





























## 1.2: Physical Description

The components of each refrigerated sampler are mounted in two parts, refrigerator and control.

### 1.2.1: Temperature Control System

The temperature is control by the thermostat mount inside the refrigerator. The temperature is adjusted by turning the temperature control knob clockwise for colder settings.

### 1.2.2: Sample Collection Systems

The sample collection system has the following major components:

- A clear plastic **sample chamber** with **velocity-limiting** and discharge-tube **pinch valves**.
- A **liquid-sensor that signals the controller when the sample chamber is full**.
- A piston or diaphragm **air compressor/vacuum pump** connected to that chamber by a four-way **solenoid valve**, which alternately evacuates and pressurizes the sample chamber in order to draw wastewater in and force it back out.
- A pump discharge pressure regulator and intake velocity-limiting valve.
- A 3/8 inch clear **stream sampling tube** that extends to the sampled wastewater stream.

The sample chamber and liquid-sensor are mounted inside the refrigerator, which also houses the sample storage system and is accessed through the unit's front door.

The pump, solenoid valve, pressure relief valve, step down transformer and fuse are mounted in the control box mount on top of the refrigerator.

### 1.2.3: Sample Storage Systems

Refrigerated Samplers can be purchased with either composite or sequential sample storage systems, which are installed in the sample compartment.

**Composite-storage** systems deposit all samples into a single container.

**Sequential-storage** systems deposit samples into multiple bottles.

If your sampler is configured for composite sampling, simply place the discharge tube in the center of the sample bottle. Refer to the instructions for your bottle size.

#### 1.2.3.1: 10 liter or 20 Liter Bottle Installation without indexing turntable

- 1) Remove cap (lid) and position the bottle under the discharge tube. Install discharge tube if needed.
- 2) Go to BOTTLE OPT. in the program menu and select COMPOSITE. Then select the correct bottle size.

**Note**

The composite containers are not designated to be used in the sampler along with the sequential table installed. If switching from sequential to composite sampling, the sequential turntable will need to be removed by removing the fastening screws and the table connector. In Bottle Opt. under the program menu, select Composite sampling.

**Sequential Storage** systems have multiple sample bottles twenty-four 500ml bottles sitting on a turntable-mounted carousel, which are rotated under the sample chamber and filled as specified by the sampling program.

Each program can be set to discharge one sample into each bottle, then a second sample into

























### 3.1: Control Buttons and Functions

<b>Table 3-1: Control Buttons Table</b>		
<b>Icon</b>	<b>Name</b>	<b>Functional Description</b>
<b>F1</b>	<b>HOME RUN STOP RESET ESC YES</b>	<b>Go to home screen Start the program Stop the program Reset the program Go back to previous menu Accept</b>
<b>F2</b>	<b>MAN TIMED GRAB BACK MORE</b>	<b>Manual sample Set a timed delay Grab sample Go back in the program See more detail in log file</b>
<b>F3</b>	<b>MENU SEL PAUSE RESTART START DETAIL CONTINUE NO</b>	<b>Go to menu Select Pause the program Restart a program Initiate sample View log detail Continue program Reject</b>
<b>Back</b>		<b>Press this button to back one space when entering a number.</b>
<b>Enter</b>		<b>Press this button to enter a number.</b>
<b>0-9</b>	<b>Keypad</b>	<b>Keypad enter number's</b>



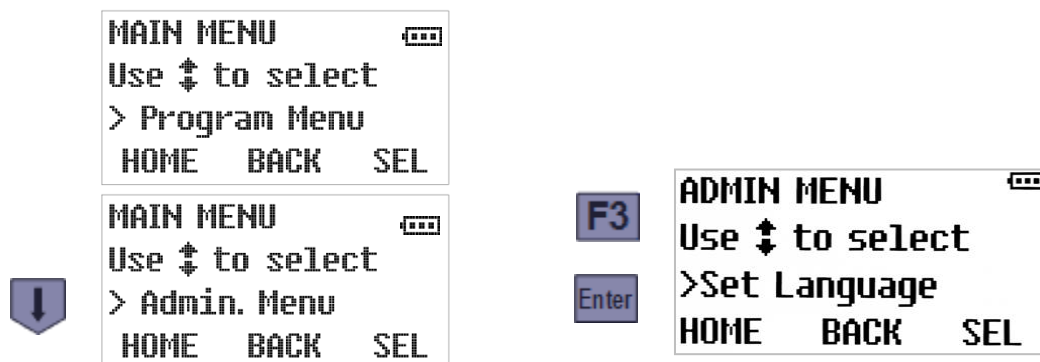


### 3.3: > Administration Menu

Administration Menu screens can be used to:

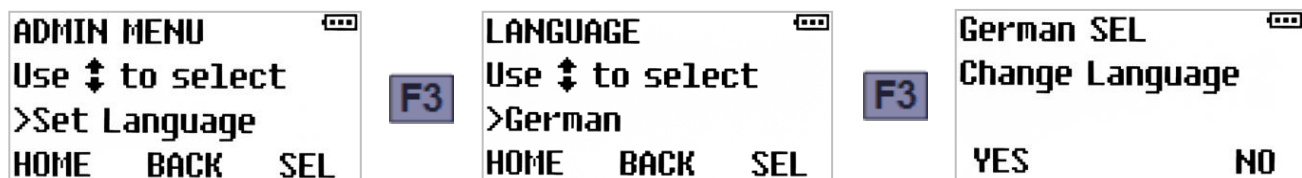
- > Set Language- change Languages (Chapter 3.2.1)
- > Set Password- set a password (Chapter 3.2.2)
- > Clr Password- allows you to clear the selected password
- > Set DST- set time for daylight saving time
- > Set Clock-set time and date (Chapter 3.2.3)
- > Adjust LCD- adjust display contrast (Chapter 3.2.4)
- > Download Archives- Downloading sampling data (this feature is not active at this time)
- > Clear Archives- clear sampling data (Chapter 3.2.5)
- > Set ID- sampler can be assigned ID number (Chapter 3.2.6)
- > Set Units- set units English or Metric (Chapter 3.2.7)

1. Access the **Main Menu** by pressing the MENU [F3] key and (if so prompted) entering the optional password (see Menu System above).
2. Press the DOWN key to scroll to the **Administration Menu** option, then press the SEL [F3] or Enter key to display that menu's first option:



#### 3.3.1: Set Language

Select this menu option to change the display language. To select a language, scroll using the up and down arrows to the right of the display (English, German, French, Spanish, Italian, Polish, Danish, Swedish) then push F3 (SEL) Enter. The screen will then advance to Change Language, Yes or No. If the language selection is correct, select Yes, if incorrect select No.









- Pressing the SEL [F3] or Enter key saves the displayed setting and displays the next Administration Menu option.



### 3.3.5: Archival Data Administration

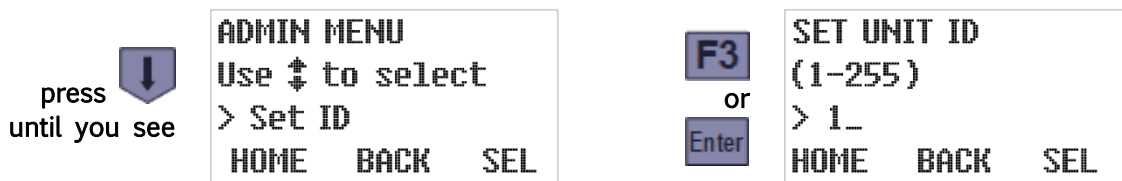
To erase those log files from the microprocessor’s memory, select the Administration Menu, use the Up or Down key to scroll to (Clear Archive) option, and press the SEL [F3] or the Enterkey.



### 3.2.6: Set ID Number

Each sampler can be assigned a unique ID number. To set it:

- Select the Administration Menu , use the Down key to scroll to its Set ID option, and then press the SEL [F3] or Enter key to display the current ID:



- Type the new ID by pressing the corresponding numeric keys, then press the SEL[F3] or Enter key to save it and advance to the next Administration Menu option:







## Chapter 4: Sampling Program Configuration

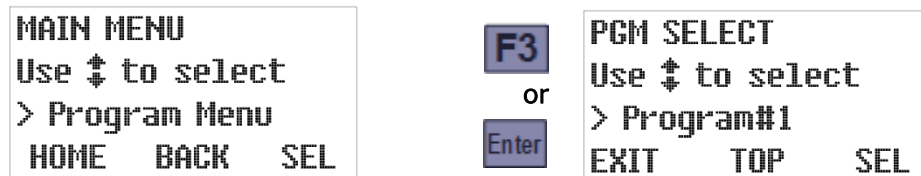
Each user interface panel's **Program Menu** is used to configure that controller's Sampling Programs (see Appendix A:) and specify which is selected to be configured and/or started. Although you can directly view and change individual parameters for each program, the menu is designed so that all parameters for each program can be set in one continuous process:

- Each program's parameters are divided into several configuration groups.
- Selecting a specific program displays the first parameter in its first group.
- Pressing the SEL[F3] or Enter key (whether or not you have changed the displayed value) displays the next parameter in the same group.
- Options that are rendered inapplicable by those you have already set are not displayed.
- Setting the last parameter in any group returns you to the Program Configuration menu with the next parameter group selected.

In other words, simply access the Program Menu, select the program you want to configure, and then keep pressing the SEL [F3] or Enter key as you verify or change each setting.

### 4.1 : Program Selection

Access the **Main Menu** by pressing the MENU [F3] key and (if so prompted) entering the optional password. The **Program Menu** should be the first Main Menu option—if not, use the Up or Down key to scroll to that option. Then press the SEL [F3] or Enter key to display the Program Select screen:



Use the Up or Down key to scroll to the program you want, then press the SEL [F3] or Enter key to select it and display the Program Configuration menu.



If that program has already been configured and you are just selecting it to be run, press HOME [F1] twice (or BACK [F2] or the Back key three times) to return to the Ready screen:



Otherwise, you can configure the selected program by setting the parameters in each of its five configuration groups (see next section).

