampler should attempt.

For most sampling applications you should use Liquid Detection. Selecting NO may adversely affect sample volume repeatability and will turn off Rinse Cycles and Sampling Retries.

You can use Rinse Cycles to condition the suction line and strainer before collecting a sample. Rinse Cycles may also improve sample volume repeatability by ensuring the suction line is wetted before each sample. One rinse cycle draws liquid through the suction line until it reaches the Liquid Detector. Then, the pump reverses direction and to clear the suction line.

Note that Rinse Cycles add to the Pump Counts (section 3.3.6) and requires more frequent pump tube changes.

3.3.5 Refrigeration

Select this option to set the target temperature of the refrigeration system. The sampler will operate the cooling or heating systems as needed to maintain this target temperature.

1.

SELECT OPTION: (<-->) REFRIGERATION
--

Select the REFRIGERATION option and press Enter.

2.

TARGET TEMPERATURE __ C (1-9)

Use the Number buttons to set the target temperature as degrees Celsius. Press Enter to save the setting.

3.

QUICK COOL FOR FIRST DAY? YES NO

Single Bottle Only – Select YES to enable the Quick Cool mode, NO to disable it.

Quick Cool lowers the target temperature by 2.5°C for the first 24 hours. This feature can be quite useful when collecting warm liquids or larger sample volumes to draw down the temperature quickly. To prevent the sample from freezing, Quick Cool will not lower the target temperature below 0.5°C.

3.3.6 Tubing Life

Select this option to view and reset the pump counts. The Tubing Life feature serves as a

reminder so you can replace the pump tube at regular intervals before its wall cracks and ruptures. Several problems may arise from a weak or ruptured pump tube:

- The sampler will not pump the liquid
- Pump jams
- Inaccurate sample volumes
- Faulty liquid detection

To set the Tubing Life reminder:

1.

SELECT OPTION: (<-->) TUBING LIFE

Select the TUBING LIFE option and press Enter.

2.

___ PUMP COUNTS, WARNING AT 1000000
--

The sampler displays the current pump count. The display automatically advances in four seconds or press Enter to continue.

3.

RESET PUMP COUNTER? YES NO

If you have replaced the pump tube, select YES, then press Enter. Otherwise, select NO.

4.

__00000 PUMP COUNTS TO WARNING

Type an interval and press Enter. (The default value is "5.")

The sampler counts pump revolutions in both the forward and reverse cycles with a resettable counter. When the counter reaches the default of 500,000 counts, the sampler displays an alert message, “WARNING! REPLACE PUMP TUBE.” After replacing the pump tube (see section 5.1.2), reset the count to zero so the sampler can begin tallying the pump counts for the new tube.

Opening the pump housing and replacing the pump tube will not reset the counter.

The default count of 500,000 represents the average interval at which the pump tube should be inspected. Because liquid properties and site conditions affect the life of the pump tube, you can change this interval to better suit your application. If a pump tube inspection (section 5.1.1) at 500,000 counts reveals little or no wear, this value can be increased to avoid needless replacements. Conversely, if an inspection reveals significant wear at 500,000 counts, this value should be reduced to prevent a pump tube failure. Pump tubes wear out sooner when the sampled liquid contains a high percentage of suspended or abrasive solids. Pump tubes typically last 1,000,000 counts when pumping relatively clean liquids at normal temperatures.

 **Note**

The importance of regular tubing replacement cannot be overstated. The key is to replace the tube before failure, not after. When a pump tube ruptures, grit and other abrasive debris can enter the pump housing. Over

time, this abrasive material may degrade the sample collection performance.

Failure to maintain the pump tube may result in permanent damage to the sampler. Check the condition of the pump tube regularly and if the tube shows signs of fatigue or wear, replace it immediately. A properly maintained sampler will provide years of reliable service that is expected of a Teledyne ISCO Sampler.

3.3.7 Program Lock

Select this option to turn the Program Lock feature on or off, and to change the password. When this security feature is enabled, the sampler requires a numeric password before a user can configure, program, calibrate, run a program, or grab a sample.

1.

SELECT OPTION: (<-->) PROGRAM OPTIONS
--

Select PROGRAM OPTIONS.

2.

SELECT PROGRAM: #1 #2 #3 #4

Press the program number to lock and press Enter.

3.

USE PROGRAM LOCK? YES NO

Select YES to turn on the Program Lock feature or NO to turn it off, then press Enter. If YES, the CHANGE PASSWORD option is displayed.

3.

CHANGE PASSWORD? YES NO

Select YES to change the password or NO to exit and leave the password unchanged.

