

Foreword

This instruction manual is designed to help you gain a thorough understanding of the operation of the equipment. Isco recommends that you read this manual completely before placing the equipment in service.

Although Isco designs reliability into all equipment, there is always the possibility of a malfunction. This manual may help in diagnosing and repairing the malfunction.

If the problem persists, call or email the Isco Customer Service Department for assistance. Contact information is provided below. Simple difficulties can often be diagnosed over the phone. If it is necessary to return the equipment to the factory for service, please follow the shipping instructions provided by the Customer Service Department, including the use of the **Return Authorization Number** specified. **Be sure to include a note describing the malfunction.** This will aid in the prompt repair and return of the equipment.

Isco welcomes suggestions that would improve the information presented in this manual or enhance the operation of the equipment itself.

Isco is continually improving its products and reserves the right to change product specifications, replacement parts, schematics, and instructions without notice.

Contact Information

Phone:	(800) 228-4373	(USA, Canada, Mexico)
	(402) 464-0231	(Outside North America)
Repair Service:	(800) 775-2965	(Analytical and Process Monitoring Instruments)
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6100CR Refrigerated Sampler

Site Requirements Checklist

CAUTION

All items on this checklist *must* be met before operating the 6100CR, or it will not perform as designed. Operation of the sampler under improper conditions could result in collection of unrepresentative samples, failure to collect samples, and/or possible damage to the sampler.

- | YES | NO | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | 1. Is the source pressure between 2 psi and 100 psi, measured at the sampler? |
| <input type="checkbox"/> | <input type="checkbox"/> | 2. Is the pressure steady, not varying more than ± 5 psi (not fluctuating)? |
| <input type="checkbox"/> | <input type="checkbox"/> | 3. If the pressure is less than 15 psi, has a booster pump been installed? |
| <input type="checkbox"/> | <input type="checkbox"/> | 4. Will the sampler's ambient temperature during operation remain between 32°F and 120°F? |
| <input type="checkbox"/> | <input type="checkbox"/> | 5. If the ambient temperature can fall below 32°F, have you protected the sample lines from freezing? |
| <input type="checkbox"/> | <input type="checkbox"/> | 6. Is the sample source temperature 185°F or less? |
| <input type="checkbox"/> | <input type="checkbox"/> | 7. Has a shut off valve been installed where the sample line connects to the source to permit maintenance? |
| <input type="checkbox"/> | <input type="checkbox"/> | 8. Is the line between the sample source and the sampler a minimum of 25 ft., but no more than 100 ft. in length? |
| <input type="checkbox"/> | <input type="checkbox"/> | 9. Has the main line filter been installed? |
| <input type="checkbox"/> | <input type="checkbox"/> | 10. Is the overflow drain line 20 ft long (as supplied by Isco) and has it been installed on the restrictor and routed to an open discharge drain? |
| <input type="checkbox"/> | <input type="checkbox"/> | 11. Have the strainer bypass and overflow drain lines been routed to open discharge drain? |

Note

Any of these criteria not met at the time of installation must be corrected before operating the sampler.

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6100CR Refrigerated Sampler

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6100CR Refrigerated Sampler

Section 1 Introduction

Note

Never install the Refrigerated 6100CR Sampler where there is any possibility of submersion. The electronic components are environmentally sealed, but the mechanical components cannot be. The linkages and moving parts inside the controller can be damaged by submersion. Parts of the refrigeration mechanism can also be damaged by submersion, particularly the condenser fan. Exposure of the mechanical parts to water will void the warranty.

1.1 How the 6100CR Works

The 6100CR Refrigerated Volatile Organic Sampler consists of a 6100VOC Sampler mechanism installed inside a refrigerator. The primary purpose of this sampler is to monitor VOC concentrations in waste discharge effluent from bleaching operations at paper pulp mills. Continuous sample fed from a pressurized effluent line is periodically injected by needle into sample bottles that are sealed before and after the sample is taken to prevent contamination. Location of the sample bottle rack inside the refrigerator ensures rapid cooling of the sample, which also retards its decomposition.



Figure 1-1 6100CR Refrigerated Sampler

1.1.1 Connection to Pressurized Line

The Refrigerated Sampler is permanently connected to a pressurized discharge line from which the sample liquid is periodically drawn. A filter on this line prevents any solids present in the effluent from entering the sampler. A valve allows sample to flow only when the 6100CR needs to take a sample. A pressure regulator reduces the line pressure to a safe fill value. Once inside the refrigerated sampler, the sample flows through a serpentine coil inside an aluminum container (the ballast) at the bottom of the refrigerator for cooling before injection into the sample vials. Waste sample is discharged from the drain line.

1.1.2 Controller Operation

The microprocessor in the controller governs the operation of the mechanism that selects, opens, fills, and closes the sample bottles. A motor rotates the bottle rack placing each bottle directly under the fill mechanism. The bottle rack is kept chilled by its location inside the refrigerator. When the filled rack is sent to a lab for analysis, it may be kept cold by filling the inside of the rack with ice and placing in the styrofoam mailer to keep samples cool during the transport to the lab for analysis.

The fill operation consists of:

- Purging the sample line
- Rotating the bottle rack to place the bottle in position for filling
- Opening the valve on the sample bottle cap
- Lowering the fill needle into the sample bottle
- Filling the sample bottle with the liquid sample
- Withdrawing the fill needle from the sample bottle
- Closing the valve on the sample bottle

When filling the sample bottle, the 6100CR actually overflows the bottle to comply with EPA protocol to fill and dump the sample bottle. This overfilling keeps residual air pockets from remaining between the bottle and the lid, thus providing a representative sample. The excess water drains out of the sampler through an overflow tube attached to a fitting on the back of the controller. The controller also determines, through programming, when and how the 6100CR takes its samples.

1.2 Quick-Start Operating Procedure

Note that the quick-start procedure assumes you have some familiarity with the unit. If you do not, please do not try to operate the unit without first reading this entire document.

1. Put a new bottle rack in the unit. Make sure the handles on the bottles are all closed (turned sideways 90° to the bottles). See Figure 1-2. Improperly oriented handles will jam the unit.
2. Turn the unit on by pressing the **On/Off** key on the keypad. When the unit is off, the display will be blank. When the unit is on, there will always be something on the display.

3. If you have not previously set up the sampler's operation or if you want to change the setup, press the Setup key to access the setup menus.
4. Press the **Program** key to select the type of sample pacing, number of sample events, start time, etc.
5. Turn on the valve at source, calibrate the flow rate and route the drain lines from the sampler.
6. Press the **Run** key to start the sampling sequence you have programmed into the sampler. The sampler cannot run its own program until you press **Run**.
7. When the sampler completes the program you entered, the display will read:

DONE... XX SAMPLES
(time & date)

8. Press the **Rack Reset** key to move the rack to the home position so you can remove the rack from the sampler.
9. Remove the filled bottle rack from the sampler.
10. Turn the unit off with the **On/Off** key.
11. If you want to run another sampling routine, repeat the process from step 1.

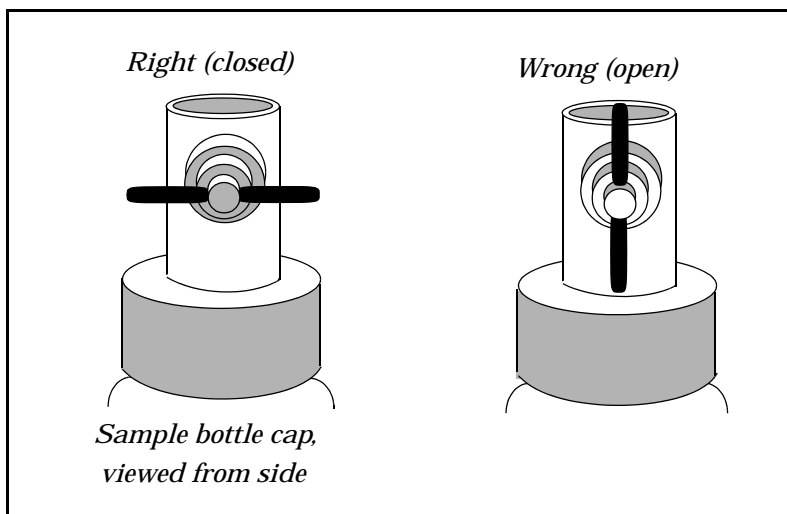


Figure 1-2 Proper Valve Orientation

1.3 Sampler Unpacking and Setup

Isco ships the 6100CR in a box with special inserts, and we suggest keeping all packing materials in case returning the unit for service ever becomes necessary. The bottle rack and accessories are shipped separately.

1. The rack and bottles come in a mailer. You will use these items to transport the bottle rack and also to ship the samples to the lab for analysis. The bottle rack is shipped with all the bottles installed and held in place under a stainless steel cover.

2. Unpack the box carefully, checking for any possible shipping damage.
3. Remove the tower shipping support. Reinstall the black knob taken off when removing the support.

1.3.1 Under the Controller Cover

When you have opened the cover over the controller, the most prominent features inside are the keypad and display. You program the sampler using the keypad and prompts from the display.

Inside the refrigerator behind the sample bottle rack is a rectangular protrusion with a yellow warning label on it. This is the housing for the fill needle. When the sampler is in operation, the fill needle raises and lowers automatically to inject the liquid sample into the bottles in the rack.

The warning label is to warn you against putting your hand between the tower and the bottle rack. You can be seriously injured by the needle coming down when the sampler is in operation.

 **WARNING**

Never place your hand or any other body parts between the needle assembly and the bottle rack. If the sampler starts unexpectedly, it will lower the needle to fill a bottle. You could suffer serious personal injury if your hand is caught between the needle and the bottle rack. The needle comes down with enough force to cause serious injury. In order to avoid damage, always make sure bottle rack is in place, bottles are in all 24 positions, and the shut-off handles on all bottles are horizontal.

1.3.2 The Bottle Rack

Isco ships the bottle rack separately from the sampler for protection. Because of the carrier's insulating properties you can pack the bottle rack with ice (or **gel packs** if you are shipping) to keep the samples cool from when they are gathered to when they are analyzed at the laboratory. (Gel packs are a packaged cooling agent.)

It is very important to keep the samples cool to keep them representative; heat drives volatile organic compounds out of solution.

The metal plate holding the bottles inside the bottle rack keeps the bottles in place during shipment and use. It prolongs the melting time of the ice. The knurled knob with the threaded shaft attaches the bottle rack to the controller. Never operate the sampler without the stainless steel cover in place and the knob securely tightened. Before installing the bottle rack, look at the tops of the bottles. Make sure all the valve handles on the bottles are turned so they are perpendicular to the standing bottles, or facing 3 and 9 o'clock. (See Figure 1-2.)

This is important, not only for proper alignment for sampling, but also to ensure that all bottles are closed and free from contamination. During normal operation, the sampler may occasionally leak a small amount of sample around the O-ring on the

tip of the needle. This is generally due to a misalignment between the needle and the bottle. The small leak does not affect sample integrity, as it occurs outside the bottle before the valve is closed. If the leak condition persists or sample is being sprayed out of this connection, consult Isco Customer Service. A leak around the valve stem on the top of the bottle indicates a worn valve. When this occurs, the valve body must be replaced. One bottle does not have a valve on top. This is the blank, and you will also notice that the bottle rack looks different behind this bottle. There is no slot in the rack. This bottle marks the home position for the bottle rack. When you reload the bottles after sampling **always** put the blank bottle back in this position, or the sampler will not work properly.