## 4.2: Program Configuration Groups

The configuration parameters for each program are divided into five groups:

- Sampling Cycle Settings (Chapter 4.3)
- Sampling Intervals (Chapter 4.4)
- Bottle Options (Chapter 4.5)
- Run Options (Chapter 4.6)
- Program Events (Chapter 4.7)

To access a particular group, select the program you want to configure (see above) to display its Program Configuration menu. Use the Up or Down key to scroll to the parameter group of interest, then press the SEL [F3] or Enter key to display that group's first setting:

	<pre>PGM CONFIG Use ↑↓ to select &gt;Cycle HOME  BACK  SEL</pre>	<pre><b>F3</b> or Enter</pre>	<pre>PREPURGE (0-99 sec.) &gt; 15_ HOME  BACK  SEL</pre>
↓	<pre>PGM CONFIG Use ↑↓ to select &gt;Smpl. Interval HOME  BACK  SEL</pre>	<pre><b>F3</b> or Enter</pre>	<pre>SMPL. INTERVAL Use ↑↓ to select &gt;Time HOME  BACK  SEL</pre>
↓	<pre>PGM CONFIG Use ↑↓ to select &gt;Bottle Opts. HOME  BACK  SEL</pre>	<pre><b>F3</b> or Enter</pre>	<pre>SAMPLE TYPE Use ↑↓ to select &gt;Composite HOME  BACK  SEL</pre>
↓	<pre>PGM CONFIG Use ↑↓ to select &gt;Pgm. Run Opts. HOME  BACK  SEL</pre>	<pre><b>F3</b> or Enter</pre>	<pre>AUTO RERUN Toggle ↑↓ &gt;Enable HOME  BACK  SEL</pre>
↓	<pre>PGM CONFIG Use ↑↓ to select &gt;Pgm. Events HOME  BACK  SEL</pre>	<pre><b>F3</b> or Enter</pre>	<pre>PGM EVENT #1 Use ↑↓ to select &gt;End List HOME  BACK  SEL</pre>

You can return to the Program Configuration menu from any parameter screen by pressing the HOME [F1] key, and then to the Program Selection screen by pressing the BACK [F2] key:

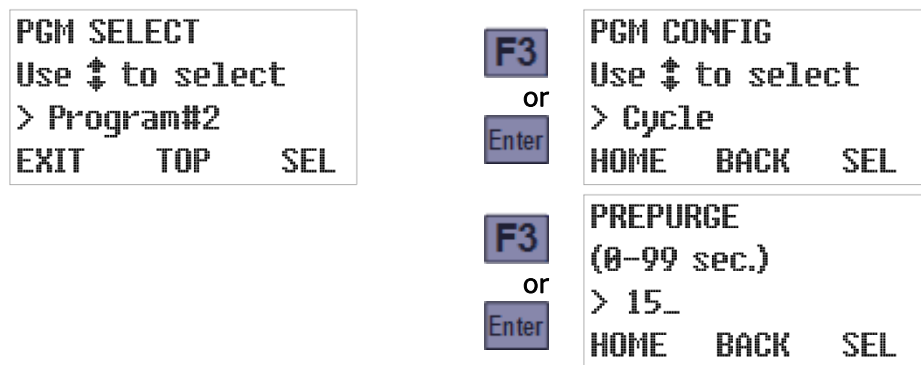
<b>F1</b>	<pre>PGM CONFIG Use ↑↓ to select &gt;Cycle HOME  BACK  SEL</pre>	<b>F2</b>	<pre>PGM SELECT Use ↑↓ to select &gt; Program#1 EXIT  TOP  SEL</pre>
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### 4.3: Sampling Cycle Settings

This group includes the parameters that configure the sampling cycle (Chapter 4.3).

- pre-sampling purge duration (Chapter 4.3.1)
- sample seconds (Chapter 4.3.2)
- post-sampling purge duration (Chapter 4.3.3)
- line conditioning rinses (Chapter 4.3.4)
- incomplete sample recycling (Chapter 4.3.5)
- consecutive sampling (Chapter 4.3.6)

To access those parameters, select the program you want to configure (Chapter 4.1) and press the SEL [F3] or Enter key to display its first parameter group (Cycle). Then press the SEL [F3] or Enter key again to display that group’s first setting:



#### 4.3.1: Pre-Sampling Purge Duration

This parameter specifies the number of seconds the chamber will be pressurized to clear the sampling tube prior to drawing a sample. To determine and optionally change its value:

1. Select the Cycle parameter group to display this parameter’s current value (see above).
2. If desired, type new pre-purge duration by pressing the corresponding numeric keys. When you type the first digit, the old value is erased and the F1 prompt changes from HOME to UNDO. You can then press the UNDO [F1] key to start over, or the BACK [F2] or Back key to delete the most recently typed digit.
3. Press the SEL [F3] or Enter key to save the displayed value (changed or not) and advance to the next Sampling Cycle group parameter.

To change the pre-purge duration to 20 seconds, for example:



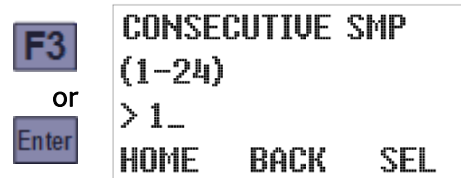




### 4.3.5: RECYCLE- (Sample Retry)

If this feature is turned On, the controller will “Recycle” the collection of incomplete samples by repeating the sampling cycle as many as four times.

1. View/change the rinse settings and then press the SEL [F3] or Enter key to display the status of this feature.
2. You can toggle this feature On or Off by pressing the Up or Down key.
3. Press the SEL [F3] or Enter key to save the displayed status and advance to the next Sampling Cycle group parameter.



### 4.3.6: Consecutive Sampling

This parameter specifies the number of samples at the end of each time or flow interval. If you set it to more than one, the full sampling cycle (including recycling, if needed) will be repeated the specified number of times for each interval.

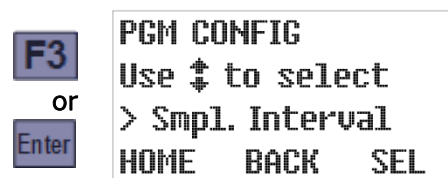
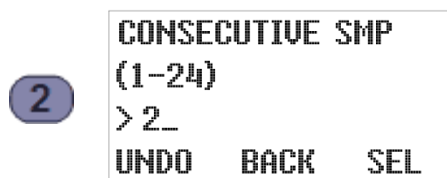
You might want to specify more than one and configure appropriate bottle options for either of two reasons:

- Drawing several samples one after the other and discharging them to the same container effectively allows you to collect samples larger than the 400 ml maximum size.
- Drawing consecutive samples and discharging them to different containers allows you to save and process duplicate samples for verification purposes.

To view/change the number of samples per interval:

1. View/change the recycling settings and then press the SEL [F3] or Enter key to display the current value of this parameter.
2. Type the new value by pressing the corresponding numeric keys. Then press the SEL [F3] or Enter key to save the displayed value and return to the Program Configuration menu scrolled to the next parameter group.

To configure a sample to draw two samples per interval, for example:



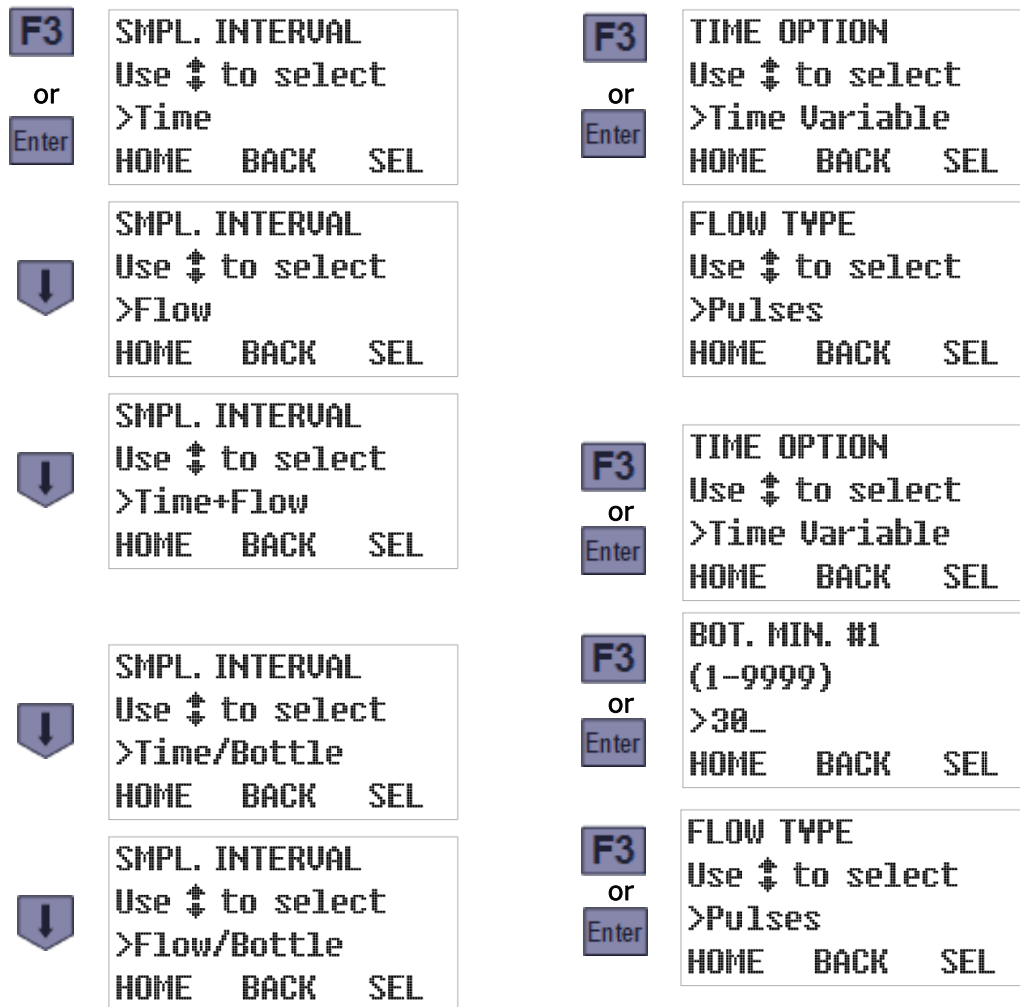
### 4.4: Sampling Intervals

This group includes one main parameter that specifies the type of sampling interval(s) the controller will use, and several parameter groups that configure those interval(s).

To directly access the sampling interval type, select the program you want to configure then press the Down key to scroll to the Sample Intervals group:



Press the SEL [F3] or Enter key to display the currently configured interval type, then use the Down or Up key to scroll to the desired new setting. With that value displayed, press the SEL [F3] or Enter key to display the first parameter for that interval type:



The “per bottle” options will appear only if your controller is equipped with the multiple bottle turntable and factory-configured to display the discrete sampling bottle options.



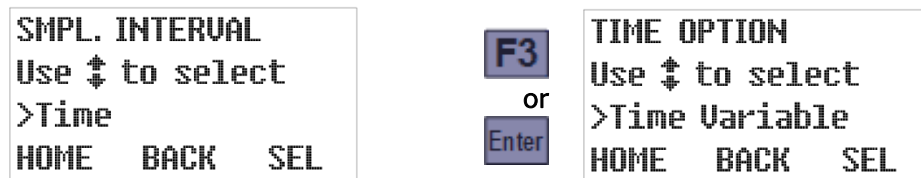
### 4.4.1: Timed Interval Sampling

Selecting the **Time** sampling interval option configures the controller to wait a specified number of minutes after initiating one sample before initiating the next:

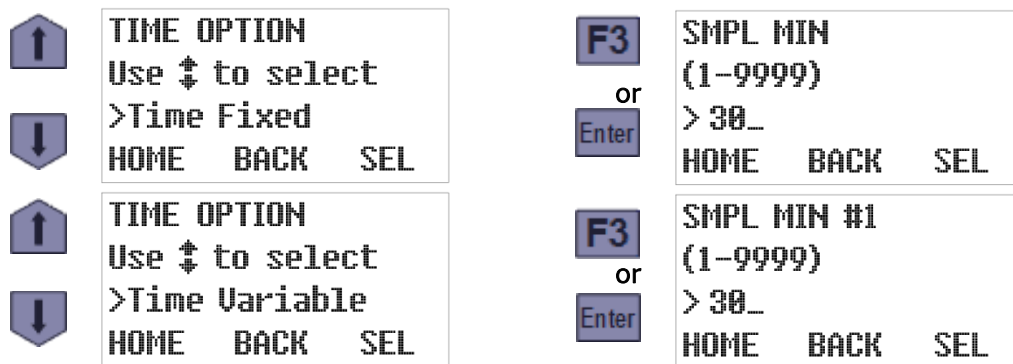
- If the samples are taken at regular intervals, select the **Time Fixed** option and then set the fixed length of those intervals. For example, you might configure a program to draw samples every 60 minutes until it is stopped.
- Otherwise, select the **Time Variable** option and then specify no more than 24 time intervals. One sample will be drawn at the end of each specified interval, after which the last interval will be repeated until the program is stopped. For example, you might configure a program to draw its first sample an hour after starting and then switch to 30 minute intervals.