4.

ENTER NEW PASSWORD:

If YES was selected, enter a numeric password, up to four characters, then press Enter.

5.

REENTER PASSWORD:

Re-enter the password to confirm it. The sampler will alert you if the passwords do not match and allow you to enter them again.

Should you forget the password, contact Teledyne ISCO's Customer Service department for assistance.

3.3.8 Language

Select this option to change the display language and display units for length measurements.

1.

SELECT OPTION: (<-->)
LANGUAGE

Select the LANGUAGE option and press Enter.

2.

SELECT LANGUAGE (<-->)
ENGLISH

Press the Next or Previous buttons to scroll through the options. Press the Enter button when the desired option is displayed.

If you select a language other than English, the sampler automatically displays length or distance units as meters and returns to the SELECT OPTION <--> screen. If you select English, the sampler lets you choose between meters and feet, then returns to the SELECT OPTION <--> screen.

3.3.9 System IDs

Select this option to view the system IDs. This function reports the unique ID for the sampler, and its hardware and software versions. These IDs are factory set.

1.

SELECT OPTION: (<-->) SYSTEM IDs

Select the SYSTEM IDs option and press Enter.

2.

5800 SAMPLER ID: _____

The first line lists the Model Number. The second line lists the unique ID for the sampler. Press Enter to continue.

3.

HARDWARE: ____ SOFTWARE: _._.

This screen lists the version numbers of the installed hardware and software. Press the Enter button to return to the SELECT OPTION <- -> screen.

3.3.10 Run Diagnostics

Select this option to enter the sampler diagnostics mode to test the sampler memory, display, keypad, pump, distributor, and various inputs and outputs.

For more information about this service-related feature, refer to the Installation and Operation guide.

3.3.11 Exit Configuration

Select this option to exit the configuration mode and return to the Main Menu screen.

3.4 Sampling Program Overview

The sampling program controls how often sample events occur and what should take place at each event. A sample event may happen when:

- you start a flow paced program that is programmed to Sample at Start (section 3.3.5).
- a time paced program reaches the First Sample time and date,
- your programmed time interval has elapsed,

- your programmed number of flow pulses has been reached, or
- a disabled sampler becomes enabled (section 3.3.5).

At each event, the sampler:

1. Resets the programmed flow or time pacing interval.
2. Moves the distributor arm over the next bottle. (This step does not occur for samplers configured with the 20 liter composite bottle.)
3. Rinses the suction line (see section 3.3.4).
4. Sends a three-second event mark signal that begins at forward pumping. The sampler deposits the programmed sample volume into the bottle.

If programmed to deposit a sample volume in more than one bottle, the sampler:

- a. Moves the distributor arm over the next bottle.
 - b. Deposits the programmed sample volume into the bottle.
 - c. Repeats steps 4a and 4b until the programmed number of bottles per event is reached.
5. Rinses the suction line (see section 3.3.4).

There are four categories of sampling program instructions that control the above actions in an event:

- Pacing instructions define what controls the sample collection interval and its frequency.
- Distribution instructions define where the collected liquid sample is placed.
Single-bottle samplers can only distribute the sample to the composite bottle therefore skip the steps in this category.
- Volume instructions define how much liquid is collected at each interval, and the total volume to collect.
- The Start Time tells the sampler when to begin operation.

These categories and their related programming screens are illustrated in Figures 3-2 and 3-3 for time paced sampling programs and Figures 3.5 and 3.5 for flow paced sampling programs. Each screen includes a section number that you can refer to should you need a detailed explanation of the step.