1.3.3 Cleaning the Bottles (the First Time)

Isco assembles the racks with new clean bottles, as shipped from the bottle manufacturer. Normally, no further cleaning is necessary before first use of the bottles. However, these bottles and valves are not certified clean. If you wish to clean the bottles before using them the first time (for example if you are sampling for extremely low concentration volatile organic compounds), you may want to clean them. Follow EPA guidelines for washing and drying the bottles. After you have used the bottles for samples, always wash and dry them according to EPA guidelines.

 CAUTION

Always make sure the rack is in the "home" position before installing or removing the bottle rack. This places the blank bottle under the fill needle. If the rack is not in "home" position, press **Rack Reset** to return the rack before removing or installing the bottle rack. If you do this, the rack will always be in the right position when you reload it.

1.3.4 Installing the Bottle Rack

Notice the D-shaped steel shaft in the center of the triangle formed by the three knobs. This is the bottle rack shaft. Place the bottle rack over this shaft, rotating it slowly until the D-shape of the shaft lines up with the same D-shape on the bottom of the bottle rack. The rack will easily settle into place. Secure the rack in place by tightening the knurled knob and threaded shaft into the threaded hole on the D-shaped shaft on the controller base. The rack is now ready to take samples.

1.3.5 Attaching the Sample Tubing

The 6100CR uses Teflon¹ bonded polyethylene tubing to connect to the source and to the filter. Connection of the tubing is with 1/4" tubing fittings.

1.3.6 Attaching the Drain Tube

Isco supplies a 20 foot length of 1/4" OD vinyl tubing to drain the sampler overflow and sample line bypass drain into any convenient place that gets the water out of the way, and cannot flow back toward the 6100CR. There is a restrictor in the end of the drain line. This must remain in place.

1. Teflon[®], registered trademark of du Pont de Nemours, Inc.



Figure 1-3 Keypad of the 6100CR

1.4 Operation and Description of the Display and Keypad

After you have connected the sampler as described in the previous sections, you are ready to program the unit to run a sampling routine. But first you must familiarize yourself with the keypad and display. You program the 6100CR by pressing the buttons on the keypad to make appropriate selections from the choices that appear on the display.

The display is a two-line, 20 character-per-line liquid crystal. The display is alphanumeric, meaning it can show both letters and numbers. The display has a backlight feature that allows you to read it easily in conditions of low light.

When you are programming, in most cases you will select a word choice from the menus appearing on the display. In some instances you will have to enter a number. The display will provide you with a range of appropriate values. The sampler will reject entry of any numbers outside this range. During programming, one option for each program step will always be flashing on and off. This flashing indicates the selection currently held in memory.

1. Pressing either of the **Arrow** keys will cause the flashing to move to the left or right of the currently selected option.
2. Pressing the **Enter** key on the keypad will cause this new choice to be entered into the sampler's memory.

Various keys also control specific sampler operations. Following is a description of the function for each key on the keypad.

1.4.1 Power Up

When you press the **On/Off** key to turn on the 6100CR, the unit can respond in several different ways, depending on what was happening when the unit was last turned on. Following are the possible operations the unit can do when you press the **On/Off** key:

1. The sampler may test the tower assembly. The sampler will move the fill head assembly a short distance up and down and then back up again, coming to rest near the top stop.

2. The sampler may test the driver that turns the valve handles on the sample bottles to open and close them. This sequence consists of four movements clockwise and counterclockwise with short pauses between them. You can see the valve actuator if you look on the inside of the tower, about the height of the bottle rack. It is round and has two pins protruding from it.
3. The sampler may move the bottle rack to the next bottle position. If the bottle rack is somehow stopped so a bottle is not directly under the fill head, the rack will rotate a few degrees to position a sample bottle directly under the fill head.
4. The sampler may reset the bottle rack. This consists of rotating the bottle rack until the "home" position of the rack is under the fill head. If the home position of the rack is close to the fill head, the rack may make more than one complete rotation the first time power is applied before the rack stops on the home position.

When you turn the sampler on with the **On/Off** key, it may do some of these things or none of them, and this is normal. When you turn the unit on for the very first time, or if you have done a *hard reset*, the sampler will move the bottle rack if necessary. It will then do a tower test and if that works correctly, it will do a valve driver test and if that passes, it will do a reset of the bottle rack, in that order.

Otherwise, when you turn the sampler on, what happens will depend on the condition it was in when you turned it off. First, it will check the positioning of the bottle rack to see that there is a bottle directly under the fill head. If not, the unit will move the bottle rack.

Then the sampler will check the condition of the tower drive (the up and down motion of the fill head). If the tower is not in the "home" position (fully up), or the sampler detected a tower jam on the last attempt to move the tower, it will do a tower test. If the tower was in the "home" position or successfully passes the tower test, the sampler will then look at the condition of the valve driver. If the valve driver is not in the "home" position or if the sampler detected a valve driver jam the last time it tried to rotate the driver, it will do a valve driver test. The unit will not reset the rack at this time.

If the sampler was in the process of running a sampling program when it was shut down, a message will appear on the display saying that the program was aborted and cannot be resumed. You will have to restart a new program if sampling is to continue. After the sampler runs these tests, it will be in the standby state, and the standby message will display on the screen.

At other times when the sampler moves the bottle rack, such as when you press the **Rack Reset** key, or the sampler is taking a sample and must advance the rack to a new bottle, it may do the tower test or the valve driver test if the associated mechanism is

not in the home position as described above, or a jam in that mechanism was detected on the previous attempt to move that mechanism.

1.4.2 On/Off

This key is the master control for the entire system. When you turn the sampler off, no other key will have any effect, even if you are in the middle of a sampling routine. However, any program choices you have made and entered for the sampler setup and sampling routine will be retained by the unit in battery-backed memory. Turning on the sampler does not make it run a program. Turning the sampler on just puts it in the "Standby" state, where it is ready to receive programming and configuration commands from the keypad.

1.4.3 Program and Setup Keys

These keys both control programming of the sampler. **Setup** configures the sampler (defines how the sampler will work) while **Program** defines the specifics of the sampling routine.

1.4.4 Program

This key puts you into the programming mode for the sampler. For the 6100CR, "program" refers specifically to the sampling routine the unit will run. You may change the Program without changing the Setup.

1.4.5 Setup

This key programs the sampler for functions that differ from the sampling routine controlled by Program. **Setup** performs the "housekeeping" functions of the sampler. In **Setup** you set the internal clock, establish a site identification number, etc. Note that you may change **Setup** without changing items selected in **Program**.

1.4.6 Run

After you have programmed the sampler with both the Program and Setup menus, you must press **Run** for the sampler to run its program, regardless of when you programmed the routine to begin. The **Run** key starts the program.

1.4.7 Clear/Exit

Pressing this key allows you a way to revert to a previous entry for a menu choice, or to exit the Setup or Program menus.

1.4.8 Enter

You must press the **Enter** key to step through the menu for either the Program or Setup functions. While programming, pressing **Enter** will store the choice or value displayed on the screen and move you to the next choice.

1.4.9 Display Status

The 6100CR keeps a record in memory of programming and sampling activity called the *History Log*. It is possible to view this record screen by screen on the display. If you press this key when the sampler is turned on and in the Standby operating mode, it will allow you to view this log. More information on the History Log, with several representative screens can be found in this manual in Section 2.9.

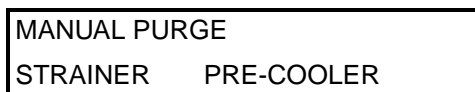
1.4.10 Rack Reset

Pressing this key when the sampler is in the normal operating state will return the bottle rack to the "home" position. This is when the blank bottle is directly under the fill needle. If the

sampler previously detected a fault in the tower, it will test the tower before it rotates the rack. The same will occur if the sampler previously detected a fault in the valve actuator, and the valve actuator must be returned to the normal position if it is not. Also, if the needle is not fully raised, the sampler will raise it before rotating the rack. The sampler raises the needle and returns the valve actuator to the normal position so they will not interfere with the rotation of the rack. Rack Reset will not have an effect when the sampler is in the running state.

1.4.11 Manual Purge

Pressing the Manual Purge key when the sampler is in the standby state will bring up the following screen:



Selecting strainer will cause the sampler to open the flow valve so liquid will flow from the sample source through the strainer and valve. The liquid will be diverted by the valve and will not go through the sample pre-cooler or the actual bottle-filling mechanism, but will flow out through the bypass drain line. The flow can be stopped by pressing the ON/OFF key, or the Clear/Exit key. The Purge will also be stopped after a fifteen minute time-out. This function is useful for checking out the operation of the system, as well as purging air from the system after the strainer housing has been opened for cleaning.

Similarly, selecting PRE-COOLER will cause the sampler to open the valve so the liquid will flow through the strainer, pre-cooler and the needle mechanism that fills the sample collection bottles. None will flow through the bypass. It exits the system through the sample overflow drain line. This selection does not cause the sampler to open a sample vial or put the sampling needle mechanism into a sample vial.

Therefore, no liquid is introduced into a vial and no vials are contaminated by this operation. This operation is useful to verify that the system is functional, and that the valves open properly so the liquid can flow through the system. The operation is also useful to purge air from the pre-cooler upon initial installation and if it is drained during subsequent maintenance operations.

The Manual Purge selections can also be useful if the sampler is not to be used for some period of time and it is desired to flush the system with clean water. If the inlet line is disconnected from the sample source and connected to clean water, these selections will make the sampler open the valves so clean water can flow through the system.

1.4.12 Manual Sample

This key allows you to take a sample any time the 6100CR is in Standby, but it will *not* do manual sample within a running program. When you press this key, the unit will place a sample in the next bottle.

Always make sure that a bottle rack is installed before starting a manual sample.

 **CAUTION**

The sampler may be damaged if there is no bottle rack installed when you try to take a sample.

After pressing the **Manual Sample** key, the following screen will appear:

BOTTLE RACK LOADED?
YES NO

NO will always be flashing. To proceed with the manual sample, select YES with the **Arrow** key and then press **Enter**. This screen reminds you to make sure that a bottle rack is in place before you start to take a manual sample.

Figure 1-4 shows the 6100CR components inside the refrigerator. Shown are the needle assembly, the bottle rack and the ballast assembly. The needle assembly is normally covered with a protective plastic shield. This is to prevent injury and to protect the needle fill mechanism as well.

Following are descriptions of the various items called out in Figure 1-4.

A - Tower assembly with needle mechanism. The needle raises and lowers to deliver the liquid sample to the sample bottles.

B - Evaporator (cold plate) of refrigerator. Provides cooling for inside of refrigerator.

C - Sample Bottle Rack (carousel). Plastic 'basket' contains slots for 25 sample bottles. Plate on top of rack holds bottles securely. Center of 'basket' can be packed with ice or cold packs to maintain sample integrity en route to lab analysis.