To select the desired option:

1. Scroll the Sample Interval parameter’s value to Time (see above), then press the SEL [F3] or Enter key to save that value and display the currently selected Time Option:



2. Use the Up or Down key to toggle between that parameter’s two possible values, then press the SEL [F3] or Enter key to save the displayed value and display its first setting:



#### 4.4.1.1: Fixed Length Time Intervals

As shown above, selecting the **Time Fixed** option displays its first (and only) parameter—the length of time it waits between initiating any sample and the next. To change it, type the new duration (20 minutes, for example) by pressing the corresponding numeric keys. Then press the SEL [F3] or Enter key to save the displayed Sample Minutes (changed or not) and display the Program Configuration menu’s Bottle Options screen:





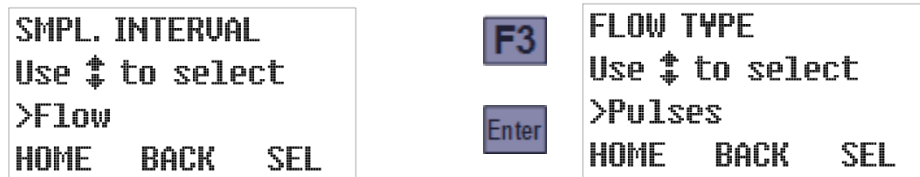
### 4.4.2: Flow Interval Sampling

Selecting the **Flow** sampling interval option configures the controller to initiate sampling as its accumulated flow measurement increases by specified volumes. You must then:

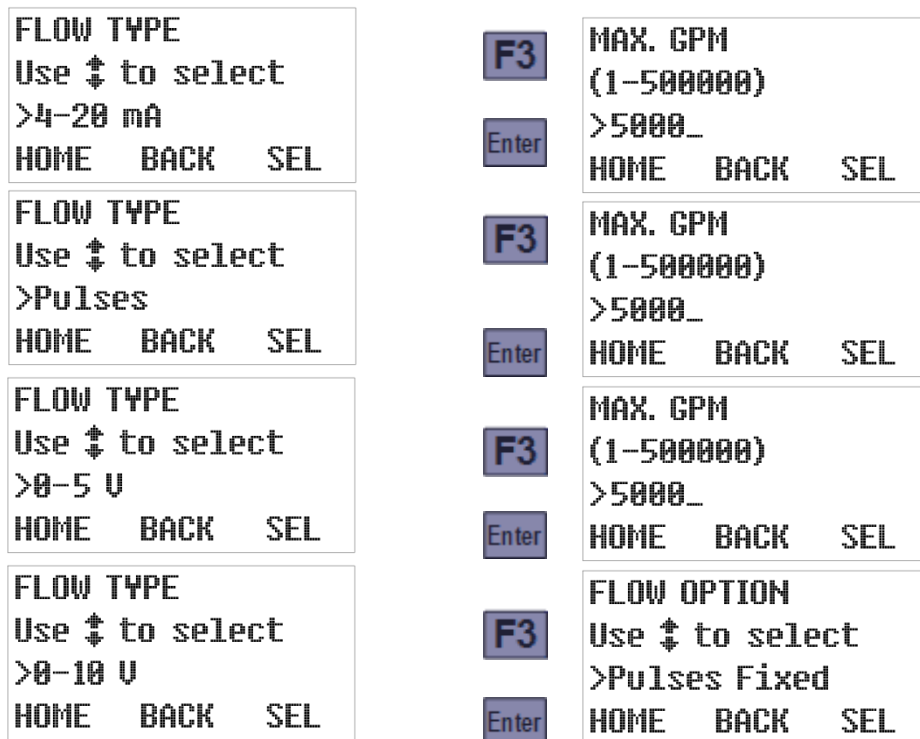
- Select the flow input type (4-20 mA, 0-5 VDC, 0-10 VDC, or discrete pulse).
- Specify the flow rate corresponding to the maximum signal (analog input only).
- Specify the incremental flow between the initiation of one sample and the next:
  - If the samples are to be drawn at regular intervals (for example, after each 5000 gallon flow increment), select the **Flow Fixed** option and set the fixed length of those intervals.
  - Otherwise, select the **Flow Variable** option and specify no more than 24 flow intervals. One sample will be drawn at the end of each specified interval, after which the last interval will be repeated until the program is stopped. For example, you might configure a program to draw its first sample when the total flow reaches 5000 gallons, and then switch to 2500 gallon intervals (i.e., after 7500, 10000 and so on total gallons).

Flow volumes are specified in either gallons or liters, depending on the current Administration Menu Set Units setting (Chapter 3.2.7).

To specify the input type, scroll the Sample Interval parameter's value to Flow, then press the SEL [F3] or Enter key to save that value and display the currently selected Flow Type:



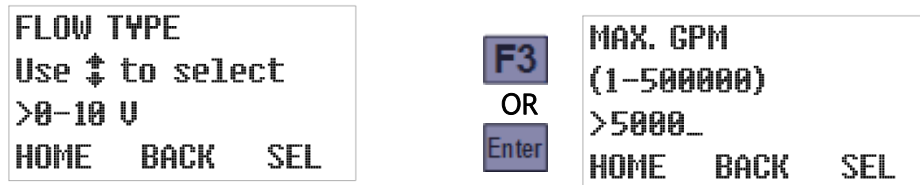
Use the Up or Down key to scroll to the desired type, then press the SEL [F3] or Enter key to save it and display its first setting:



### 4.4.2.1 : AnalogFlowInput

If you select one of the analog inputs types (4-20 mA, 0-5 VDC, or 0-10 VDC), samples will be initiated an integer number of gallons apart. Thus, you must specify the flow rate (in gallons per minute) corresponding to the transmitter's maximum signal, after which you can specify the sampling intervals in gallons:

1. Select the flow input type (as described above) to display the current maximum flow rate setting (the rate at which the transmitter would transmit its maximum signal). This example shows the 0-10 VDC option, but the resulting screen would be the same for the 0-5 VDC or 4-20 mA options as well:

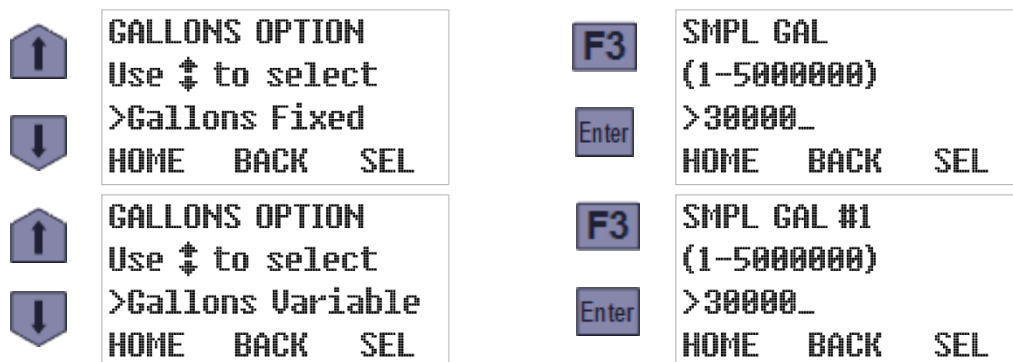


2. To change that setting, type a new maximum flow rate by pressing the corresponding numeric keys. When you type the first digit, the old value will be erased and the F1 prompt will change from HOME to UNDO. You can then press the UNDO [F1] key to start over, or the BACK[F2] or Back key to delete the most-recently typed digit.
3. Press the SEL [F3] or Enter key to save the displayed value (changed or not) and display the current flow option (fixed or variable sampling intervals). As an example:



The above example assumes you are using a flow transmitter whose signal varies from 0 VDC at no flow up to 10 VDC at 1500 gallons per minute. A 1.0 VDC signal would then indicate the flow was 150 GPM, so the controller would then calculate the instantaneous flow by multiplying 150 by the input signal in volts.

4. Use the Up or Down key to toggle between the Flow Option's two possible values, then press the SEL [F3] or Enter key to save the displayed value and display its first setting:



### 4.4.2.1.1 : Fixed Volume Flow Intervals

As shown previously, selecting the **Flow Fixed** option displays its only parameter—the specified change in flow between samples. To change that interval, type a new value by pressing the corresponding numeric keys. Then press the SEL [F3] or Enter key to save the displayed Sample Gallons (changed or not) and display the Program Configuration menu’s next screen:



### 4.4.2.1.2 : Variable Volume Flow Intervals

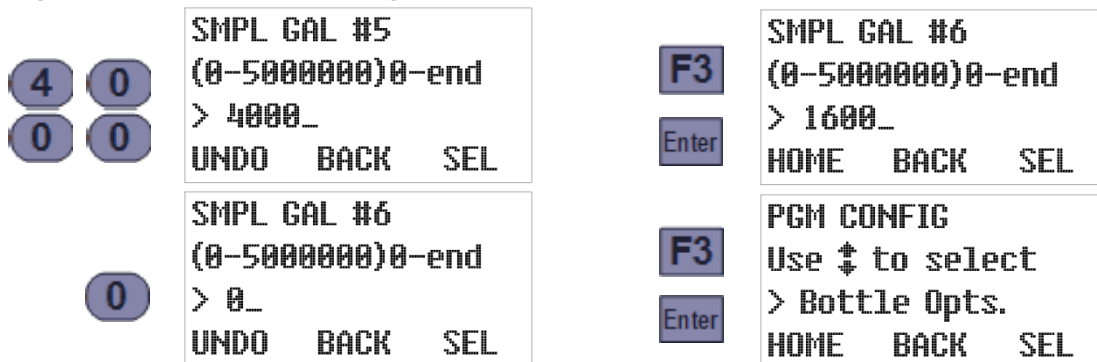
As shown previously, selecting the **Flow Variable** option displays the first of 24 Sample Gallons parameters—the incremental flow at which the controller will draw its first sample. To change it, type the new flow increment (2400 gallons, for example) by pressing the corresponding numeric keys. Press the SEL [F3] or Enter key to save that value (changed or not) and display the next:



The digit keys can then be used to change the number of gallons the program would measure between initiating its first and second samples. Pressing the SEL [F3] or Enter key would again save the displayed value and display the next. And so on until pressing the SEL [F3] or Enter key while Sample Gallons #24 is displayed restores the Program Configuration menu scrolled to its next group (Bottle Options):



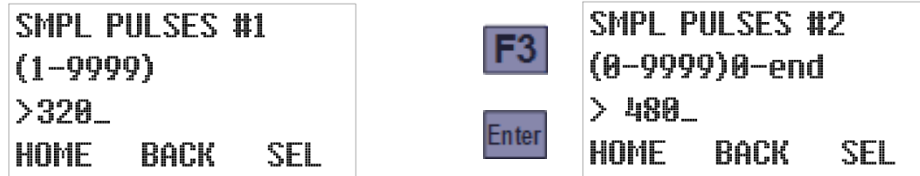
However, you do not need to set all 24 intervals—setting any one of them to 0 configures the program to use the value of the preceding parameter for all subsequent intervals. For example, setting Sample Gallons #5 to 4000 and Sample Gallons #6 to 0 would have the same effect as setting Sample Gallons #6 through #24 all to 4000 (the value of Sample Gallons #5):