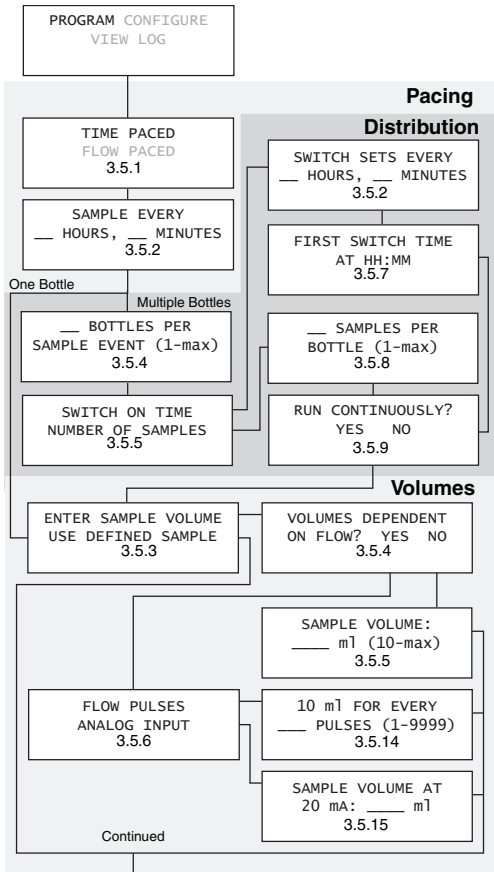


Figure 3-2 Time paced sampling program flow chart

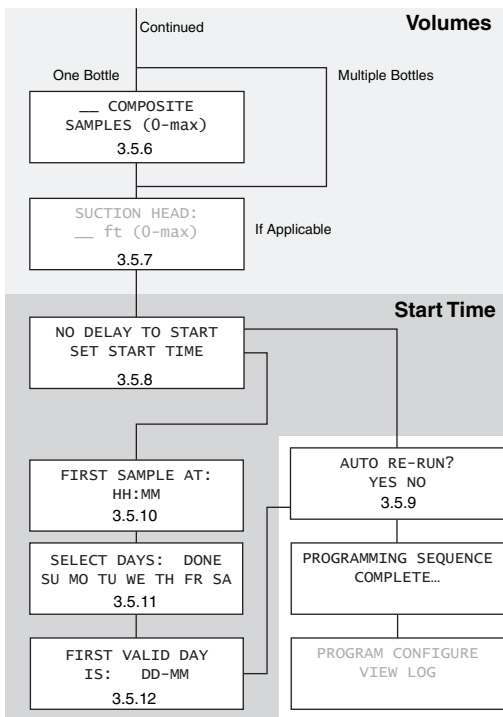


Figure 3-3 Time paced sampling program flow chart, continued

3.5 Programming Steps

To begin programming from the Main Menu screen, use the Next or Previous button to select PROGRAM. Press the Enter button to display the first programming screen. Refer to Figures 3-2 through 3.5 and the following descriptions.

3.5.1 Pacing

Time paced sampling programs use the sampler's internal clock to collect samples at a constant time interval. When you program the sampler for time pacing, the sampler will prompt you to enter the time between sample events in hours and minutes.

<input checked="" type="checkbox"/> Note

This quick start guide will focus on how to program time paced sampling with a single bottle, but more information on other types of programming can be found in the user manual.

Use the Next or Previous buttons to select the time option, then press the Enter button.

3.5.2 Sample Every __ Hours, __ Minutes

Time Paced Only – Use the Number buttons to enter the time interval in hours and minutes. The sampler collects a sample each time this interval elapses while the program is running.

3.5.3 Enter Sample Volume, Use Defined Sample

At this screen you have the option to enter a sample volume (factory default is 200 ml) or use a manually defined sample volume based on pump counts.

If you choose ENTER SAMPLE VOLUME, the programming displays will step through a series of screens that let you enter the sample volume. When running a program, the sampler will use these settings and vary the sample collection cycle to deliver the entered sample volume at any suction head height. For complete definitions of each of these steps, refer to your user manual.

To view or change the entered sample volume, use the Next or Previous button to select ENTER SAMPLE VOLUME. Then, press the Enter button to advance to the next screen (Section 3.5.5).

If you choose USE DEFINED SAMPLE, the sample collection cycle is always a fixed number of pump counts. This option can be beneficial when collecting samples from pressurized lines whenever exceptional sampling conditions make it difficult to detect liquids and collect accurate sample volumes. To USE DEFINED SAMPLE, press the Next or Previous button to select this option. Then, press the Enter button.

 Note

When using defined samples, be sure to DEFINE SAMPLE using the calibrate button. See user manual.

 Note

Selecting USE DEFINED SAMPLE will disable bottle overflow detection.

3.5.4 Volumes Dependent on Flow?

Time Paced Only – The sampler can vary the sample volume according to an input from an external flow rate measurement device, or use a fixed volume at every time interval. To use variable sample volumes, sometimes called Constant Time Variable Volume (CTVV) sampling, select YES. To use fixed sample volumes, select NO.

3.5.5 Sample Volume __ ml

This screen displays the defined sample volume. Use the Number buttons to enter the sample volume. Press the Enter button to accept the displayed value.

3.5.6 __ Composite Samples

Single Bottle Only – Use the Number buttons to type the number of composite samples to take. Press the Enter button to accept the value.

The sampler calculates the maximum possible number of samples by dividing the configured bottle size (section 3.3.2) by the size of each sample volume (section 3.5.5).