D - Sampler deck, showing location of sample tube and electrical connections.

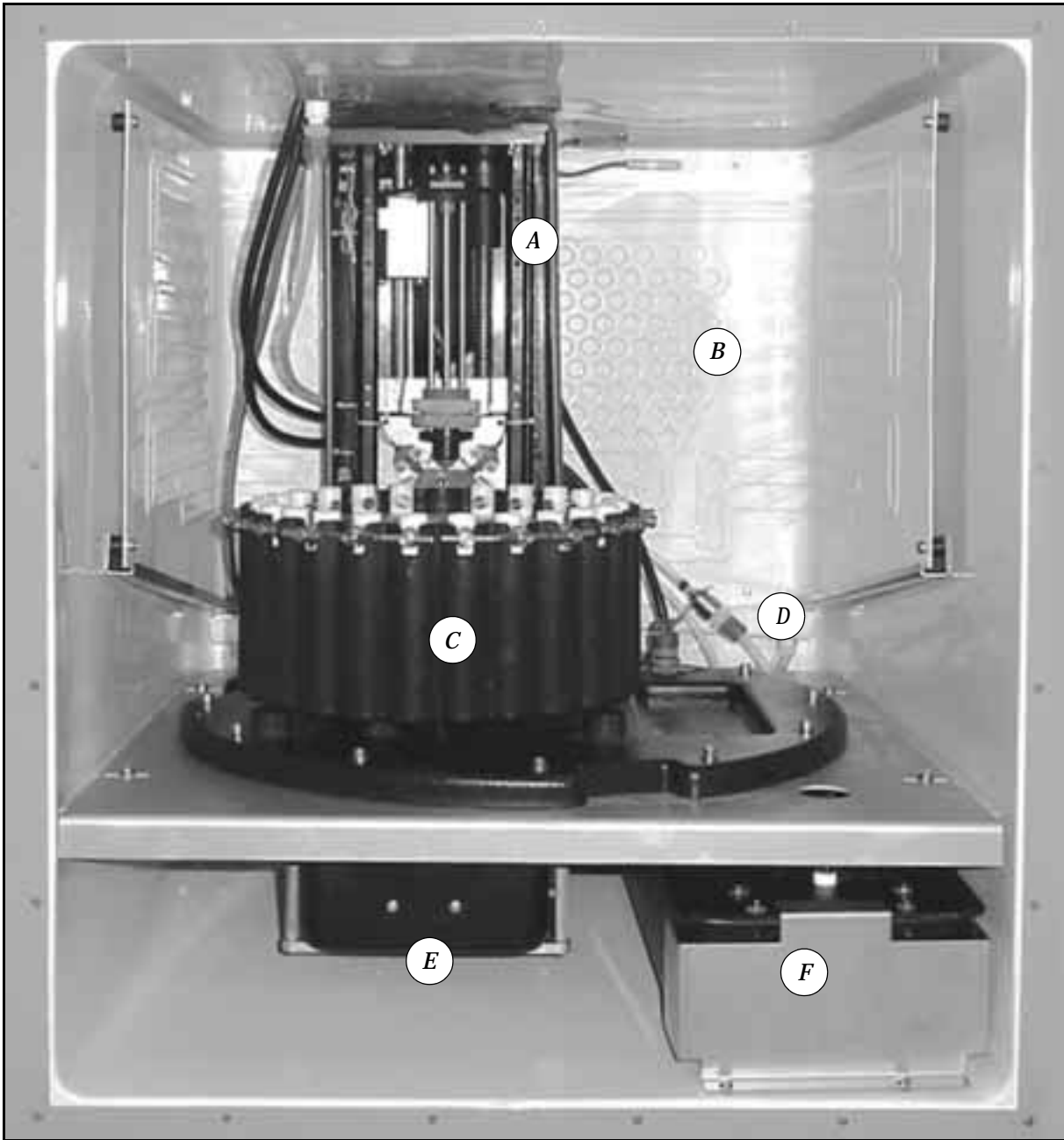


Figure 1-4 Interior View of 6100CR Sampler

E - Sampler motor housing. Rotates (3), sample bottle rack to align sample bottle under needle assembly (1).

F - Ballast box. This aluminum box contains a serpentine coil of sample tubing. Its purpose is to cool the incoming sample before the sample is injected into the sample bottles.

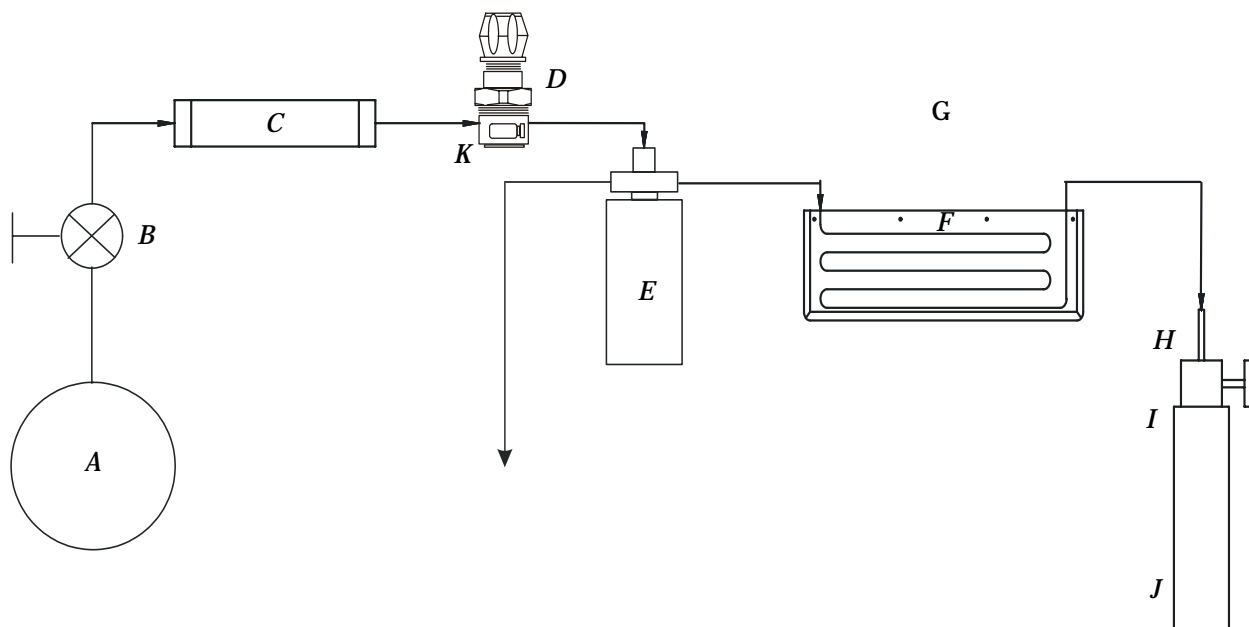


Figure 1-5 Flow Diagram for the 6100CR

1.4.13 Operating Principles

A $\frac{1}{4}$ " O.D. sample line is connected to the bleach operation effluent pipe, either alkaline or acidic, (A). Customer-supplied valve (B) is used to shut down flow to allow maintenance and service of 6100CR and associated system components. The primary filter (C) is in-line to remove any solid material from the liquid flow that could cause clogging in the sampler. This filter is of the type that can be disassembled and cleaned periodically. Regulator (D) is used to throttle down the pressure from the sample line, which can be as high as 120 psig, to a rate that allows the sampler to fill the vials at 2 ml/second. Sample valve (E) depending on its position either sends sample to the sampler or in the case of a purge, to the drain.

This rate is set by adjusting the regulator in the sampler's Calibrate step. The ballast coil (F) allows for cooling of the sample, which may leave the effluent pipe at temperatures as high as 185°F (85°C). The ballast coil is installed inside the refrigerator, (G) which supplies the cooling for the sample line, as well as for the stored samples. Cooled sample is injected into bottles by the sample needle (H). The valve (I) is automatically opened and closed by the sampler mechanism for the filling process and to preclude contamination of the bottled sample once it is collected. The bottle (J) along with 24 others in the rack are then taken to a lab for analysis. There is a screen-filter (K) located at the inlet to regulator D to catch any material that might escape from the filter C.

Table 1-1 Isco 6100CR Cluster Rule Sampler Specifications

General		
Height	47 in.	117 cm
Width	26 in.	66 cm
Depth	26 in.	66 cm
Weight (Dry)	190 lb.	86 kg
Refrigerator Body Material	Fiberglass-reinforced plastic with UV-resistant gel coat.	
Power Requirements	120 Volts, 60 Hz	
Operational Temperature Range	32° to 120° F	0° to 50° C
Controller		
Enclosure Rating	Self-certified NEMA 4X and IP67	
Interfacing	6-pin connector; data output at 2400 baud in ASCII RS-232 format allows transfer of Program Settings Report, Sampling Results Report, and history log. Compatible with Isco Samplink software.	
Diagnostics	Tests RAM, ROM, all mechanical drives, display, flow meter interface, and printer interface.	
Clock Accuracy	1 minute per month typical	
Sample Collection		
Sample (Vial) Volume Vial Capacity	40 ml (fixed volume) 24 vials with Teflon valves 1 vial reserved as blank for procedural use.	
Rinse Cycles	All wetted surfaces automatically rinsed prior to each sample collection	
Sample Frequency Time Mode Flow Pacing	15 minutes to 99 hours 59 minutes, in one minute increments. Selectable, 1-9,999 pulses in single pulse intervals.	
Sample Pacing	Time or flow. Flow mode paced by pulses from an external flow meter.	
Multiplexing	Multiple vial per sample event only. As many as 24 vials can be filled by one sample initiation.	
Sample Line	TPE Teflon lined tubing	
Sample Source Pressure	Minimum 15 psi	Maximum 120 psi
Sample Source Temp.	85°C Maximum	
Sample Filter	Stainless steel in-line cartridge style. 125 ml capacity	
Sample Pre-cooling	Sample pre-cooled to 25°C (for 85° sample source, 40° ambient temperature, and 2-hour sampling interval).	

6100CR Refrigerated Sampler

Section 2 Programming

2.1 Overview

For quick reference, following is a condensed list of the programming steps for the 6100CR Sampler.