### 4.4.2.2.2: Variable Pulses Flow Intervals

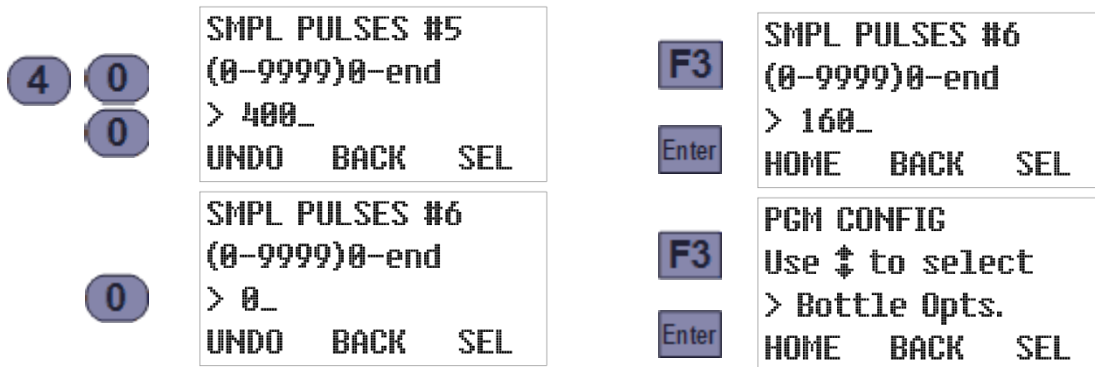
Selecting the **Pulses Variable** option displays the first of 24 Sample Pulses parameters—the number of pulses at which the controller will draw its first sample. To change it, type the new first sample pulse count (240, for example) by pressing the corresponding numeric keys. Press the SEL[F3] or Enter key to save that value (changed or not) and display the next:



The digit keys can then be used to change the number of pulses the program would wait between initiating its first and second samples. Pressing the SEL [F3] or Enter key would again save the displayed value and display the next. And so on until pressing the SEL [F3] or Enter key while Sample Pulses #24 is displayed restores the Program Configuration menu scrolled to its next group (Bottle Options):



However, you do not need to set all 24 intervals—setting any one of them to 0 configures the program to use the value of the preceding parameter for all subsequent intervals. For example, setting Sample Pulses #5 to 400 and Sample Pulses #6 to 0 would have the same effect as setting Sample Pulses #6 through #24 all to 400 (the value of Sample Pulses #5):



### 4.4.3 Time+Flow Interval Sampling

Selecting the **Time+Flow** sampling interval option configures the controller to draw samples at either time or flow intervals, which ever proves to be the soonest for each sample. In other words, it accumulates both the time and the flow since the last sample was initiated and initiates the next (and resets both counters) as soon as either reaches its configured target.

When this option is selected you will be prompted to:

1. Select the Time Option and set its associated parameters (Chapter 4.4.1), and then
2. Select the Flow Type and Option and set their associated parameters (Chapter 4.4.2).





### 4.4.5: Per-Bottle Flow Interval Sampling

Selecting the **Flow/Bottle** sampling interval option configures the program to draw samples at flow intervals that are tied to the position of the bottle carousel.

Before specifying those intervals, you must first select the flow input type. For instructions on doing that, please refer to the Flow Interval Sampling (Chapter 4.4.2). Once you have done that, the screens you will see depend on whether you are using an analog or a discrete input:

- For analog flow inputs, you first specify the flow rate corresponding to the transmitter’s maximum signal and then specify the sampling intervals in gallons. The procedures are the same as described previously in the Analog Flow Input (Chapter 4.4.2.1.1) and the Variable Flow Intervals (Chapter 4.4.2.1.2)

The flow interval for samples deposited to the first bottle are specified by the Sample Gallons #1 parameter, the interval for the second bottle’s samples are specified by the Sample Gallons #2 parameter, and so on.

- For discrete flow signals, those intervals are specified as pulse counts. The procedure is the same as described previously in the Variable Pulses Flow Intervals (Chapter 4.4.2.2.2).

The flow interval for samples deposited to the first bottle are specified by the Sample Pulses #1 parameter, the interval for the second bottle’s samples are specified by the Sample Pulses #2 parameter, and so on.

## 4.5: Bottle Options

This group includes one main parameter that specifies which type of sample containers your sampler has (Chapter 1.3.2) and a set of parameters for each possible type. To directly access that main parameter, select the program you want to configure (Chapter 4), then press the Down key twice to scroll to the Bottle Options group:



Press the SEL [F3] or Enter key to display the currently selected storage type, then use the Down or Up key to toggle between that parameter’s two possible values. Pressing the SEL [F3] or Enter key will display the first parameter for that sample storage option:











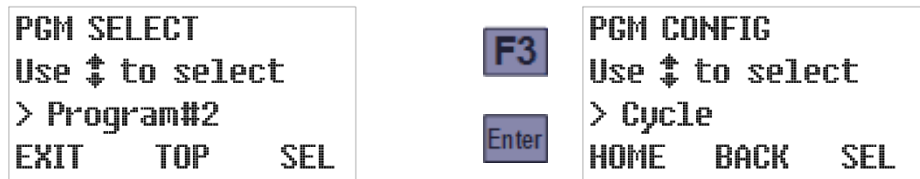


## 4.6: Program Run Options

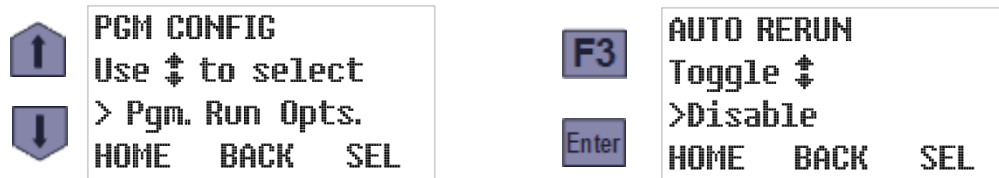
This group includes the parameters that configure the following features:

- automatic rerun (Chapter 4.6.1)
- delayed starting (Chapter 4.6.2)
- float enable (Chapter 4.6.4)
- fault enable (Chapter 4.6.3)
- timed stop (Chapter 4.6.5)
- bottle limit override (Chapter 4.6.6)

To directly access those parameters, select the program you want to configure (Chapter 4):



Press the Up key twice to scroll to the Program Configuration menu’s Run Options group, then press the SEL [F3] or Enter key again to display that group’s first setting:



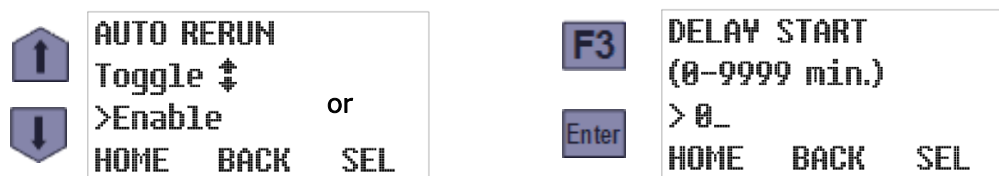
### 4.6.1: Automatic Rerun

By default, the sampling program must be manually reset each time it stops, which indicates to the controller that the sample containers have been emptied. If you configure a Start Event (Chapter 4.6.1) to repeatedly start and stop the sampler, enabling the Automatic Rerun parameter as well would enable the program to restart without being reset.

*⚠ You should not enable this parameter unless you are scheduling automatic weekly start events.*

To view and optionally change this setting:

1. Select the Run Options group to display this parameter’s current value (see above).
2. If desired, press the Up or Down key to toggle it on or off, then press the SEL [F3] or Enter key to save the displayed value (changed or not) and advance to the next Run Options group parameter.



## 4.6.2: Delayed Start

By default, starting a sampling program will immediately initiate its interval timers. If it is set up to draw samples at one-hour intervals, for example, the first will be taken one hour after the program is started. You can configure it to wait longer than that by setting a non-zero start delay. Other methods of delaying the first sample are to use the Float Enable parameter (Chapter 4.6.4) schedule regular automatic Start Events (Chapter 5.3.3) or manually set up one-time Timed Starts (Chapter 5.3.1).

To view and optionally change this setting:

1. Accept or change the Auto Rerun setting, which will display this parameter's current value.
2. If desired, type a new delay duration by pressing the corresponding numeric keys. When you type the first digit, the old value is erased and the F1 prompt changes from HOME to UNDO. You can then press the UNDO [F1] key to start over, or the BACK [F2] or Back key to delete the most-recently typed digit.
3. Press the SEL [F3] or Enter key to save the displayed value (changed or not) and advance to the next Run Option group parameter.

To change the start delay to 360 minutes, for example:




## 4.6.3: Fault/Alarm Option

This parameter specifies whether the alarm relay (Appendix A.2.2) should energize when the sampling program is waiting to be reset (whether it completed normally, was manually stopped, or detected a fatal fault) or is continuing to run despite have detected a non-fatal fault.

To view and optionally change this setting:

1. Accept or change the Delayed Start setting to display this parameter's current value.
2. If desired, press the Up or Down key to toggle it on or off, then press the SEL [F3] or Enter key to save the displayed value (changed or not) and advance to the next Run Options group parameter:

The alarm output is based one of the following events: 

- **Program Done:** This event occurs when a running program has finished or the sample bottle has reach the maximum number of samples. This alarm output stays on as long as the run time display reads **PGM : DONE**.
- **Recycle:** The collection of incomplete samples by repeating the sampling cycle as many as four times. To enable or disable it:
- **Temperature Error:** The temperature has been above its set temperature for more than 30 minutes.
- **Failed Sample:** This event occurs when the sample does touch the liquid-sensor electrodes.
- **Indexing Error:** This event occurs when the sampler has an indexing failure. This condition needs corrected before the sampling program can resume. This alarm output stays on until the condition is corrected.



#### 4.6.4: Float Option

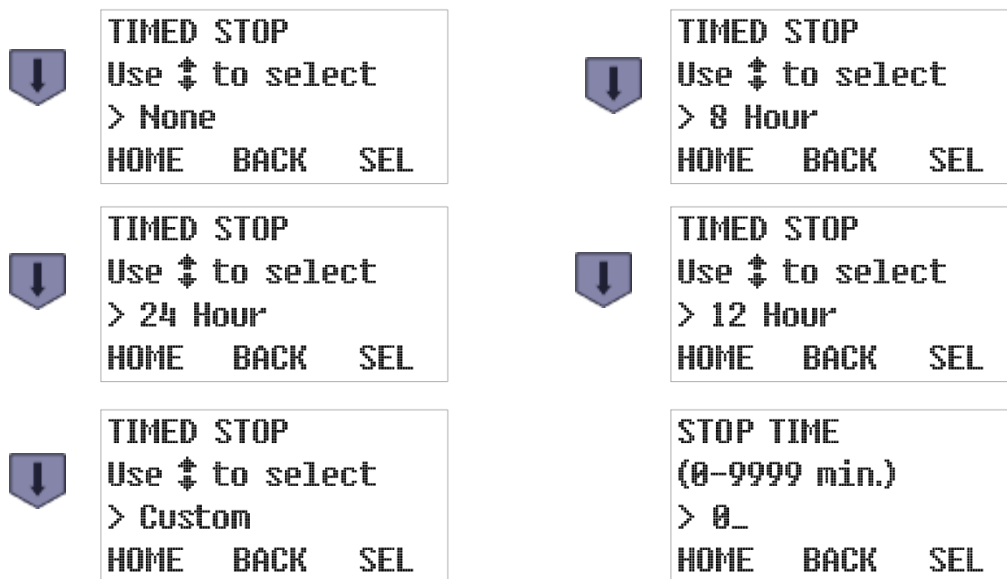
Depending if the FLOAT INPUT options have been **factory-configured**, enabling this input will configure the sampling program to delay sample collection until that circuit closes and subsequently either: **This feature is configured at the factory.**

- **Float Start:** If the FLOAT START setting is selected, the program will start with a closed contact and the program will continue sampling without interruption even if that circuit re-opens.
  - **Float Start/Stop:** If the FLOAT START/STOP setting is selected, the program will reset its sampling interval counters and not restart them until the float circuit closes again (i.e., those counters will restart from zero when the water level rises high enough to close the float switch). This feature is used for the full bottle shut off switch.
1. Accept or change the Fault Option setting, which will display this parameter's current value.
  2. If desired, press the Up or Down key to toggle it on or off, then press the SEL[F3] or Enter key to save the displayed value (changed or not) and advance to the next Run Options group parameter.