If you enter zero, the sampler collects samples without regard for the total number of samples. If you enter zero, keep in mind that the sampler might overfill the bottle.

3.5.7 Suction Head

This screen is displayed only if the liquid detector is turned off (section 3.3.4). Use the Number buttons to type the suction head height. Press the Enter button to accept the value.

Suction head height is the vertical distance from the liquid surface to the pump inlet. To measure the suction head height, refer to Figure 3-4.

For most applications, Teledyne ISCO recommends that you turn on the liquid detector (section 3.3.4). The sampler will automatically calculate the suction head height, typically resulting in more accurate and repeatable sample volumes.

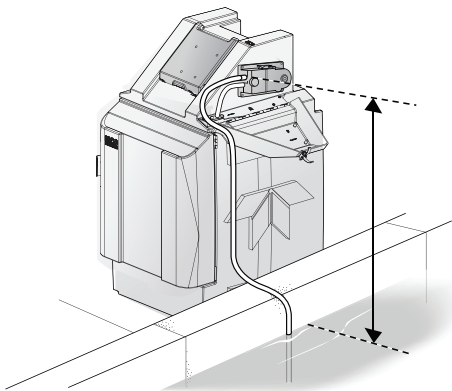


Figure 3-4 Suction Head Height

Applications that collect samples from a pressurized line are an exception. Teledyne ISCO offers a pressurized line option for the sampler. Contact the factory for more information.

When using Teledyne ISCO's pressurized line option, disable liquid detection and enter "1" at the suction head screen. Sample volumes should use the DEFINED SAMPLE option. Refer to section 3.5.3.

3.5.8 No Delay to Start, Set Start Time

At this screen you have the option to start the sampling program immediately when you press the green Run Program button, or delay the sampling program until user-defined start time is met.

To program the sampler to start immediately, use the Next and Previous buttons to select the NO DELAY TO START option and press the Enter button.

To set a start time and date, use the Next and Previous buttons to select the SET START TIME option. Then, press the Enter button to advance to the next screen (section 3.5.11).

 Note

If you enter a "First Sample At" or Start Flow Count At" month less than the current month, the sampler interprets the start time as *next* year's date.

3.5.9 Auto Re-Run

If a program reaches its end without using all of the bottles, AUTO RE-RUN causes the sampler to begin with the next available bottle in the sequence, the next time the program is run.

3.5.10 First Sample At:

Time Paced Only – Use the Number buttons to set the start time hours. Press the Enter button to accept the value and advance to the minutes. Repeat to complete the minutes, date, and month.

3.5.11 Select Days:

Use the arrow buttons to select the desired days of the week, pressing Enter to activate or deactivate selections. When selections are completed, select DONE, then press Enter to advance to the next screen.

3.5.12 First Valid Day:

Use the number keys to set the program starting day and month, pressing Enter to accept the values.

5800 Refrigerated Sampler

Section 4 Operation

This section describes how to operate the sampler. These instructions assume that the sampler has been correctly installed (section 2), configured, and programmed (section 3).

4.1 Start a Sampler Program

Before starting a program:

- Verify that the pump tube is in good condition. Refer to section 5.1.1.
- Place empty bottles in the rack or locating base.

To start the program from the Main Menu screen, press the green Run Program button.

If a sampler configured for multiple bottles was previously halted (see section 4.2), the sampler will display a start bottle option when you press the Run Program Button. This start bottle option only appears if no programming changes were made after halting the program.

ENTER START BOTTLE: ____ (1-max)

Using the Number buttons, enter the starting bottle. Then press the Enter button.

4.1.1 Start Time Delay

If the program is set for NO DELAY TO START (section 3.5.18), The sampler immediately begins to operate according to its Configure and Program settings.

If the program is set to use a start time, the sampler will wait for the specified time and date. During this delay, the display for time paced programs will show:

FIRST SAMPLE AT: HH:MM

Or, for flow paced programs:

START FLOW COUNT AT: HH:MM

When the programmed start time and date match the sampler's time and date, the sampler program begins to run.

If you press the green Run Program button after the programmed start time has passed by no more than 5 minutes, the sampler program starts immediately. Otherwise, the program will start at the next programmed start time.

4.1.2 The Run State

Because the sampler operation is fully automated, no user intervention is required. Should there be a need to check on the running program, you can view the sampler display. It always reports the current state or operation and the refrigerator temperature.