2.1.1 Setup Steps

1. **Calibrate Flow (Yes/No).** Yes provides steps through calibration routine
2. **Filter Purge Time, 0-600 seconds.** (Time spent purging liquid through the line and the filter.) This liquid is bypassed to the drain without passing into the pre-cooler (ballast) or the sampler, as that would generally overwhelm the capacity of the pre-cooler.
3. **Bottle Volume Flush, 1/2, 1, 1 1/2, 2, 2 1/2.** This is the additional sample that will be flushed through the sample vial after the vial has been filled.
4. **Site ID Number** (User selected).
5. Set Clock
6. **Run Diagnostics** (see text).
7. Select Enable Mode (Error, Skip, Delay)

2.1.2 Program Steps

1. **Time/Flow** (sample collection mode)
2. **Time or Flow Interval** (15 minutes to 99 hours, or 1 to 9,999 flow pulses.
3. **Sample at Start - Yes/No** (Only if flow-paced.)
4. **Bottles per Sample Event**
5. **Number of Sample Events**
6. **Enter Start Time - Yes/No**

2.1.3 Calibration Steps

1. Display **Put discharge tube in drain** alternates with **Then press Manual Purge.**
2. Pressing the **Manual Purge** opens the flow valve so that liquid flows through the pre-cooler and sampler. The display will show: **When no bubbles, press Clear/Exit.**
3. Pressing the **Clear/Exit** key stops the flow and displays: **Put Discharge Tube in Grad Cylinder, alternated with: Then, Press Manual Sample.**
4. Pressing **Manual Sample** will again start the flow for 50 seconds. After this, the user will be given the chance to run another calibration or continue. The user should measure the volume in the cylinder and adjust the pressure regulator to get the flow to within 5 ml of the target 100 ml. Turn-

ing the regulator handle clockwise will increase the flow, counterclockwise will decrease it.

2.2 Program Displays

In the following section, the words printed in capital letters represent messages the 6100CR displays as you work through the **Setup** and **Program** routines. You do not have to go into **Setup** if all you want to change is something in **Program**. Likewise, it is not necessary to work all the way through **Program** to change something in **Setup**. Some lines have XXs or other capital letters in them. These letters represent variables, such as amounts, times, and dates. When the sampler is first turned on, the number and software revision will appear briefly on the display.

```
ISCO 6100CR  
SOFTWARE VERSION X.XX
```

When the sampler is in the standby state, not running a program, the following message will appear on the display:

```
... STANDBY ...  
HH:MM:SS          DDMMYY
```

There are two programming sequences for the 6100CR. One sequence controls the operation of the sampler and is called **Setup**. The other sequence is called **Program**; in **Program** you define the sampling program you want to run. The first time you use the sampler, you need to work through both sequences to correctly program the sampler to run a sampling routine. After that you may never need to reprogram the **Setup** section. As the various screens appear, the selected entry (the option currently held in memory) will flash. Use the **Arrow** keys to move from one entry to another. Where the display requests a numeric value, use the **Number** keys to enter the appropriate value. Use the **Enter** key to move to the next menu item. The unit must be turned on to function.

2.3 The SETUP Sequence

1. If you press the **Setup** key, the following will appear:

```
CALIBRATE FLOW RATE  
YES   NO
```

Calibration of the flow rate is critical for proper operation of the 6100CR. The procedure consists of purging the discharge line and then adjusting the pressure regulator to achieve a discharge rate of 2 ml/sec, measured while filling a graduated cylinder. See the following menus. When calibrating the flow rate, the drain line and graduated cylinder should be on the same level as it will be when in operation. Also observe that for proper operation, the drain line

should always discharge into a normal, non-pressurized open drain.

2. If you select YES, the following will appear:

PUT DISCHARGE TUBE IN DRAIN

Alternating with:

THEN,
PRESS MANUAL PURGE

Make sure that the sampler drain line is in a suitable drain and press the **Manual Purge** key. This will start liquid flow through the sample cooler and discharge through the drain line.

Followed by:

WHEN NO BUBBLES
PRESS CLEAR/EXIT

Observe the discharge line. After the air is purged from the sample cooler, you should only observe a few bubbles in the sample line. When the air is purged, push **Clear/Exit**, and the flow will stop.

Followed by:

PUT DISCHARGE TUBE
IN GRAD CYLINDER

Alternating with:

THEN,
PRESS MANUAL SAMPLE

Place the discharge tube into a beaker or graduated cylinder. Place the beaker at the same level as the discharge tube will be in normal operation. Then press the **Manual Sample** key to start the 50 second flow for calibration. The display will show:

COLLECTING 100 ML
TEST VOLUME XX

After the 50 second interval has passed, the flow valve will shut off and the following display will appear:

REPEAT CALIBRATION	
YES	NO

Followed by (if Yes is selected):

PUT DISCHARGE TUBE IN GRAD CYLINDER
--

Before repeating the calibration, measure the flow volume you have collected in the graduated cylinder. The collected volume should be between 90 and 110 ml. If it is low, increase the flow slightly by turning the handle on the pressure regulator clockwise. If the collected volume is high, turn the regulator handle counter-clockwise slightly to decrease the flow.

Select "YES" for the repeat calibration until the collected volume is between 90 and 110 ml. Then select "NO" to continue the Setup sequence. Once calibration is successfully completed, lock the regulator adjustment knob in place by holding the knob still in your hand and tightening the locking ring against the bottom of the knob. If a considerable number of calibration routines have to be run to achieve proper calibration, the pre-cooler will warm up and not provide the usual amount of cooling if the first sample is taken immediately.

3. If you select NO for CALIBRATE FLOW RATE, the following will appear:

STRAINER PURGE TIME (XX) SECONDS (0-600)

The value entered for purge time is dependent on several factors. First is the amount of carryover from sample to sample that is acceptable. Second is the amount of time that can be allocated to purging. Third is the length of the sample line. Tests have indicated that a minimum of seven volumes are needed to reduce the carryover in the strainer to 1%. Based on the volume of the strainer, Isco recommends a setting of from 875 - 1250 ml to purge the strainer and 60 ml per 25 feet of line from the source to the sampler.

The flow rate through the strainer "bypass" is somewhat variable, ranging from 400-500 ml/minute. It can be checked by pressing **Manual Purge** in the Standby state and then selecting "Strainer Purge" and measuring the amount of liquid collected.

For a minimal purge of 7 volumes with 25 feet of line, you would need $875 + 60 = 915$ ml. At 500 ml/minute this would require 1.83 minutes or 110 seconds.

For a ten-volume flush with 100 feet of line, a flush volume of $1250 + 240$, or 1490 ml is needed. At 400 ml/sec, 3.725 minutes or 223 seconds would be required.

4. Then:

BOTTLE VOLUME FLUSH					
1/2	1	1-1/2	2	2-1/2	

The display above selects the amount of additional flow through the sample vial once the bottle has been filled. Higher volume bottle flushes reduce the likelihood of air bubbles sticking to the inside of the vial and are more likely to flush any residual contaminants from the vial. Selection of a lower flush volume is better suited to situations where crystalline sample preservatives are used (as the lower volume will not cause them to be flushed out).

5. Next:

SITE ID NUMBER
1234567890

The SITE I.D. NUMBER screens allows you to assign a number to provide an identity for the sampling site for later reference in analyzing results. The number can be anything you select that gives meaning to the sampling site up to 10 digits. This number will be printed on all records.

6. Next:

SET CLOCK
YES NO

This step lets you set the internal clock. This clock runs all the time, even when the sampler is turned off, as it is powered by a lithium battery. To set the clock, selecting YES allows you to enter the correct time and date with the **Number** keys. The digit that is flashing is the one you can change. Enter the correct number from the keypad and press **Enter**. The flashing cursor will move one number to the right of the display with each press of **Enter**. To accept a current entry, press **Enter**. NO allows you to skip the clock option and work through other aspects of the Setup menu. You generally will not have to set the clock again (except for the change to and from daylight savings time).

7. If you select YES for setting the clock, the following screen will appear:

HH:MM MM/DD/YY
HH:MM

- 8.

RUN DIAGNOSTICS
YES NO

In normal operation, you would select NO. You would RUN DIAGNOSTICS only if you suspected a problem. NO will always be flashing. If you select NO, the sampler advances to Step 18.

The ENABLE MANUAL DIAGS menu gives you the capability of manually controlling some of the mechanical functions of the sampler as a diagnostic aid. It provides special functions to some keys on the control panel for a limited period of time. Selecting YES will let you move the tower up and down with the **arrow** keys. It will also let you move the valve driver (opens and closes the valves on the sample bottles) through a sequence with the **0** key and it also enables you to move the bottle rack through a variable number of bottle positions (1-24) by entering the number of positions desired with the **number** keys on the keypad and then pressing **Enter** and **Rack Reset**. Selection of this option (YES) allows you access to these capabilities for only **15 minutes**. You will have to reenter the selection if you wish to continue access to the manual diagnostics.

9. If you need to access the manual diagnostics, select YES at the following menu. If you select YES from the ENABLE MANUAL DIAGS, the unit will ask for a pass number on the next screen.

ENABLE MANUAL DIAGS
YES NO

However, if you have entered the pass number within approximately the last 20 minutes, ENTER PASSNUMBER screen will not appear.

- 10.

ENTER PASSNUMBER
0000

The correct pass number (6100CR) should be entered with the number keys at this time. An incorrect pass number will cause the machine to again ask for the pass number unless you press the **Clear/Exit** key.

11.

RUN ALL DIAGNOSTICS	
YES	NO

Selecting of YES will cause the sampler to run the following six diagnostic routines and return to the standby state. If you don't want to run one of the routines, just select NO, the sample will then allow you to select each diagnostic individually.

 CAUTION
--

Some of the manual tests can cause damage to the unit if not done properly, such as running the tower down without having a bottle rack in place, or running the tower down without first opening the valve on a bottle. Because of this danger, manual testing should only be done by qualified personnel.

12. Selecting YES causes the machine to test the RAM (Random Access Memory) by loading and reading back various values.

TEST RAM	
YES	NO

13. Selecting YES for TEST ROM causes the sampler to test the ROM (Read Only Memory) by adding all the locations and checking the result.

TEST ROM	
YES	NO

14. This option causes the sampler to test the LCD readout, first blanking the display and then displaying various characters.

TEST DISPLAY	
YES	NO

15. This option tests the sampler's serial printer port by sending and receiving data.

TEST PRINTER PORT	
YES	NO

Note

You must have a special plug that loops the transmit and receive signals together to run the "TEST PRINTER" and "FLOW METER" diagnostic.

16. This option causes the sampler to test the flow meter serial port by sending and receiving data. As for the TEST PRINTER PORT diagnostic above, you must have a special plug to connect the appropriate pins.

TEST FLOW METER PORT
YES NO

17. This option tests the mechanical operations of the sampler by moving the tower up and down, operating the valve driver, and rotating the bottle rack one full revolution.

TEST OPERATION
YES NO

18. The SELECT DISABLE MODE menu refers to the treatment of sampling events that occur during the time the sampler is disabled, or shut down. If time-paced, the sampler will have three disable choices.

SELECT DISABLE MODE
ERROR SKIP DELAY

Note

The Select Disable Mode choice only applies if the 6100CR is programmed for *time-paced* sampling. It determines operation if samples are missed either because of the unit being disabled, or because of power failure. It does not cover samples missed because the unit has been shut down. For units programmed to take flow-paced samples, the sampler will take a sample on enable and reset the flow pulse counter.

- If you select SKIP, the sampler will maintain the time intervals as set up at start time. The log will show the event as an error, and the sampler will skip the bottle(s) allocated to that time and advance to the next bottle position so that following samples will be placed in the scheduled bottles.
- Selecting ERROR means that the sampler will log an error. The time interval will reset. If it is programmed for sample intervals of one hour and the sampler is disabled

at one o'clock, it will skip the one o'clock sample and reset the timer with one hour and take the next sample at two (if the sampler is then enabled). The sample event will be logged as an error.