#### 4.6.5: Timed Stop

This parameter configures the program to automatically stop a specified number of hours or minutes after it initiates its interval timers. To view and optionally change its value:

1. Accept or change the Fault Option setting, which will display this parameter's current value.
2. If desired, press the Up or Down key to scroll to the desired value, then press the SEL[F3] or Enter key to save that value (changed or not). Selecting any option other than Custom will save that value and display the next Run Option parameter's current value:



Selecting the Custom option displays a screen for setting the number of minutes the program will run before automatically stopping. The digit keys can then be used to change that setting, and pressing the SEL [F3] or Enter key will save the displayed value and display the next Run Option parameter's current value:



#### 4.6.6: Bottle Limit Override

Each program's Bottle Options (Chapter 4.5) configure it to stop after discharging a specific number of samples into its composite sample container (or each of its discrete sample bottles), provided this parameter has its default "Program Stop" value. If you would prefer that the unit continue drawing samples indefinitely, without keeping track of how full the sample container is (or bottles are), you should instead set this parameter to "Program Continue":

1. Accept or change the Stop Time setting, which will display this parameter's current value.
2. If desired, press the Up or Down key to toggle between its two possible values, then press the SEL [F3] or Enter key to save the displayed value (changed or not) and return to the Program Configuration menu.



## 4.7: Program Events

Each program's scheduled events (Appendix A.3.6) are defined by a list that can be accessed via the **Program Events** group. Each event on that list has three associated values:

- the type of event (start, stop, pause, halt, resume or manually sample),
- the days of the week on which the event will be executed, and
- the time of day on those days at which the event will be initiated.

Events are consecutively numbered as they are defined, so the event numbers shown when you review the list do not indicate the order in which those events will be executed. You cannot directly access a particular event's settings, add a new event without reviewing those already on the list, or delete an event without deleting all higher numbered events as well. But you can disable an existing event (by setting it to execute on no days of the week) or replace it by changing any or all of its three settings (type, days and/or time).

#### 4.7.1: Reviewing Scheduled Events

When you access the Program Events group, it will initially display the event type for the first event on the list (which will be **End List** if there are none). Repeatedly pressing the Enter key will then display the remaining settings for that event, followed by the settings for the second event, and so on until you reach the first undefined event (whose type will be End List).











## Chapter 5: Sampler Operation

Although your Refrigerated Samplers requires little or no operator intervention, its user interface panel can be used to:

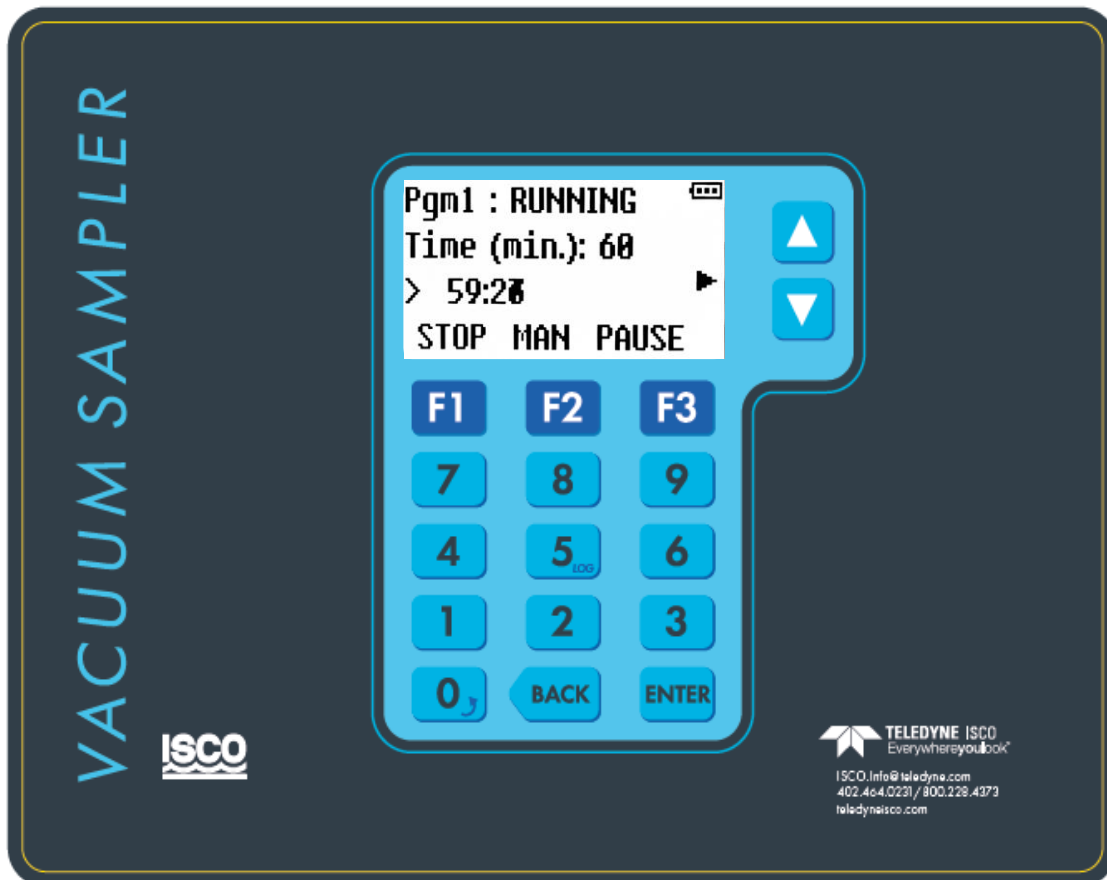
- select a different sampling program (Chapter 4.1)
- start the indicated program (Chapter 5.3)
- monitor the program while it is running (Chapter 5.4)
- manually collect unscheduled samples (Chapter 5.4.3.2)
- pause and resume sample collection (Chapter 5.5)
- stop and reset the sampling program ( Chapter 5.6)
- review archived sample collection data (Chapter 5.7)

That interface (see below) is mounted in the upper shell's top panel and consists of a keypad and a four-line LCD readout:

- The readout's top line identifies the selected program and displays its operating state.
- Its second and third lines display sets of status information you can cycle through by pressing the Up or Down keys to the right of the readout.
- Its bottom line indicates the functions of the F1, F2 and F3 keys.

In addition, any of the icons listed in Table 5-1 might be displayed along its right edge.

*Table 5-1: User Interface Panel and Icons*



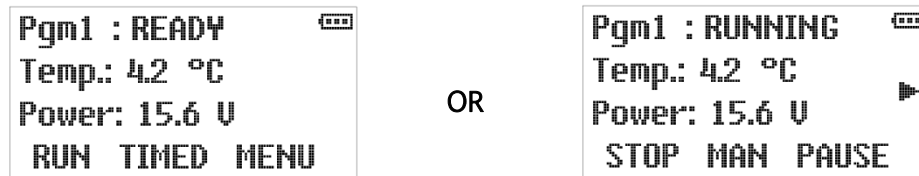






## 5.2: Sampler Conditions

The approximate control system power supply voltage is always indicated by a battery icon in the upper right corner of the user interface readout, and you can scroll to a screen that displays that voltage and the current sample storage compartment temperature:



A fault icon will also be displayed if any of the following fault condition exists:

- Sampling has been suspended because the float input circuit is open;
- Indexing Error has occurred.
- Bottle full or program complete.
- The most recent sample cycle failed to trigger the liquid-sensor.
- The storage compartment has been above its intended temperature for at least 30 minutes (this will also be indicated by displaying a °C icon).

Those conditions will also energize the Alarm Relay (if enabled), which is also energized when the program is waiting to be reset after completing normally, being manually stopped, or failing to determine the position of the sequential-sampling turntable.

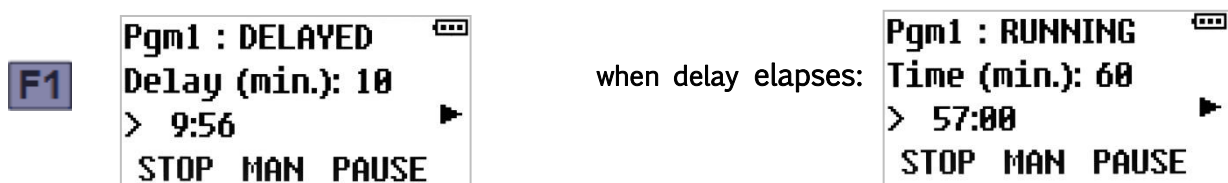
## 5.3: Starting the Selected Program

When the control system is in its Ready state:

- Pressing the RUN [F1] key starts the selected sampling program. The first sample will be taken once the turntable reaches home position or a programmed delay has timed out. However, it might not begin sampling until a time delay elapses, a stream-level float switch closes, or a scheduled time arrives.
- Pressing the TIMED [F2] key allows you to set a timer that starts that program at a specified time and date (see Timed-Delay Starting below). Any configured time or float-input delay would further delay the first sampling interval.
- Pressing the MENU [F3] key will activate the menu system (Chapter 3.1). You could then select a different program using the Program Menu (Chapter 4), although you might first need to enter the administration password ((Chapter 3.2.2)

### 5.3.1: Timed-Delay Starting

The interval counter(s) will not start until the start delay (if non-zero) has elapsed. In the meantime, the operating state will display as DELAYED and the first information screen will indicate the progress of that delay:







## 5.4: Running State

Once the selected program has initiated its sampling-interval counters, the readout's top line displays its operating state as "RUNNING". The second and third lines display scrolling sets of additional information similar to those available in the Ready state:

If set for Time+Flow intervals, the elapsed Time and Gallons or Time and Pulses will be shown. If not, only one of them will.



```
Pgm1 : RUNNING
Time (min.): 60
> 57:00
STOP MAN PAUSE
```

Program 1 is sampling at timed intervals. The sample will be drawn after a 60 minute interval and the time interval counts down.

```
Pgm1 : RUNNING
Gallons : 2500
> 1048 : 42%
STOP MAN PAUSE
```

Program 1 is sampling at measured flow intervals. The next one will be drawn after a 2500 gallon interval that started 1048 gallons ago (42 percent elapsed).

```
Pgm1 : RUNNING
Pulses : 600
> 253 : 42%
STOP MAN PAUSE
```

Program 1 is sampling at flow meter pulse intervals. The next one will be drawn after a 600 pulse interval that started 253 pulses ago (42 percent elapsed).



```
Pgm1 : RUNNING
Smp1:#8
12:34:56 07/08/15
STOP MAN PAUSE
```

The next sample will be the eighth (#8) drawn by the current program run. The current time is 12:35:45. The current date is July 8, 2018.

sample container screens (Chapter 5.4.2)

start timer (Chapter 5.3) or stop timer (Chapter 5.6) screen



```
Pgm1 : RUNNING
Temp.: 4.2 °C
Power: 15.6 V
STOP MAN PAUSE
```

The current sample storage compartment temperature is 4.2 degrees Celsius and the control system power supply is providing 15.6 VDC power.

When the indicated program is running, the top row keys are assigned the following functions:

- Pressing F1 will immediately stop the program (Chapter 5.6).
- Pressing F2 will immediately trigger the collection of a manual sample (Chapter 5.4.3.2).
- Pressing F3 will pause the sampling (Chapter 5.5).