Typically, the display will count down to the next sample event. This countdown screen may alternate with other messages:

- If the sampler is disabled by an external device, the display will show **PROGRAM DISABLED**.
- If the sampler is currently taking a sample the display will show **TAKING SAMPLE (number)**.
- If the sampler has encountered error conditions during the running program, the display will show **ERRORS HAVE OCCURRED**.
- If the sampler is programmed for time-switched bottles (section 3.5.5), the display will show **NEXT BOTTLE AT: HH:MM:SS DD-MON-YY**.
- If any programmed sampler operations are based on the sampler's internal clock, the display will show the current time and date.

4.1.3 Completed Program

When the program is complete, the display will show PROGRAM DONE and list the number of samples.

If the sampler encounters an error at any time during the running program, this display will alternate with an “ERRORS HAVE OCCURRED” message. Error messages are listed in Table 4-1.

4.2 Pause or Stop a Running Program

Press the red Stop button to pause a running program. The sampler will display:

RESUME IN MM:SS VIEW LOG HALT

The top line of the display shows a five minute count down timer. If no buttons are pressed, the sampler program will automatically resume when the count reaches 0:00.

While paused, you can:

- View the log (see section 4.3.1)
- Collect a Grab Sample (see section 4.4)
- Halt the program — Press the Next or Previous buttons to select the HALT option. Then, press the Enter button.
- Resume the program — Press the Next or Previous buttons to select the RESUME IN M:SS option. Then, press the Enter

button. Or, you can press the Stop button to exit the paused state and resume the program.

During the pause, you can reset the countdown timer to five minutes by pressing the Number, Next, or Previous buttons.

 Note

While paused, the sampler skips sample events that would have occurred otherwise. These are reported in the Log as MISSED SAMPLES (number): PROGRAM PAUSED.

4.3 Post Sampling Activities

Post-sampling activities include:

- Viewing the Log (section 4.3.1)
- Retrieving the Refrigerator Temperature Log (refer to the Installation and operation guide)
- Removing the sample bottles (section 4.3.2)

4.3.1 View the Log

The sampler records events during the running program and summarizes them in a log. This log is held in the sampler memory until the next program is started.

To view the log after the completion of a program, press the Stop or Enter button to return to the Main menu. Then, press the Next or Previous buttons to select the VIEW LOG

option and press the Enter button. You can also view the log while a program is paused.

While viewing the log, you can:

- Step forward through the screens by pressing the Next or Enter buttons.
- Step backward by pressing the Previous button.
- Exit the log by pressing the Stop button.

The log generally contains the following information:

1.

COLLECTED _____
OF _____ SAMPLES _____

The log reports the number of successful samples out of the total number programmed.

2.

MISSED SAMPLES: _____
NO LIQUID DETECTED

If samples were not collected, the log reports the number of missed samples and the error message. If there are multiple reasons, this screen will be repeated for the other error messages. Error messages are described in Table 4-1.

3.

PROGRAM STARTED
HH:MM DD-MON-YY

The log reports the time and date the program was started.

4.

PROGRAM COMPLETED HH:MM DD-MON-YY

If the program was allowed to finish, the log reports the time and date the program was completed.

5.

PROGRAM HALTED HH:MM DD-MON-YY

If the program was halted before the programmed completion time, the log reports the time.

6.

PROGRAM PAUSED ___ SAMPLES REMAIN

If you are viewing the log while the program is paused, the log displays the number of samples that remain.

7.

POWER LOST HH:MM DD-MON-YY

If power was lost during the program, the log reports the time of the most recent power failure event and the time that power was restored.

8.

REFRIG TEMP DATA: AVERAGE: ___ C

The log reports the average refrigerator temperature and the most recent time of the minimum and maximum recorded temperatures.

9.

LAST CALIBRATED HH:MM DD-MON-YY

The log reports the time and date of the last sample volume calibration (see section 4.5), or the last DEFINE SAMPLE (section 3.6.1).

10.

LAST PROGRAMMED
HH:MM DD-MON-YY

The log reports the last time the program was modified.

11.

CLOCK SET AT
HH:MM DD-MON-YY

The log reports the last time the clock was set.

12.

5800 SAMPLER
ID: _____

The log reports the unique ID for the sampler control panel. This identifier is assigned at the factory.

13.

HARDWARE: ____
SOFTWARE: _._

The log reports the hardware and software revision of the control panel.

14.

TEXT TRANSLATION
REVISION: ____

If the sampler displays a language other than English, the translation revision is displayed.

15.

WARNING:
CHANGE PUMP TUBE

If the pump tubing count is exceeded the log will display a warning. For more information on the pump tube warning see sections 3.3.9 and 5.1.2.