- Selecting DELAY means that if the sampler enable is set to delay and is disabled when the time for taking a sample occurs, it will delay the collection of the sample until the sampler becomes enabled. At that time it will reset the counter so that the succeeding sample will be one sampler interval after the time the delayed sample was actually collected.

2.4 The PROGRAM Sequence

Note

You must have a flow meter connected to the 6100CR if you want to use flow pacing. The flow meter supplies the flow pulses, signals to the sampler that indicate volumes of flow.

1. To begin the Program sequence, Press the **Program** key. Sample pacing refers to the way the sampler determines the interval between samples.

SAMPLE PACING	
TIME	FLOW

- Selecting TIME means you will take a sample after a specific period of time has passed.
 - Selecting FLOW means you will take a sample only after a specific flow volume has passed. If the flow is variable, the time interval may vary considerably between samples.
2. If you select TIME, the sampler will ask you to enter an interval of time. The smallest amount of time that can be entered is 15 minutes. The following screen will appear:

SAMPLE EVERY	
XX HOURS	XX MINUTES

While it is possible to program a sample interval of 15 minutes, other program settings may prevent the sampler from completing the sample even within the 15 minute interval. For example, you could program a strainer purge cycle of 600 seconds, (ten minutes). Added to the one minute pre-cooler purge and the one to two minute bottle-fill time, the long purge could easily exceed the time available if more than one bottle per event is required by the program. In such a case, the sampler, once started, will sample continuously. Also, the performance of the sample

pre-cooler is degraded if samples are taken more frequently than once every sixty minutes.

3. If you selected FLOW, the sampler will ask you to enter the number of flow pulses between samples.

SAMPLE EVERY XX PULSES (1-9999)

Note

The following option, SAMPLE AT START TIME, will only appear if you have selected Flow Pacing in the Time/Flow Pacing menu.

- 4.

SAMPLE AT START TIME YES NO

The choice you make here will determine whether or not the 6100CR takes a sample at the time the sampling routine starts. If you select NO, the 6100CR will not take the first sample until enough flow pulses are received. The sampler will begin counting flow pulses at start time. The sampler will take a sample at start only if flow pacing is selected.

5. A sample event occurs each time the flow or time interval elapses. This is the number of bottles that will be filled for each sample event. The following display will appear:

BOTTLES/SAMPLE EVENT XX (1-24)

6. Enter the number of bottles per sample and press **Enter**.

OF SAMPLE EVENTS XX (1-YY)

The number YY will be **24** if you are entered "1" in step 5. Otherwise, YY will be 24 divided by the number entered in Step 5 rounded down. For example, if you are filling two bottles each time, YY will be **12**. If you fill four bottles YY will be **6**. If you fill 5 bottles, YY will be **4**, etc.

7. If you select NO for ENTER START TIME, the sampling program will start immediately after you press the **Run** key. If you prefer to start the program at a specific time,

select YES. See Step 8

ENTER START TIME
YES NO

8. **START TIME** is the time the sampling routine starts. Enter a time later than the present time, or you will be asked to reenter the Start Time. In **Time** mode, The 6100CR will take the first sample at Start Time. In **Flow** mode, the 6100CR will only take a sample at Start Time if you enabled that option in the Programming sequence with Flow Pacing selected. If not, the 6100CR will simply begin counting down the flow pulses before the first sample.

START TIME
HH:MM MMM/DD

Note

When you finish programming the 6100CR, you must press **RUN** for the sampler to run its program. Otherwise, the program will never run, even after the start time passes.

2.5 The RUN Key

1. If you want to start at the beginning of the rack (bottle 1), press **Rack Reset** before pressing **Run**. After you press **Run**, the following display will appear:

START AT BOTTLE
X

The value of *X* will be the next available bottle. If the bottle rack is in the “home” position, this will be bottle 1. If the rack is on the last bottle (number 24), the sampler will reset the rack to the “home” position and the display will show the bottle “1.”

Pressing **On/Off** will turn the sampler off. Pressing **Clear/Exit** will return the sampler to the standby state; the **Run** key must be pressed again to operate the sampler.

You can press **Enter** to select the displayed bottle to start the sampling routine, or you may enter a higher bottle number. The highest number you can enter is 24. You cannot enter a smaller number than that displayed.

The number entered is the maximum number of sample events that the sampler will perform. If the sampler starts at a bottle other than bottle #1, the sample program may

stop before the programmed number of sample events if there are not enough empty bottles remaining.

If no entry is made, the sampler will time out and return to standby.

If you chose not to enter a start time in the **Program** sequence, the sampling program will start immediately after you enter the bottle to start on. The sampler may or may not take a sample at this time, depending on how it is programmed.

If you chose to enter a start time in the **Program** sequence and the time you entered has not passed when you press the **Run** key, the program will start at the time you entered.

If you entered a start time in the Program sequence but the start time has passed by the time you pressed the **Run** key, the following screen will appear:

PAST START TIME

Followed by:

CHANGE START TIME?
YES NO

2. If you select NO, the start time will become the present time and the program will start immediately. See Section 2.6, Active State Displays. Again, whether or not a sample is actually taken at this time depends on other choices you made in programming.
3. If you select YES, the sampler will ask you to enter a new start time.

START TIME
HH:MM DD MM

4. The sampler will advance the hour to the next hour after the present time. The day and month will be the current day and month. You can accept this time by pressing the **Enter** key or enter the start time you choose. After a valid time has been entered, the sampler will start. See Section 2.6, Active State Displays.
5. If you enter a time that has passed, the MUST BE LATER THAN screen appears. Enter a valid start time. The sam-

pler then will return to Step 4 above to ask for the start time.

MUST BE LATER THAN HH:MM DD MMM

2.6 Active State Displays (Run Mode)

After you have programmed the sampler and pressed **Run** to begin the sampling routine, any of the following messages, depending on how you programmed the sampler, can appear during the sampling routine.

If no start time has been programmed, the sampler will start immediately, (Step 4 below will show the display that appears).

If the sampler has been programmed with a start time and in the flow mode, the display that appears will depend on whether the start time is in the current day or not.

1. If the start time is not in the current day, the following display will appear:

START AT HH:MM DDMMM HH:MM:SS DDMMYY

2. When the day of the start time is reached, (or the start time is in the current day), the following display will appear:

START AT HH:MM HH:MM:SS DDMMYY

3. When the sampler starts (or the start time is reached), the action depends on whether you programmed the sampler to take a sample at the start time or not. (This only occurs with flow pacing.)

If the sampler was programmed for flow pacing and to take a sample at START TIME, it will proceed to take the first sample. Step 4 below shows the display that will appear. If the unit is programmed for flow pacing but not to take a sample immediately, the sampler will start its interval counter so that the first sample will occur one interval past the start time.

One time interval refers to the number of flow pulses you programmed to elapse between sample events. When the start time is reached, the display will change to the following:

SAMPLE X AFTER XX PULSES

4. While the 6100CR is taking a sample, during the purging of the air and water lines, the display will show:

TAKING SAMPLE PURGING LINES

5. While the sampler is filling the bottle, if you entered a number greater than 1 for **bottles/sample event**, the display will show:

TAKING SAMPLE 1 BOTTLE 1 OF X

6. While the sampler is filling the bottle, if you entered **1** for the number of **bottles/sample event**, the display will show:

TAKING SAMPLE 1 BOTTLE 1

7. Between samples, if you selected **time pacing**, the display will show:

SAMPLE X AT HH:MM HH:MM:SS DDMMYY

8. Between samples, if you selected **flow pacing**, the display will show: *XX* (the number of flow pulses) decreasing as the sampler receives each flow pulse from the flow meter.

SAMPLE X AFTER XX PULSES

When the sampler is done with its sampling routine, the rack may not be in the home position.

9. If you want to remove the bottle rack, press **Rack Reset** to move the rack to the home position so you can remove it.
10. If you are going to run another sampling program to fill more bottles in the rack, press the **Clear/Exit** key to return to the STANDBY display. The rack will stay where it stopped for the last sample of the program you just ran. When the sampler completes the routine you programmed, the display will show:

DONE. . .XX SAMPLES (up to 24) HH:MM:SS DDMMYY

If you press the **On/Off** key before a program has finished, **the sampler will terminate that program**. When you turn the sampler back on, a message will appear to remind you of this. The display PREVIOUS SAMPLING will show:

PREVIOUS SAMPLING PROGRAM ABORTED

It is **not possible to halt** a program and resume it later.

However, the program is still in memory, just as you entered it, and you can run it again. The program will not change until you reprogram. While you cannot resume the program where you terminated it, you can press the **Run** key and the sampler will rerun the same program starting from the beginning, but placing the samples in the next available bottle as outlined in the beginning of this section.

2.7 Sampler Response to Power Failures

The 6100CR will respond to power failures that occur after a sampling routine has been initiated. If the sampler is in the time mode and power fails, the sampler will terminate any sample cycle in progress. Any of the vial(s) allocated to the sample that was interrupted will be skipped. If the time interval expires during the time that power was lost, the sampler's action upon power restoration will be dependent on the sampler's delay setting.

DELAY - In the delay mode, if the sample interval was passed either before power was lost, or during the time power was lost, the sampler will take a sample as soon as power is restored and Pin F is enabled. Subsequent samples will be taken at the preset interval after the sample is actually taken.

SKIP - Any sample times missed will be logged, and the bottles "burned."

ERROR - Any missed sample times will be logged, but no bottles will be "burned" unless the sampler was actually in the process of taking a sample when power failed. (See first paragraph above.)

If the 6100CR is programmed for flow-paced sampling, the following will occur: Power loss before the start time does not affect the operation, assuming that power is restored before the start time is reached.

If there is no power at the programmed start time, or the sampler is disabled, the sampler's action upon power restoration or enable depends on the "Sample at Start Time" option. If the sampler is programmed to take a sample at start time, it will take a sample when power is restored. Otherwise, it will start counting flow pulses.

Any time power is lost after the start time, the sampler will take a sample and reset the flow pulse count immediately upon power restore.

If in standby, the unit will not turn off.

2.8 Error Messages

The possible **ERROR** types are:

- **RACK JAM**
- **TOWER JAM**
- **RACK FULL**
- **VALVE JAM**
- **POWER FAILURE**

If the **RACK JAM** message appears, try to clear the problem by pressing the **Rack Reset** key. If **TOWER JAM** appears, call Isco Customer Service. **RACK FULL** means the sampler has filled all 24 bottles, and you will need to replace the bottle rack with a new one. **VALVE JAM** indicates the sampler was unable to open the valve on the sample bottle. Check the bottle in question and make changes as necessary.

POWER FAILURE means that the power was disconnected during the sampling routine.

If there is some problem and the unit is unable to take a sample two times in a row because of the same error, an **ERROR** message will appear on the display:

SAMPLING ERROR
(error type)

2.9 The Display Status Key and the History Log

1. When you press the **Display Status** key, the sampler will show you a log of events it has recorded in memory. The first display will ask you to choose from the following:

DISPLAY STARTING AT
BEGINNING LAST SAMP

2. If you select **LAST SAMP**, the display will only show you the record for the last program the 6100CR has run.
3. If you choose **BEGINNING**, the log will go as far back as the internal memory allows. It will either go to the first entry made or to the oldest entry in memory. (When memory allocated to the log is full, the log will begin overwriting the oldest entries with new ones.) If you choose **BEGINNING** and the entries are too long or not what you want, you can leave the log by pressing the **Clear/Exit** key.