### 5.4.3.1 : Incomplete Sample Recycling

If the sample seconds timer elapses before the chamber fills to the liquid-sensor level, a failed sample error will be indicated:

- If “recycling” is disabled, the error screen is displayed for only a few seconds, after which the line is purged and the incomplete sample is discharged.
- If it is enabled, a recycling icon is displayed while the pre-purge and vacuum steps are repeated. When the chamber finally fills, or the fourth recycle fails, the line is purged and the sample is discharged.

if the target weight is not reached	<pre>SAMPLING failed sample please wait... STOP</pre>	If recycling is enabled	<pre>SAMPLING failed sample please wait... STOP</pre>
when sample is completed or aborted	<pre>SAMPLING postpurge... sec: 25 STOP</pre>	post-purge counts down	<pre>SAMPLING read weight... sec: 4 STOP</pre>

### 5.4.3.2: Manual Sampling

Pressing the MAN [F2] key while the selected program is running will trigger the immediate collection of an unscheduled sample using the configured sampling cycle discussed above:

<pre>Pgm1 : RUNNING Time (min.): 60 &gt; 57:00 STOP MAN PAUSE</pre>	<div style="border: 1px solid black; background-color: #4a7ebb; color: white; padding: 5px; display: inline-block;">F2</div>	<pre>SAMPLING loadcell init... sec: 2 STOP</pre>
---	--	--

That sample will then be discharged to the bottle meant for the next automatic sample and counted toward the number of samples the program is configured to put into that bottle. If it fills that bottle, the next one will be rotated into place (sequential-sampling units) or the sampling program will be stopped (composite-sampling units).

If an automatic sample would otherwise have been triggered during the manual cycle, the following screen will be briefly displayed:

```
SMPL. INTERVAL
Sample Blocked
>Wait
ESC
```

Blocked samples ARE NOT DRAWN when the manual sample is completed.

## 5.5: Paused and Halted States and Grab sampling

If you press the PAUSE [F3] key while a program is running, it will immediately enter its PAUSED state. Programs can also be configured to automatically pause and resume at scheduled times.

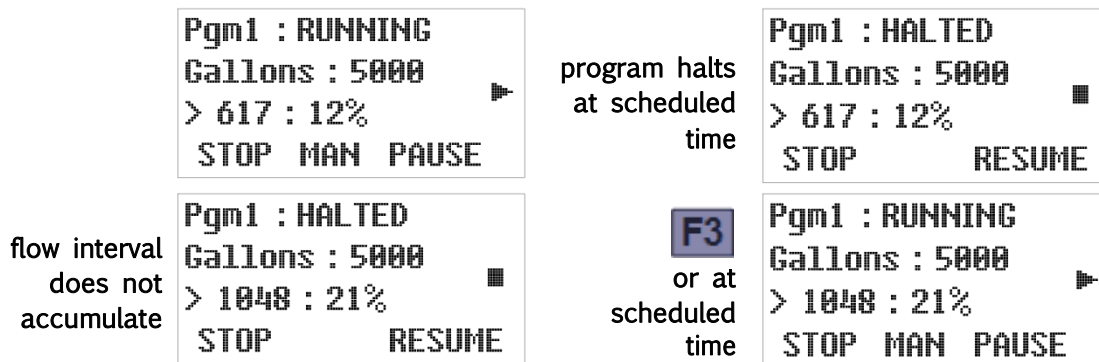
While the program is paused, the run icon is replaced by a paused icon. The sampling interval will continue to accumulate, but no samples will be taken until the RUNNING state is restored by pressing the RESUME [F3] key:



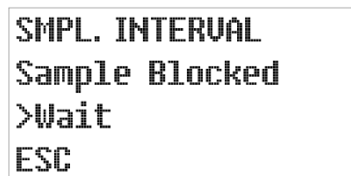
**Notice:** The interval continues to accumulate when the program is paused.

Programs can also be configured to halt and resume at scheduled times. The resulting Halted state is similar to the Paused state, except that any configured flow intervals will not continue to accumulate.

While the program is halted, the running icon is replaced by a halted icon (as shown below). The Running state is often automatically restored at a scheduled time, but in any case can be manually restored by pressing the RESUME [F3] key:



You can stop the program or take manual samples while automatic sampling is paused or halted. If the configured sampling interval reaches 100 percent one or more times, the following screen will briefly appear:

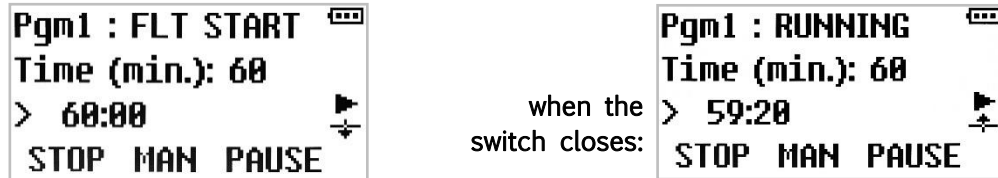


*Blocked samples are not drawn when the paused or halted program is resumed.*



### 5.5.3 : Float Suspended Sampling

If the Float Option (Chapter 4.6.4) is enabled and factory-configured (Chapter 2.6.1) to suspend sampling when that input is cleared, the interval counters are held at zero whenever the float switch is open: This option is used with the full bottle switch.

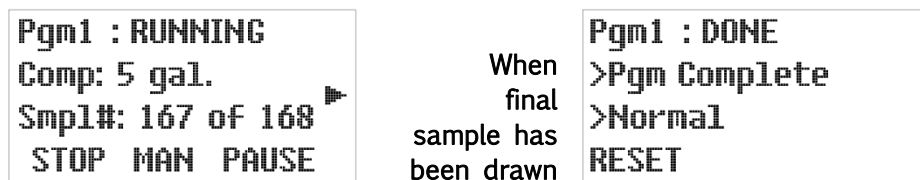


Note that the float icon points down when the float-switch circuit is open (sampling suspended) and up when that circuit is closed (sampling resumed). This can be remembered by thinking of this icon as a thumbs-up or thumbs-down indicator:

- indicates the stream depth is insufficient to sample/ Full container
- indicates the stream depth is sufficient to sample / Empty container

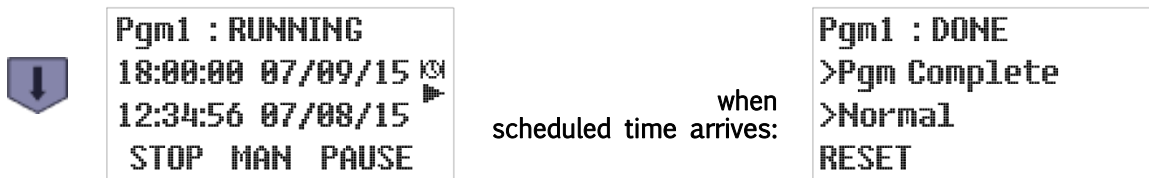
### 5.6: Stopping the Program

The running program might have been set up to take a specific number of samples and then stop, in which case it would then display the following DONE operating state screen:

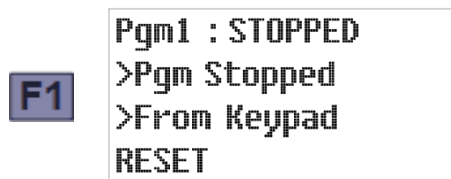


Prior to resetting the program, you can scroll to the other run-time screens. For example, you could to the screen that tells how many samples were collected.

Alternately, it might have been set to only run for a specified length of time or to stop at a specific, scheduled time. If so, it displays a timed stop icon above the running icon (as shown below) and you can scroll to an added RUNNING screen whose second line shows the time and date at which the program will shut down and display the DONE operating state screen:



In either case, the program can be prematurely stopped by pressing the STOP [F1] key, after which it would then display its STOPPED screen:



The RESET prompt indicates you cannot restart the program until you press the F1 key to zero its interval and container volume counters and advance it to its READY state.

## 5.6.1: Continuous Operation

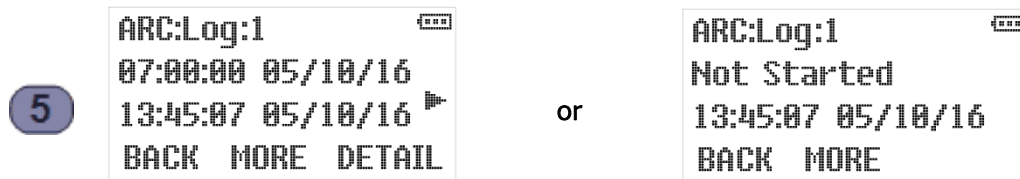
If the Bottle Limit option (Chapter 4.6.6) is set to “Program Continue”, the program will ignore its samples per bottle setting and continue sampling indefinitely, without requiring anyone to ever press the RESET [F1] key.

Because the sampling program will then have no way of knowing how many samples it has discharged since the container was last emptied, the sample count screen (Chapter 5.4.2) will merely indicate “NL” (no limit).

## 5.7: Reviewing Archived Data

The sampler store time stamped records of each sample they draw, separated into individual log files for each sampling run (i.e., one log file for each time any sampling program has been run).

That archived data can be reviewed from the user interface panel by pressing the **5** key when the selected program is RUNNING or READY mode, but not while the Administration or Program menu is active. The first line of the resulting display will indicate you are viewing log file 1, in which data for the current (or pending) sampling run is being (or will be) recorded:



The second line of that display indicates the date and time at which the selected program was started, while the third line displays the date and time at which you started viewing its log file. For example, the screen shown to the left above indicates the currently running program was started at 7:00 AM on May 10, 2016, and the data archive was opened at about 1:45 PM that same day. If the program had not yet been started, the screen shown to the right above would be displayed.

- ⚡ *The icons along the right edge of the screen will continue to indicate the current status of the selected program (see Table 5-1 Chapter 5).*
- ⚡ *The DETAIL prompt for the F3 key appears only for log files that contain one or more sample and/or exception records.*

Pressing the Down arrow would then access the first log file screen for the second-most recent sampling run (log 2) and display the times and dates at which that sampling run was started and stopped. For example, the display shown to the left below indicates the prior sampling run was initiated at 7 AM on May 9, and concluded about 12 hours later:



You can use the Up and Down keys to scroll through the available log files. Pressing the Up key while viewing the newest will access the oldest, pressing the Down key while viewing the oldest will access the newest. The sample screen shown to the left below indicates 42 log files are currently available, the oldest of which was recorded on March 14, 2016:































## A.2: Inputs and Outputs

As shown on the Electrical Diagram appended to this manual, the sampling controller has the following required and optional inputs and outputs:

- run-status and alarm output relays (see below)
- a turntable motor control output and two position sensor inputs (see below)
- a sample-compartment temperature input (Appendix A.2.4)
- one analog and one discrete-pulse flow input (Appendix A.2.5)
- a float-switch input (Appendix A.2.6)
- the sample chamber's liquid-sensor controller (Appendix A.2.7)
- pump-motor, solenoid-valve and pinch-valve sampling outputs (Appendix A.2.8)

### A.2.1: Run-Status Output

The controller energizes the power board's run-status relay (thus connecting pins 3 and 4 of the optional field I/O connector) as each sampling cycle is initiated, and de-energizes it as that cycle discharges the sample it collected.