Table 4-1 5800 Errors

Message	Description
NO LIQUID DETECTED	The sampler was unable to detect liquid.
NO MORE LIQUID	After the sampler detected liquid and while the sample was being taken, the liquid detector stopped detecting liquid.
NOT ENOUGH FLOW	Not enough flow was measured to produce the minimum sample volume while collecting flow-proportional sample volumes (CTVV).
POWER FAILED!	The power was interrupted at the sample event time.
USER STOPPED PUMP	The Stop button was pressed during the sample event.
PROGRAM PAUSED	The program was paused at the time of the sample event.
DISTRIBUTOR FAILURE	The distributor did not operate correctly. The sampler reports this error if the distributor arm is not attached to the sampler, if the distributor arm-stop is missing or broken, or if the distributor drive mechanism is malfunctioning.

Table 4-1 5800 Errors

Message	Description
PUMP FAILURE	The sampler reports this error when an obstruction has stopped the pump rotor from turning. User intervention is required to clear this error.
PUMP LATCH OPEN!	The sampler detected the pump band is open.
PROGRAM HALTED	The program was halted.
PROBABLE OVERFLOW	The sampler did not deliver the sample because it would have overfilled the bottle.

4.3.2 Remove Sample Bottles

After the program is complete, the bottles can be removed and prepared for the laboratory. Gain access to the bottles by releasing the door latch and swinging the door open. The bottles can then be removed from the rack or locating base. Push the distributor arm out of the way if needed.

When sliding the rack out, observe the rack guides (Figure 4-1). The back two guides run along the top of the rack to prevent the rack from tipping forward. Do not pull the rack out beyond these guide pins unless you are securely holding the rack.

Removed bottles should be capped and labeled according to the protocol established by your laboratory.

4.4 Grab Samples

Grab samples let you take a single sample on demand and collecting it in an external container. You can collect a grab sample while the sampler is running a program, paused, or at the Main Menu screen.

To collect a grab sample:

1. Press the GRAB SAMPLE button.
2. The sampler asks how much liquid to collect. To collect a sample volume defined by pump counts, select USE DEFINED SAMPLE. To collect a different volume, select the ENTER SAMPLE VOLUME, then

use the Number buttons to enter the desired grab sample volume.

 **Note**

If you selected the USE DEFINED SAMPLE option, the sampler will collect the sample volume according to the DEFINED SAMPLE calibration setting. For more information on this feature see section 3.6.1.

3. The sampler displays GRAB SAMPLE PRESS (enter) WHEN READY and waits for you to prepare to collect a grab sample. Pull the lower pump tube from the bulkhead fitting. Hold the end of the tube over a container. Press the Enter button when you are ready.
4. The sampler goes through a complete sample collection cycle and deposits the requested amount of liquid in the container.
5. Return the pump tube to the bulkhead fitting.

 **Note**

If a grab sample is taken while a program is running, it is not counted as part of the number of samples.

4.5 Calibrate Sample Volumes

The sampler can deliver sample volumes repeatable to ± 5 ml or $\pm 5\%$ of the average volume in a set. For accurate sample volumes, the sampler uses the suction line length (section 3.3.3) to generate pump tables. The pump tables along with the liquid detector are used to determine the suction head height and

measure the liquid volume. By calculating the suction head, the delivered volumes are not affected by varying liquid levels.

Incorrect suction line values, disabling the liquid detector, and worn pump tubes may adversely affect the sample volume accuracy.

Calibrating the sampler can enhance sample volume accuracy. To calibrate sample volumes, follow the steps below. These steps assume that the sampler has been correctly installed (section 2) and the suction line has been cut and its length entered in the sampler configuration (section 3.3.3). These steps also require a graduated cylinder to measure the delivered sample volume. Teledyne ISCO offers a 1000 ml graduated cylinder. Order part number 299-0020-00.

To calibrate the sample volume:

An alternative method using manually defined sample volumes may be helpful for difficult applications. See section 3.5.10.

1. At the Main Menu, press the Calibrate button.

2.

CALIBRATE VOLUME DEFINE SAMPLE

Select the CALIBRATE VOLUME option and press Enter.

3. CALIBRATE VOLUME:
PRESS ↵ WHEN READY!

4. Pull the lower pump tube from the bulkhead fitting. Hold the end of the tube over the graduated cylinder. Press the Enter button when you are ready.

5. TAKING ___ m^l
CALIBRATE SAMPLE

Hold the graduated cylinder while the sampler collects the sample.