Note

In general, **LAST SAMP** is the better choice for viewing the log. Do not select **BEGINNING** unless you need to look over the entire log. There may be a large number of entries. If the sampler has been running for some time, the log can have as many as 1,000 entries, going back several months. Trying to make sense of all this when you can only see two lines at a time could be difficult. You can use the **Clear/Exit** key to leave the log at any point.

You can move backward and forward through the log with the arrow keys. The **Left Arrow** key moves backward and the **Right Arrow** key moves forward. If you press the **Left Arrow** key to go backward and the display is in a sequence that has two different messages to display, the display will still advance to the second message before reversing and moving through previous displays.

2.10 Quick View of Sampling Sequences Only

If you are viewing the log and want to move to the next sampling sequence, press the **Right Arrow** key and then press **Enter**. The display will advance to the next sampling sequence. Continue pressing **Enter** to move the log forward through each successive sampling sequence. If you want to revert to the previous sampling sequence, press the **Left Arrow** key and then press **Enter**. The display will return to the first screen of the previous sampling sequence. Using this method, you can quickly move through the log, stopping only at the beginning of each sampling sequence.

2.11 The Display Status Screens

The log displays times in military format. One to eleven p.m. will appear as 13:00 to 23:00. Dates appear as day, month, and year. "Day" will be one or two digits. "Month" will appear as a three-letter abbreviation, as "JAN" for January. "Year" will be two digits as "03."

At the start of the log:

START OF HISTORY LOG HH:MM DDMMYY

1. When you apply power to the unit, the following display will appear on the log:

POWER RESTORE AT HH:MM DDMMYY

2. If you remove power from the unit, the following display will appear on the log:

POWER FAIL AT HH:MM DDMMYY

3. When you use the **On/Off** key, the following will appear:

UNIT ON AT HH:MM:SS DDMMYY

Or:

```
UNIT OFF AT
HH:MM DDMMYY
```

4. When you activate a sampling program by pressing the **Run** key, the following display will appear on the log:

```
PROGRAM ACTIVATED
HH:MM DDMMYY
```

When the sampling sequence actually begins, the following display will appear on the log:

```
PROGRAM STARTED AT
HH:MM DDMMYY
```

The following log entry will display for a sampling event:

```
SAMPLE: 1 HH:MM
BOTTLE: 1 DD MMM
```

5. If you press the **Right Arrow** key again, the following log entry will appear:

```
SOURCE: FLOW
```

The possible Sources are: TIME, FLOW, START, MULTIPLE, and MANUAL.

If there was a problem and the unit was unable to take a sample at that time, this message would appear instead:

```
SOURCE: FLOW
ERROR: RACK JAM (example)
```

The possible errors are: RACK JAM, TOWER JAM, RACK FULL, UNIT OFF, VALVE JAM, DISABLED, and POWER FAIL.

When the sampling sequence ends, the log will display:

```
PROGRAM FINISHED AT
HH:MM DDMMYY
```

When the sampling program has finished (or was stopped) and the 6100CR has returned to the standby state, the log

will display:

STANDBY STATE AT HH:MM DDMMYY

6. If you changed the SETUP section of the program at some point, the log will display the following:

(First screen):

SETUP CHANGED AT HH:MM DDMMYY

(Second screen):

STRAINER PURGE XX SECONDS

(Third screen):

BOTTLE VOLUME FLUSH XX

(Fourth screen):

SAMPLE AT START TIME YES NO

(Fifth screen):

SITE ID NUMBER: 12345678980

(Sixth screen):

SET CLOCK YES NO

(Seventh screen, if clock was changed):

NEW TIME HH:MM DDMMYY

(Eighth screen):

RUN DIAGNOSTICS YES NO

(Ninth screen):

SELECT DISABLE MODE ERROR SKIP DELAY

7. If you changed the PROGRAM section of the program at some point, the log will display the following:

(First screen):

PROGRAM CHANGED AT HH:MM DDMMYY

(Second screen):

SAMPLE PACING: <i>(flow or time)</i>

(Third screen *[flow pacing]*):

FLOW INTERVAL: XXXX PULSES

(Third screen *[time pacing]*):

TIME INTERVAL: XX HOURS XX MINUTES

(Fourth screen):

BOTTLES/SAMP EVENT: X

(Fifth screen):

OF SAMPLE EVENTS <i>X (number)</i>

8. If a start time was entered:
(First screen):

START TIME: HH:MM DDMMYY

9. If no start time was entered:

NO START TIME

End of log:

END OF HISTORY LOG HH:MM DDMMYY

6100CR Refrigerated Sampler

Section 3 Installation of the Sampler

3.1 Installation Guidelines

Note

Never install the 6100CR where there is any possibility of submersion. Water could seriously damage mechanical components inside the controller. Isco will not honor the warranty for any 6100CR Sampler that shows evidence of submersion.

Other than this, there are no serious restrictions on the installation of the sampler. You must locate the controller no further than 100 feet from the effluent pipe that is being sampled. Mount the sampler upright, in a stable location so it will not be tipped over. Route the drain hose away from the sampler far enough so the area around the base will not get wet. Avoid placing the controller in very hot locations. Make installations in a secure place so they will not be at risk from vandals or damage from any other activity going on in the area.

3.1.1 Connection of the Sample Line

The sample line provided by Isco is a 1/4" OD polyethylene tube with an internally bonded Teflon liner to maintain sample integrity. The sample line is attached to the effluent lines by a customer-supplied valve, with appropriate coupling. The length is 25 ft. minimum to 100 ft. maximum.

Note

The tap into the effluent line must be a valve, rather than just a simple fitting. It is necessary to be able to turn off the flow through the sample line to service the filter periodically and for other maintenance concerns, in addition to safety concerns.

 **CAUTION**

The sample tube (and its valve) are connected to an effluent pipe containing discharge that may be pressurized (as much as 120 psi); may be hot (as high as 180°F [85°C]), and will be chemically reactive, either caustic (high pH) or acidic (low pH), depending on which effluent line is being sampled. While the risk of chemical burns from either line may not be severe, the risk of heat burns from liquid this hot is very serious. Do NOT cut or shorten the sample line, even if the entire length is not needed. The 25 foot length helps remove heat from the sample.

The sample line runs to the 6100CR through a filter.

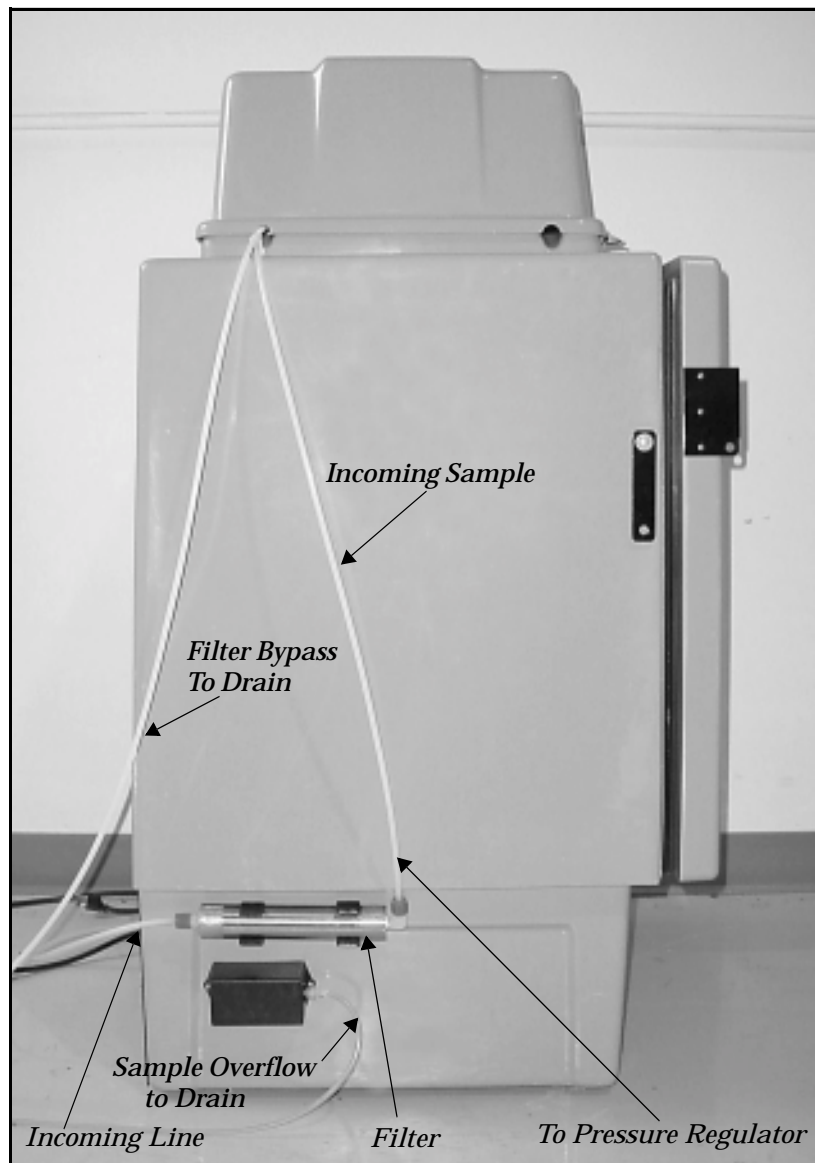


Figure 3-1 Location of Sample Line Filter on Refrigerator

Figures 3-2 and 3-3 provide a close-up of the installed filter. Note that the filter must be installed in the proper direction. The knurled endcaps have flow direction arrows stamped on them, and this is how you can tell if the filter has been installed in the proper direction. Refer to section 3.1.2 for tubing preparation.

 **CAUTION**

Proper orientation of the filter at installation and proper reassembly after cleaning are essential for correct operation. Correct assembly and orientation ensure that particulate material trapped inside the filter will remain **outside** the filter screen and be easily removable. Reverse assembly of the filter will cause this material to fill the **inside** of the screen and plug it completely. This material is very difficult to remove once it is firmly packed inside the screen element.

Do **not** under any circumstances operate the filter without the screen element in place. If it becomes clogged and cannot be cleared, replace it, but always make sure there is a screen in place. Operation without the screen will cause clogging in the fill needle apparatus that cannot be removed, and will require replacement of the needle, and may cause further harm to the sampler's mechanism.

 **Note**

The recommended maintenance cycle for cleaning the primary (large) filter is once per filled bottle rack inside the sampler (24 bottles.)