### A.2.2: Alarm Output

If the power board's alarm relay is enabled (Chapter 4.6.3), the controller energizes it (thus connecting pins 5 and 6 of the optional field I/O connector) when:

- the sampling program is waiting to be reset after completing normally, being manually stopped, or failing to determine the position of the sequential-sampling turntable;
- sampling has been suspended because the float input circuit is open, as discussed below (this will also be indicated by displaying a fault icon along the right edge of the screen);
- the most recent sample cycle failed to reach the liquid-sensor electrodes, failed sample (recycle).
- the storage compartment has been above its intended temperature for at least 30 minutes (this will also be indicated by displaying a °C icon along the right edge of the screen).
- Indexing Error, the sequential table is not turning, or it cannot find the proper bottle location.

### A.2.3: Turntable I/O

The controller uses one discrete output and two discrete inputs to operate the optional sequential-sampling turntable.

- That output starts and stops the turntable's motor by energizing and de-energizing the power board's table control relay.
- Those inputs are wired to sensors that detect the passage of magnets (usually 24) that are radially embedded in the turntable's upper plate. The H sensor is positioned to detect the turntable's single home-position magnet, while the S sensor detects the others.

All three circuits are wired to a seven-pin CPC mounted in the roof of the sample compartment.



## A.2.6: Float Input

The controller provides one internally-powered discrete input that can be connected to an external stream-level float switch. The controller can then be configured (see below) to draw samples only while or after that input circuit has closed. Thus:

- If a stream-level float switch is connected, it should close as the stream level rises above an appropriate minimum level. The sampler could then be configured to draw samples only when the stream depth was sufficient to cover the intake strainer (or above some other appropriate threshold).
- More generally, this is essentially a remote run-permissive input that could connect to any appropriate field device or PLC relay output.

### A.2.6.1 : Factory Menu Float Setting

If the Float Option (Chapter 4.6.4) is Enabled and its input circuit is open when the control program is started, the unit will not start drawing samples until the float switch circuit is closed. If that circuit opens after sampling has begun, the program's response will depend on its Factory Menu FLT setting (which is set to your specifications before the unit is shipped):

- If the FLT START/STOP setting is selected, the program will reset its sampling interval counters and not restart them until the float circuit closes again (i.e., those counters will restart from zero when the water level rises high enough to reclose the float switch). This setting is used for the full bottle switch.
- If the FLT START setting is selected, the program will continue sampling without interruption even if that circuit reopens. This setting works like a one shot delay.

If the FLT OFF setting is selected, the float input is disabled, and the Program Menu's FLOAT INPUT parameter is hidden.

## A.2.7: Liquid Sensor Controller

Each sample cycle vacuums wastewater into the sample chamber until the liquid-sensor electrodes signal the sample chamber is full and switch to post purge. That liquid sensor device has its own control box which attaches to the controller's SDI-12 communication port.

## A.2.8: Sampling Outputs

Three electrically-actuated devices control the flow of air and wastewater into and out of the sample chamber (as illustrated above). As shown on the appended Electrical Diagram, each of those devices is controlled by a relay on the controller's power board:

- The Pump relay turns the compressor/vacuum pump motor on at the beginning of each sampling cycle, and off after the collected sample has been discharged.
- The Solenoid relay energizes and de-energizes the four-way solenoid valve that alternately connects the sample chamber to that pump's the vacuum or pressure port.
- The Pinch relay energizes the pinch valve solenoid to seal off the chamber's discharge tube during all but the final (discharge) phase of the sampling cycle. That valve connects to it via a 2-pin CPC in the roof of the sample compartment.



















### A.3.5: Timed Stopping

Once a sampling program has started, it will continue running until it has drawn the number of samples specified by its Bottle Options unless:

- it is stopped by pressing the STOP [F3] key,
- its Timed Stop Run Option (Chapter 4.6.5) has been set to stop it a specified number of hours or minutes after the program was started, or
- Stop Program events have been configured it to stop at configured times on specified days of the week (see next section).



If either a Timed Stop or a Stop Program event has been configured, an additional run-time screen will show the scheduled stop time and all such screens will display a timer icon.

### A3.6: Scheduled Events

Each program can be set to automatically start its interval counters, pause or halt and then resume, initiate manual samples, or stop itself at scheduled times on specified days of the week. As discussed in Chapter 4.7 those **Program Events** are defined by a variable-length list of parameters, each of which has three associated values:

- the type of event (see table on next page),
- the days of the week on which the event will be executed, and
- the time of day on those days at which the event will be initiated.

Events do not have to be defined in the order they will execute and can only be added or deleted from the end of the list.

*Table A-1: Available Program Event Types*

<b>Start Program</b>	The parent program will start automatically if it is ready when the scheduled time is reached on the next scheduled day.
<b>Stop Program</b>	The parent program will stop automatically if it is running when the scheduled time is reached on the next scheduled day. Unless the Auto Rerun option is enabled (Chapter 4.6.1), the program will have to be manually reset before it can be restarted.
<b>Manual Sample</b>	A manual sample will be drawn if the program is running when the scheduled time is reached on the next scheduled day. If a time or flow interval elapses while the manual sample is being drawn, an automatic sample will be drawn as soon as the manual sample cycle has been completed.
<b>Pause Program</b>	Sampling will be suspended if the program is running when the scheduled time is reached on the next scheduled day, but the time and flow interval counters will continue to run. Sampling can be resumed by a Resume Program event, or from the user interface panel. If one or more intervals elapse while the program is paused, only the first such sample will be drawn when the program is resumed.

<b>Halt Program</b>	The interval time and flow counters will be paused if the program is running when the scheduled time is reached on the next scheduled day. Those counters can be resumed (with the accumulated values they had at the time they were halted) by a Resume Program event, or from the user interface panel.
<b>Resume Program</b>	Interval sampling will resume if the program is paused or halted when the scheduled time is reached on the next scheduled day.
<b>End List</b>	Previous event is the last one on the list. Changing an event's type to End List deletes it and all high-numbered events.

### **A3.7: Data Archiving**

The log file contains the following info:

- Each time one of its six sampling programs was started and stopped;
- Each sample it has collected which bottle it was deposited into, and whether or not recycle was activated. The time and date of each sample collected and with the cabinet temperature.
- all operational exceptions, including:
  - power loss and restoration,
  - bottle-full sampling suspensions,
  - sequential turntable indexing errors, and
  - sample compartment temperature and deviations

These sample and exception records are separated into multiple log files. Each time a sampling program completed or stopped. The log file is closed and a new one is opened. Exceptions that occur between sampling runs are logged into the following run's file. The controller will keep up to 50 such files, after which the oldest file will be deleted each time a new one is created. The newest file is accessed as log 1; the one recorded prior to log 1 is accessed as log 2, and so on.

Currently, those log files can only be:

- Reviewed on screen when the menu system is not in use (Chapter 5.7)
- Deleted using the Administration Menu's Clear Archive option (Chapter 3.2.4).



## Appendix B: Replacement Parts

Table B-1: Labels and Controller

	Part	Number	Additional Information
1	Field I/O Connector	WW002	7-pin CPC Panel Connector
	Protective Cover	WW005	
	Mating Cable Connector	WW001	Screw Terminations
2	Flow Inputs Connector	WW024	4-pin CPC Panel Connector
	Protective Cover	WW005	
	Mating Cable Connector	WW025	Screw Terminations
3	Controller, Complete	WW322	Specify Sampler Model Number
	Backup Battery	340503001	
	Face Plate	WW354	
	Face Plate Gasket	WW355	
	Logic Board	WW401	
	Power Board	WW320	
4	Label, 4-20Ma/Pulse Pinout	WW607	
5	Label, FLOAT/ALARM/RUN	WW608	
NOTE: 1. For current prices and quotations on parts, contact Teledyne Isco Service Department. 2. This list is subject to change without notice			

Table B-2: Exterior Parts

	Part	Number	Additional Information
1	Strainer, Low Flow	692903138	For 3/8-inch line
	Strainer, Weighted	609004367	For 3/8-inch line
	Strainer, Weighted	609004366	For 1/2-inch line
	Strainer, CPVC	603704066	For 3/8-inch line
2	Intake Tubing, 3/8-inch I.D.	029091603	sold by the foot—specify length
	Intake Tubing, 1/2-inch I.D.	029071406	sold by the foot—specify length
	Intake Kit, 3/8" (9mm)	602320008	includes 602703113 & 609004367
	Intake Kit, 1/2" (12mm)	602320004	includes 602320009 & 609004366
3	Door Latch	WW098	
4	PVC Bulkhead	WW426	
5	3/8" 90 Degree Nylon Elbow	WW127	Intake fitting (9mm)
	1/2" 90 Degree SST Elbow	WW748	Intake fitting (12mm)
NOTE: 1. For current prices and quotations on parts, contact Teledyne Isco Service Department. 2. This list is subject to change without notice			

Table B-3: Inside the Sampler

	Part	Number	Additional Information
1	Sequential Table Assembly	602320005	
2	Velocity-Limiter, Check Valve	WW019	
3	Velocity-Limiter, Bleed Valve	WW033	a.k.a. Pisco Valve
4	Turntable Connector Mating Cable Connector	WW171 WW172	6-pin CPC panel connector crimp-pin termination
5	Pinch Valve Assembly	WW373	
6	Temperature Sensor	WW757	
7	Sampler Chamber Assembly	WW471	
NOTE: 1. For current prices and quotations on parts, contact Teledyne Isco Service Department. 2. This list is subject to change without notice			

Table B-4: Sequential Bottle Kit

	Part	Number	Additional Information
	500ml Bottle	WW218	Each
	Bottle Cap	299033400	Each
NOTE: 1. For current prices and quotations on parts, contact Teledyne Isco Service Department. 2. This list is subject to change without notice			

Table B-5: Composite Bottle Kits

	Part	Number	Additional Information
	1-bottle Configuration, Includes One 5-gallon (18.5-liter) bottle	682320025	HDPE, with lid and full bottle switch
	1-bottle Configuration, Includes One 3-gallon (11-liter) bottle	682320026	HDPE, with lid and full bottle switch
	1-bottle Configuration. Includes one 5.5-gallon (20.5-liter) bottle	299001306	HDPE, with lid
NOTE: 1. For current prices and quotations on parts, contact Teledyne Isco Service Department. 2. This list is subject to change without notice			

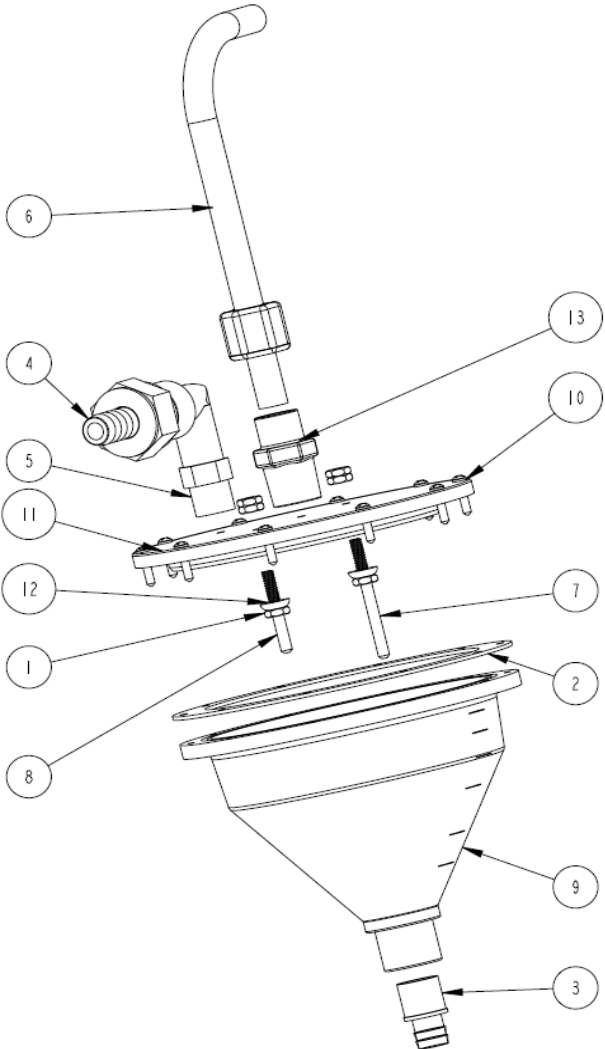


Figure B-6: Sample Chamber (WW471) and Pinch Valve (WW373)