6. VOLUME DELIVERED:
___ m^l

Measure the sample volume collected in the graduated cylinder and enter it in the VOLUME DELIVERED screen.

7. ___! ARE YOU
SURE? YES NO

If there is a large difference between the expected volume and your entered volume, the sampler asks you to confirm the entered volume. If the volume you entered is correct, select YES. Otherwise, select NO and re-enter the measured sample volume.

8. Return the pump tube to the bulkhead fitting.

For small volumes, repeat the calibration to ensure the calibration is averaged and not unduly influenced by the normal random variations.

4.6 Operate the Pump Manually

The sampler pump can be operated manually from the Main Menu display.

To operate the pump:

1. Press the “1” Number button to prepare the pump for reverse operation (line purge).



Or, press the “3” Number button to prepare the pump for forward operation (sample).



2. Press the Enter button to start the pump in the selected direction.
3. Press the Stop button to stop the pump and return to the Main Menu.

5800 Refrigerated Sampler

Section 5 Maintenance

This section describes how to maintain your sampler. If you think your sampler requires repair, or if you have questions concerning its operation or maintenance, contact your authorized ISCO service facility or Teledyne ISCO's Technical Service Department:

Phone: (800) 228-4373

(402) 464-0231 (international)

FAX: (402) 465-3001

E-mail: IscoWaterSupport@teledyne.com

5.1 Periodic Maintenance Checklist

Before each use:

- Inspect the pump. Service as necessary.
- Inspect the pump housing and rollers.
- Clean or replace the wetted parts (bottles, suction line, strainer, pump tube, and discharge tube).
- Clean the sampler as necessary.

5.1.1 Pump Inspection

Inspect the pump before each use. Inspections are especially important when pumping large sample volumes over long distances or when the sample liquid contains a high percentage of suspended or abrasive solids. Pumps in need of service might experience performance problems such as:

- Faulty liquid detection
- Inaccurate sample volumes
- The sampler will not pump any liquid
- Pump jams.

To inspect the pump:

1. Press the On/Off button to place the sampler controller in the Standby state. This ensures that the sampler will not attempt to operate the pump.



CAUTION

The sampler has a safety interlock that prevents the pump from operating when the pump housing band is open. **DO NOT** tamper with the pump housing and band. The pump is extremely powerful. The pump can injure you severely if the sampler activates the pump while you are working on it. Place the sampler controller in the Standby state before opening the pump housing.

2. Refer to Figure 5-1. Release the latch (G) securing the metal pump housing band (J).

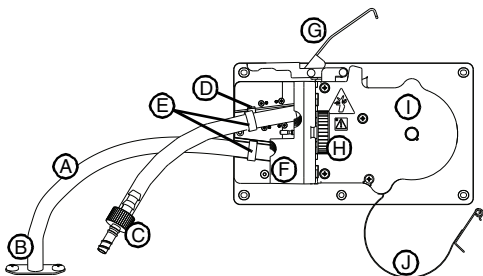


Figure 5-1 5800 Pump

- A. Pump Tube
- B. Bulkhead Fitting
- C. Tubing Connector
- D. Alignment Notches
- E. Alignment Collars
- F. Liquid Detector Cover
- G. Latch
- H. Knob
- I. Pump Housing
- J. Pump Housing Band

3. Swing the pump housing band away from the pump housing.

4. Inspect the following:

Pump tube – Look for excessive wear caused by the pump rollers and for cracks along the sides of the tube. Cracks might not be apparent unless you flex or squeeze the tubing. If

cracks or excessive wear are evident, replace the pump tube (section 5.1.2).

Pump Rotor – Look for debris build-up on the pump roller or guide surfaces (Figure 5-2). Clean when needed (section 5.1.3).

Housing – Look for debris inside the pump housing. Clean as necessary (section 5.1.4). (Debris inside the housing is usually evidence that a pump tube needs to be replaced.)

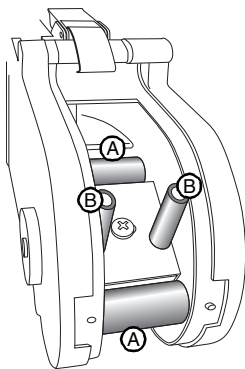


Figure 5-2 Rollers (A) and guides (B) on the pump rotor

5.1.2 Pump Tube Replacement

The correct sampler pump tubing is easily recognized by the blue alignment collars. Pump tubing from non-ISCO vendors and tubes designed for other types of samplers should not

be used. Incorrect pump tubing may result in poor pump performance or even cause parts to fail prematurely. Also note that the discharge tube is not the same as the pump tube.