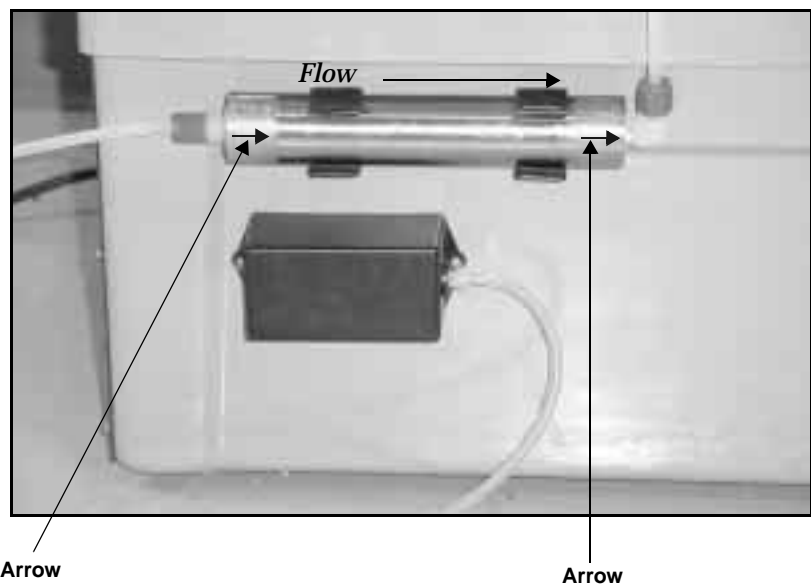


Figure 3-2 Detail of Filter Installation

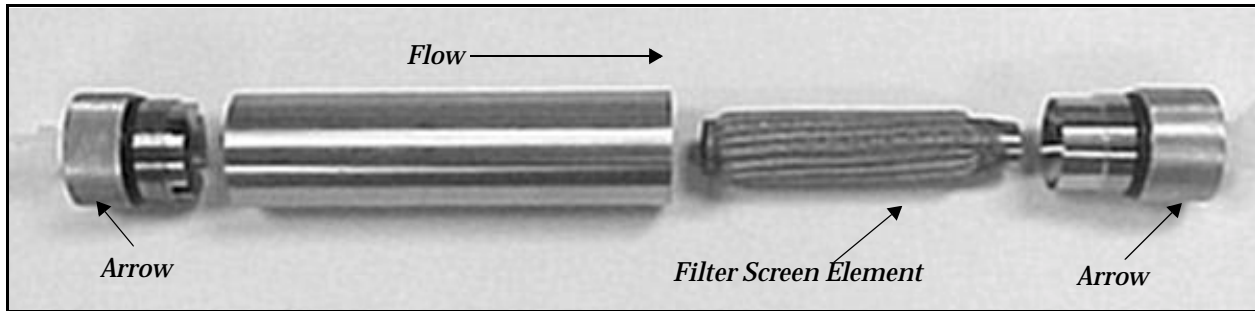


Figure 3-3 Filter, Disassembled

3.1.2 Preparation of Tubing and Connectors

The tubing used for the sample delivery line is terminated with specially-designed connectors in an optimized system that is both leak-tight and easy to install.

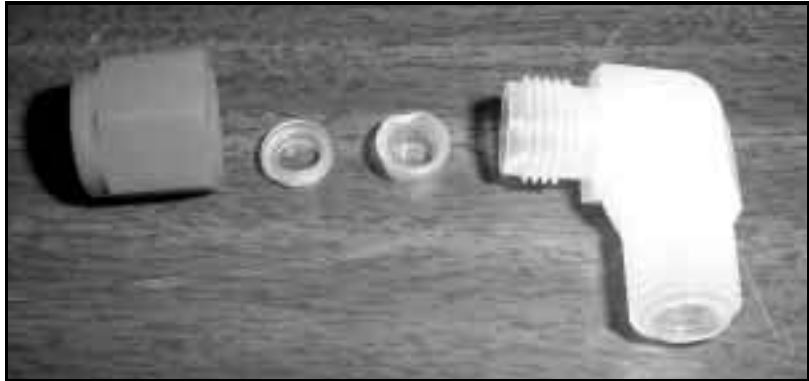


Figure 3-4 Fitting, Disassembled

Note

Normally there is no need to disassemble the tubing fittings. In fact, it is better to avoid disassembly, as it increases the risk of loss of small internal parts, or of incorrect reassembly. In actual practice, it is only necessary to groove the tubing with the scoring tool, insert the tubing into the fitting after loosening the blue end, and then re-tighten to secure the tubing. Make sure the tubing bottoms out in the fitting. Tighten the fitting nut only to the point where the nut just stops at the ridge of the fitting body. Do **not** overtighten; the fittings are Teflon[®] and the threads will be destroyed!

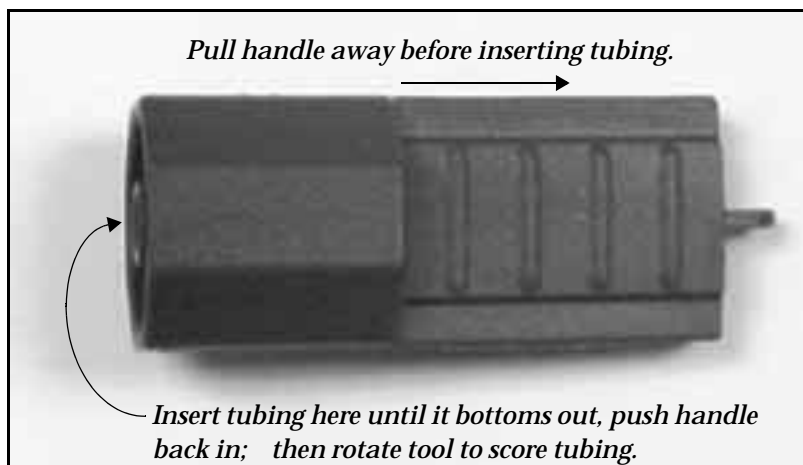


Figure 3-5 The Scoring Tool

The scoring tool cuts a precise groove in the surface of the tubing at the right distance from the end. This ensures that tubing will be properly seated and locked inside the connector when the blue fitting is tightened.

The fittings in Figure 3-4 have two ferrules, a thick one and a thin one. The thin one locks the tubing by seating in the groove. The thick one seals the connection between fitting and tubing. If you must disassemble the fittings for any reason (and this should be avoided), note the orientation and position of the ferrules when reassembling them. See Figure 3-4.

Note

Where the tubing fittings are screwed into other threaded fittings, apply Teflon[®] tape to the threads before assembly to prevent leaks. Proper tightening of the fittings is reached when the blue nut just touches the clear fitting.

3.1.3 Tubing Connection from Filter to Regulator

Because the 6100CR cannot be shipped with the filter installed or the tubing connected, it will be necessary to connect a piece of tubing between the filter outlet (see Figure 3-1) and the pressure regulator.

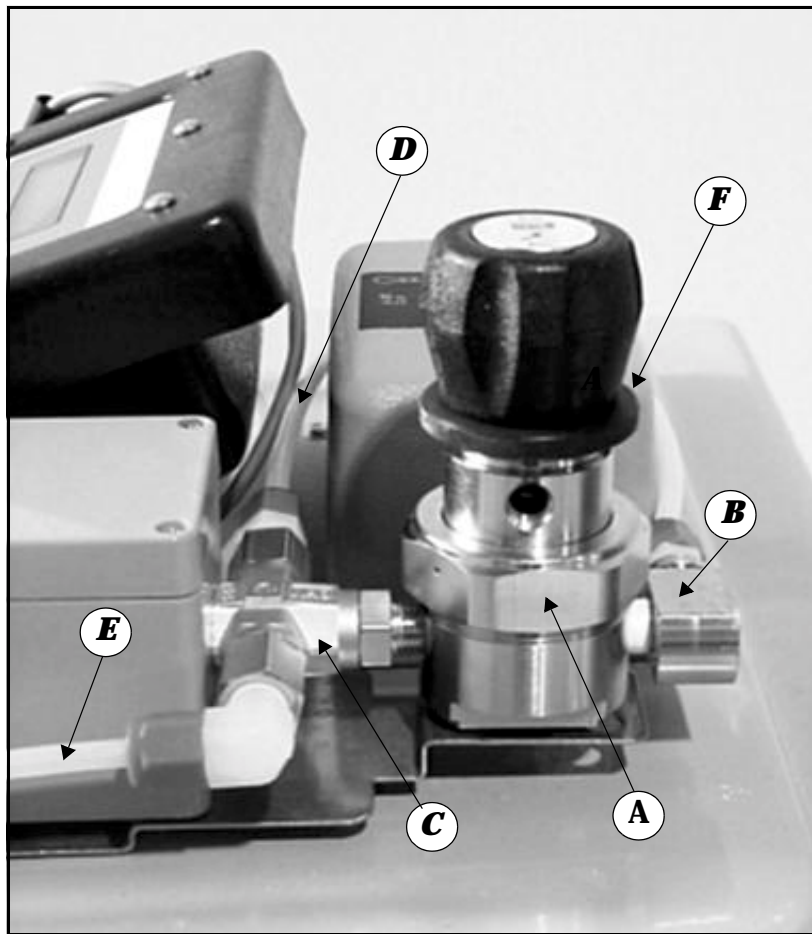


Figure 3-6 Pressure Regulator

- A - Pressure regulator
- B - Incoming sample (Fitting contains screen filter)
- C - Sample Valve
- D - Bypass line (to drain)
- E - Sample line output to sampler
- F - Locking ring for regulator adjustment knob

Connect the sample line from the filter to point *B* on the pressure regulator (*A*) as shown in Figure 3-6. Connect another piece of tubing from (*D*) for the bypass drain. This will go to the same discharge location as the drain line from inside the refrigerator. Line (*E*) is the sample line which goes to the sampler.

After connecting the sample line, all that remains is to route the two drain lines, the strainer purge bypass from the sample valve on top of the sampler, and the sampler overflow from inside the sampler, to a drain area. This of course will depend on the arrangement of each specific installation.



Figure 3-7 Sample Line from Sample Valve

 **CAUTION**

Do not permit the sample line to contact the evaporator plate inside the refrigerator at any point along its run, or the line will freeze during operation.

3.2 Connection to a Flow Meter

If you want to run the sampler in the flow-paced mode (taking samples after a specific volume of flow has passed, rather than at timed intervals), you **must** use a flow meter to pace the sampler. The flow meter is designed to send signals to the sampler called **flow pulses** that indicate a specific volume of flow has passed through the flow stream. You program the flow meter to send one flow pulse to the sampler for whatever volume of flow you have selected. If you do not know how to do this, consult the flow meter instruction manual for information on programming the flow meter. When you have programmed the sampler to take a sample after the desired volume of flow has passed, the sampler will count the flow pulses from the flow meter and take the sample when the proper number of pulses has been received. (Of course, if you want, you can also take a sample after only one flow pulse.) When the sampler takes a sample, it will send a signal back to the flow meter, indicating a sample event has occurred and also the bottle number of the sample.

The flow meter should be any Isco 3000, 4100, or 4200 series flow meter.

A **flow meter-to-sampler cable** terminated with two, six-pin M/S connectors is available from Isco for this purpose. Make sure you have the **newer** flow meter-to-sampler cable. The newer cables have the F pins on the two M/S connectors wired together. Do not use a cable you may have from an earlier application without first checking for continuity between the F pins. Connect either end of the cable to the male six-pin M/S connector on the

base of the sampler controller section. This connector has an icon of a flow meter just beneath it. Connect the other end of the cable to the six-pin connector labeled SAMPLER on the flow meter.