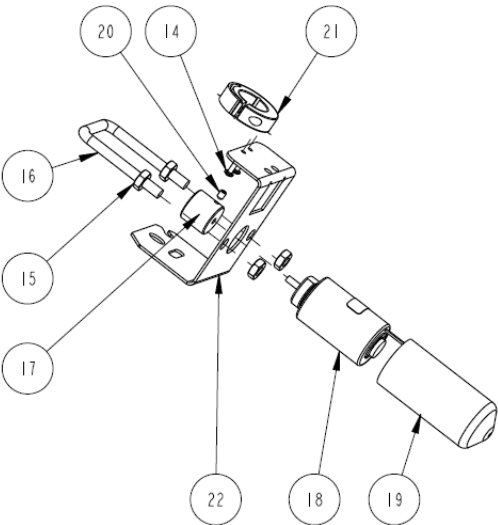


Table B-6: Sample Chamber and Pinch Valve Components

	Part	Number	Additional Information
1	Nut, Hex 10-24	232116000	3 per electrode
2	Gasket	WW425	
3	Chamber Base Fitting	WW429	
4	1/2 Hose X Swivel Fitting	WW434	
5	3/8 MNPT x MGHT Elbow	WW436	
6	Intake Tube	WW453	
7	CVE-16 Electrode long	WW454	
8	CVE-16 Electrode short	WW455	
9	500mL Sample Chamber Base	WW458	
10	6-32 x 5/8 Panhead Screw	WW466	
11	CVE-16 Sampler Chamber Lid	WW526	
12	Conical washer w/gasket	WW527	
13	Fitting, 1/2" OD Tube X 1/2" MNPT	WW612	
14	Screw, Panhead 6-32 x 3/8	231014406	
15	Nut, 3/8-16	232119200	
16	Square Bend U-Bolt	WW186	
17	Plunger	WW190	
18	Pinch Valve	WW193	
19	3" Vinyl Cap	WW370	
20	Set Screw, 10-24 x 1/4	WW529	
21	Set Collar	WW595	
22	Pinch Valve Bracket	WW802	
	Sample Chamber Assembly	WW471	Complete assembly
	Pinch Valve Assembly	WW373	Complete assembly
NOTE: 1. For current prices and quotations on parts, contact Teledyne Isco Service Department. 2. This list is subject to change without notice			

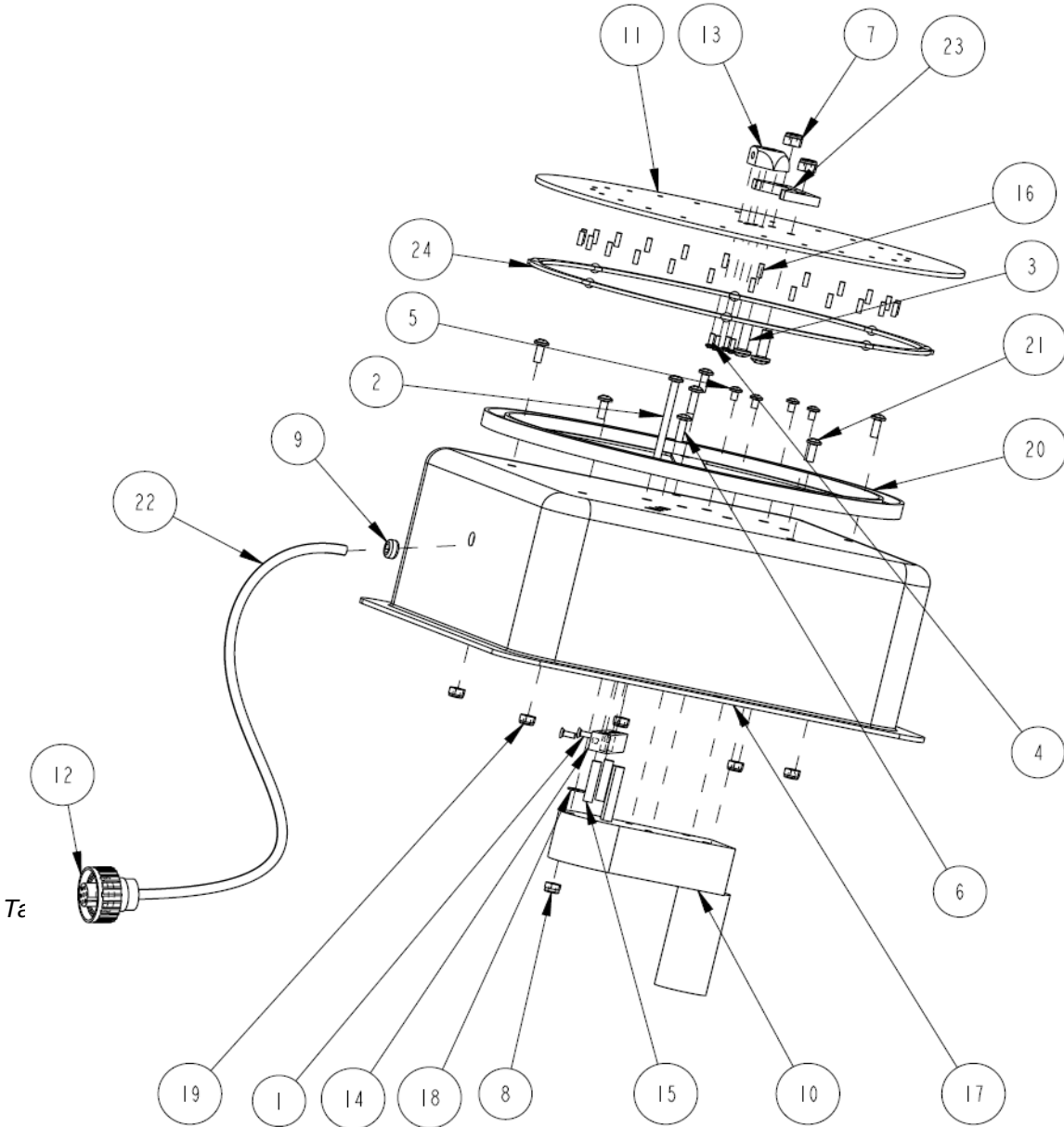


Figure B-7 Sequential Table

Table B-7 Sequential Table Parts

ITEM	PART NUMBER	QTY	DESCRIPTION
1	231011406	2	SCR FLH 6-32X3/8
2	231014780	1	SCR PNH 10-32X2.5
3	231014912	2	SCR PNH 1/4-20X3/4
4	231514305	4	SCR PNH 4-40X5/16
5	231514504	4	SCR PNH 8-32X1/4
6	231514710	2	SCR PNH 10-32X5/8
7	232422520	2	NUT LK SST 1/4-20
8	232916101	1	NUT STOP 10-32
9	308-00133	1	GROMMET .25X.38 MTG ODX.062GRV
10	WW084	1	MOTOR, SEQ MODEL 440DC
11	WW163	1	SEQ TOP PLATE QL-41
12	WW172	1	CONN PLUG HSNG MALE 7POS INLINE
13	WW206	1	SEQ DRIVE BLOCK S-55
14	WW209	1	SENSOR BLOCK
15	WW341	2	MAGNET SENSOR
16	WW342	24	MAGNET, 1/8" DIA X 3/8"LG
17	WW465	1	TABLE HOUSING
18	WW533	1	#10 FL WASHER 7/16 OD
19	WW534	5	NUT HEX S 10-24
20	WW535	1	BEARING RING TRACK
21	WW536	5	SCR PNH 10-24X1/2
22	WW713	1	CABLE, MULTI-CONDUCTOR
23	WW726	1	LOC BLOCK BOTTOM
24	WW535A	1	BEARING RING

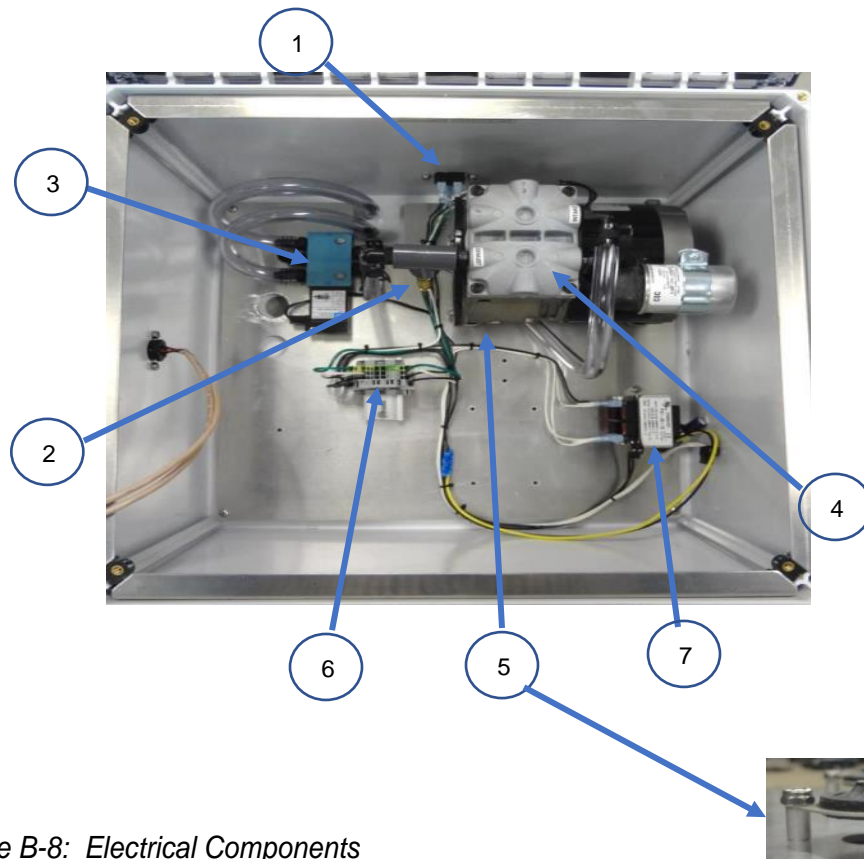


Figure and Table B-8: Electrical Components

	Part	Number	Additional Information
1	AC Power Connector	WW275	
2	Pressure Regulator, 20 psi	WW092	
3	Solenoid Valve, 4-Way	WW030	
4	115V Pump, (28ft) High Lift Piston Pump Service Kit 115V Pump,(23ft.)Standard Diaphragm Pump Service	WW102 WW298 WW103 WW391	115 VAC Piston Pump Rebuild piston pump kit 115 VAC Diaphragm Pump Rebuild diaphragm kit
5	Vacuum Pump Mounting Pads	WW131	4 required
6	3-position fuse block Fuse holder AC Fuse	WW364 WW362 WW326	10A/250V cartridge fuse
7	Transformer, Controller Power	WW300	Step-down from 120 to 240 VAC
	3-position terminal block 5-position terminal block 2-position terminal block	WW368 WW367 WW366	
<p>NOTE: 1. For current prices and quotations on parts, contact Teledyne Isco Service Department. 2. This list is subject to change without notice</p>			