Refer to Figure 5-1 and the following steps to replace the pump tube.

1. Unplug the sampler to ensure that it will not attempt to operate the pump.



CAUTION

The sampler has a safety interlock that prevents the pump from operating when the pump housing band is open. **DO NOT** tamper with the pump housing and band. The pump is extremely powerful. The pump can injure you severely if the sampler activates the pump while you are working on it. Place the sampler controller in the Standby state before opening the pump housing.

2. Loosen the Liquid Detector Cover (F) by unscrewing the large black knob (H).
3. Unlatch the Pump Housing Band (J).
4. Pull the tube (A) away from the bulkhead fitting (B) and disconnect the tubing connector and suction line.
5. Pull the old pump tube through the pump.
6. Thread the new pump tube through the pump. Note that the short end (inlet) should extend from the top opening.
7. Align the blue collars with the alignment notches.

8. Close the liquid detector cover and secure it tightly with the large knob.
9. Close the pump housing band and secure it with the latch.
10. Reset the pump-tube counter. (Follow the steps in section 3.3.9 and select YES when asked “RESET PUMP COUNTER?”.)
11. Take a “dry” grab sample (section 4.4) to test the new tube.
12. Reconnect the suction line.

Pump Tube Life – Several factors shorten the pump tube life. Among them are:

- Incorrect installation.
- Abrasive materials suspended in sample liquid.
- Frequent line rinses.
- Long purge cycles, such as those used with long suction lines.

To extend the life of the pump tubes:

- Always use ISCO pump tubes.
- Install the tube properly, aligning the blue collars correctly in the notches.
- Follow the natural curve of the tube when wrapping the tube around the pump rollers.
- Minimize the line rinses and sampling retries in the sampling programs.
- Use the shortest possible suction line.

5.1.3 Cleaning the Pump Rollers

Debris should be removed from the rollers and guides to keep the pump operating efficiently and to extend tubing life. Remove loose debris from the pump rollers, guides, and pump band with a stiff nylon-bristle brush. If debris has built up and cannot be removed with the brush, scrape the rollers or guides with a plastic or wooden tool to loosen the debris.



CAUTION

Do not use a metal tool. This might damage the plastic rollers and guides.

5.1.4 Cleaning the Pump Housing

Remove loose debris from the pump housing with a stiff nylon-bristle brush. If needed, flush debris from the housing with water. Do not forcefully spray with water. This might force water through the seals and bushings and damage internal components.

5.1.5 Cleaning or Replacing Wetted Parts

For general cleaning, you can wash the strainer and sample bottles with a brush and soapy water, then rinse with clean water. You can clean the liquid path through the wetted parts (Figure 5-3) by placing the strainer in a cleaning solution and pumping it through the delivery system. Next, place the strainer in clean water and pump it through the delivery system to rinse it. If these items are severely contaminated, replace them.

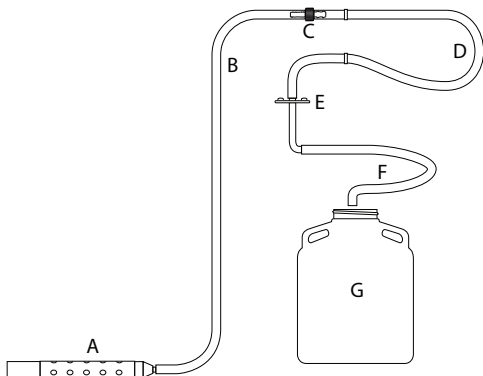


Figure 5-3 Wetted Parts

- A. Strainer (316 stainless steel, polypropylene, or CPVC)
- B. Suction Line (vinyl)
- C. Tubing Connector (316 stainless steel)
- D. Pump Tube (silicone)
- E. Bulkhead Fitting (316 stainless steel)
- F. Discharge Tube (silicone)
- G. Bottle Polyethylene

For application-specific requirements, consult with your laboratory to establish cleaning or replacement protocols.

5.1.6 Sampler Cleaning Guidelines

Keeping the sampler clean and protected from harsh elements may extend the usable life of the sampler. When necessary, clean the exterior and interior of the sampler with warm soapy water and brush, then rinse with water. Be sure to use a detergent that is compatible with low-density polyethylene, polystyrene, PVC, ABS, polycarbonate and NORYL^{TM1}. Avoid using strong solvents and acids.

1. NORYL is a registered trademark of SABIC Innovative Plastics IP B.V.