3.2.1 Connection to a Non-Isco Flow Meter

You can connect certain non-Isco flow meters directly to a 6100CR for flow-paced sampling. The flow meter must have an **isolated contact closure** of at least **25 milliseconds** to provide acceptable flow pulses to the sampler. The frequency of the contact closure must be directly proportional to total flow. Connect the flow meter pulse output to the A and C pins of the Flow Meter connector on the 6100CR. Isco has an interface kit with a six-pin M/S connector that mates with the connector on the sampler. Wire connections from the non-Isco flow meter to the six-pin connector and plug it into the sampler. Isco also has a six-pin M/S connector wired to a 22 foot cable terminated in two wires. The **black** wire connects to pin **A** and the **white** wire connects to pin **C**. The following table shows the connections for the Flow Meter connector on the sampler.

Pin	Signal
A	+12 VDC
B	Common
C	Flow Pulses In
D	Bottle Number Out
E	Event Mark Out
F	Inhibit In

You will be unable to communicate anything other than the flow pulse contact closure with a non-Isco flow meter. The non-Isco flow meter will not be able to interpret event and bottle number information. If the flow pulse generated by the contact closure on the flow meter is not compatible with Isco's standard, the **Type A Interface** is available to convert incompatible flow pulses into the proper duration for the 6100CR.

Flow Meters with Non-Pulsed Flow Outputs - You can also use the 6100CR with flow meters that have outputs other than a flow pulse. One common output type is the 4-20 mA current loop used for many types of industrial control equipment. Of course, you cannot use the 4-20 mA current output directly. You must use the **4-20 mA Sampler Input Interface**. This device converts the constant 4-20 mA current into flow pulses acceptable to the 6100CR.

If you use the 6100CR with other manufacturers' flow meters, please note that Isco cannot assume any liability for operation or results obtained with the 6100CR and other manufacturers' equipment.

3.3 Event Mark and Bottle Number Timing

The event mark and bottle number are digital signals the sampler generates to send to a Flow Meter. This digital information is converted by the flow meter to marks and text on the flow meter's plotter chart. Thus, when you review the chart generated by the flow meter, you have a hard copy record not only of level and total flow, but of when the samples were taken (the event marks) and into which bottles the samples were placed (the bottle number).

3.3.1 Sample Considerations

There are certain conditions that can affect the quality of the samples gathered by the 6100CR. Most of these are items of common sense, but they will be discussed here to help ensure that your installation takes accurate and representative samples.

As much as possible, samples should be free of air other than what is normally dissolved in the stream. Avoid situations that cause the sample to be unrepresentative by either adding or removing air from the stream.

The sample bottles have Teflon® caps. Teflon typically cannot be wetted by liquids with high surface tension. An example of this type of liquid would be laboratory-grade deionized water.

If the sample cannot wet the Teflon caps, bubbles of air may remain on the surface.

3.4 Handling the Samples

When you have finished a sample routine and all 24 bottles are full, you will need to ship the rack to the laboratory for analysis.

3.4.1 Cooling the Samples

To preserve the integrity of the samples, you must keep them cold until they reach the lab. Heat readily drives volatile organics from solution. If you intend to transport the bottle rack to the lab yourself, remove the stainless steel cover and fill the cavity between the bottles with chipped ice; then replace the cover to hold the ice in place. Put the bottle rack in the styrofoam carrier and pack ice chips in the area between the bottle rack and the inside walls of the styrofoam carrier.

3.4.2 Shipping the Bottle Rack

To ship the bottle rack to the testing laboratory, follow the same procedure as described above, except for the use of ice. After the samples are collected, remove the stainless steel cover plate. Pack the inside of the bottle rack with **gel-packs**, a product that absorbs heat like ice, but is packaged in plastic bags, that remain flexible and leak-free. Place the bottle rack inside the styrofoam carrier and pack more gel-packs between the bottle rack and the walls of the styrofoam carrier. Replace the stainless steel bottle rack cover. Put the lid on the styrofoam carrier. Place the carrier, with the bottle rack inside, in the cardboard shipping carton Isco originally shipped the carrier in.

Note

Do not pack the bottle rack with ice if you need to ship it to a laboratory. The styrofoam carrier cannot be adequately sealed, and the cardboard shipping carton is not waterproof. Use only gel-packs for cooling. Additional bottle racks, styrofoam carriers, and shipping cartons are available from Isco.

3.4.3 Cleaning the Bottles

After the bottle rack has been returned from the testing laboratory, you will need to clean the bottles and reload the rack. Cleaning the bottles is an easy procedure, but you must disassemble them first.

1. Remove the bottles from the bottle rack.
2. Remove the stainless steel valve stem from each bottle. (Hold the bottle in one hand and pull the stem firmly toward you with the other hand. Turn the handle back and forth while you are pulling it toward you.
3. Unscrew the cap from the bottle to free the valve body.
4. Push the valve body out of the cap and remove the O-ring.

Note

The construction of the cap keeps the O-ring from ever contacting the sample. In this application the O-ring serves as a spring to help seal. It is not necessary to sterilize the O-ring. Also, some solvents and detergents could attack the O-ring.

5. Clean all parts in an autoclave or with appropriate detergents.

Note

If you use detergent or solvent to clean the bottles, make sure the detergent or solvent is non-residual. Non-residual means that no trace of the detergent will remain on the glass after rinsing and air-drying. Cleaning agents that leave any residues could cause misleading results when you use the bottles to take future samples.

6. After cleaning, allow the bottles, caps, valve bodies, and stems to air dry in a clean, dry environment.
7. Reassemble the bottles, lids, and valves while you are wearing rubber gloves, to avoid contaminating them.
8. Put the O-ring on the top of the valve body.
9. Put the cap over the valve body.

Note

The O-ring must be between the cap and the valve body. Do not place the O-ring between the valve body and the bottle.

10. Screw the cap down onto the bottle.

11. Reinsert the valve stem into the valve body by pressing and twisting the valve stem into the valve body at the same time. Turn the valve stems so their final position is perpendicular (90°) to the bottle.
12. Reassemble the bottle rack with the cleaned bottles. Make sure all valves are closed. It is very important to keep the valve stems closed to prevent contamination.

 **CAUTION**

The bottles used in the 6100CR are borosilicate (hard) glass, also known by the trade name of Pyrex[®]. Their capacity is 40 ml. Isco does not recommend the use of bottles other than those supplied by Isco to ensure conformity with the original equipment dimensions. If you use bottles from a source other than Isco, the bottles must have identical length, diameter, and cap thread as those supplied with the sampler. For safety reasons they should also be made of hard glass. Failure to use identical bottles may result in crushed bottles or a damaged needle assembly, and will result in an inoperable sampler.

3.5 The Booster Pump

Isco offers a booster pump accessory for 6100CR samplers when the pressure from the incoming sample lines is found to be inadequate to properly supply the sampler. Minimum sample line incoming pressure must be at least 20 psig. The booster pump raises the pressure of the incoming line to 35 psig if it is below the 20 psig minimum. This is enough pressure to allow accurate calibration of the sampler at 2 ml/sec.

The booster pump consists of a housing, controls, and a motor-driven gear pump. To maintain the integrity of the incoming sample fluid, the pump gears are made of Teflon. The housing containing the booster pump is mounted on the side of the 6100CR (see Figure 3-8). The interior of the booster pump housing is shown in the Figure 3-9.

 **Note**

The pump must **never** be run without liquid inside the lines. Operation of the pump without liquid will destroy the Teflon gears inside the pump head.



Figure 3-8 6100CR with Booster Pump Installed

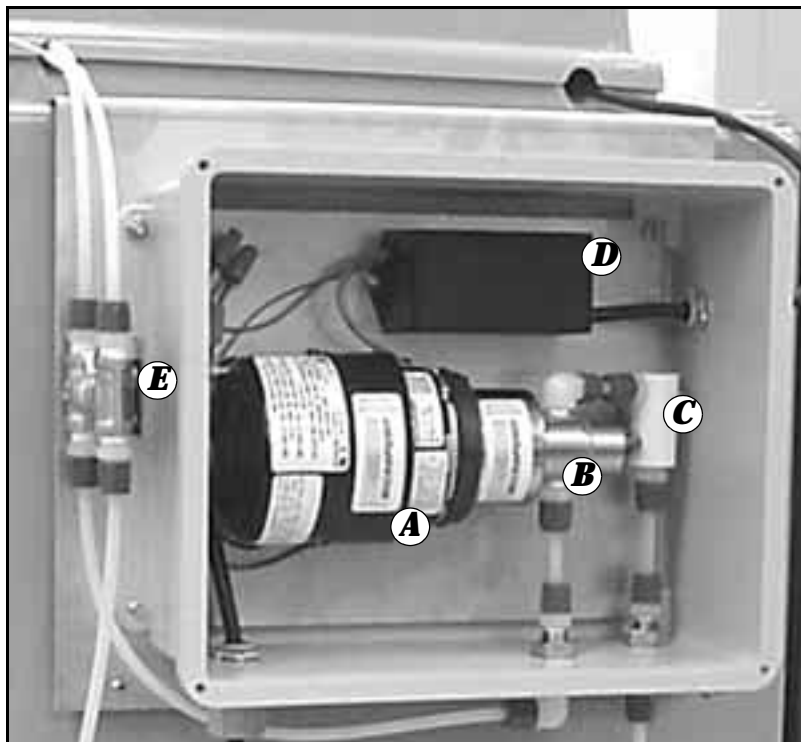


Figure 3-9 Booster Pump Components

Components inside the booster pump enclosure:

- A - Pump motor
- B - Pump head (enclosing the Teflon gears)
- C - Liquid level detection switch (prevents “dry” operation of pump)
- D - Electronic control box (to interface the pump with the 6100CR Sampler)
- E - Pressure relief assembly

The pump has no lift capability, so the sample line source must have enough pressure to deliver liquid to the pump inlet. Pump output is controlled by the pressure relief assembly to ensure performance and long pump life. Power for the pump is supplied from a separate 120 VAC grounded outlet.

The booster pump is shipped with instructions for its installation on the 6100CR.

Booster Pump Specifications:

Supply Power	120 VAC 60 Hz 1.48 A
Control Power	12 VDC (from sampler)
Minimum Input Pressure	1 PSIG
Maximum Input Pressure	20 PSIG
Maximum Ambient Temp.	120°F
Minimum Ambient Temp.	32°F

6100CR Refrigerated Sampler

Section 4 Maintenance and Special Features

4.1 Replacing the Needle Assembly

It is possible to replace the needle assembly in the field, if that should become necessary. **Before attempting this, please read the following warning:**

⚠ WARNING

Disconnect power completely before attempting needle replacement. The needle drive mechanism will cause serious injury to your hand if the sampler starts while you are working on it.

1. Note that the tower housing consists of two pieces that fit together like a clam shell. Remove the front half of the tower housing. The two sections of the tower housing fit together inside an H-shaped molding. There are four thumbscrews that hold the front on. You should be able to see the needle assembly clearly after removing the housing.

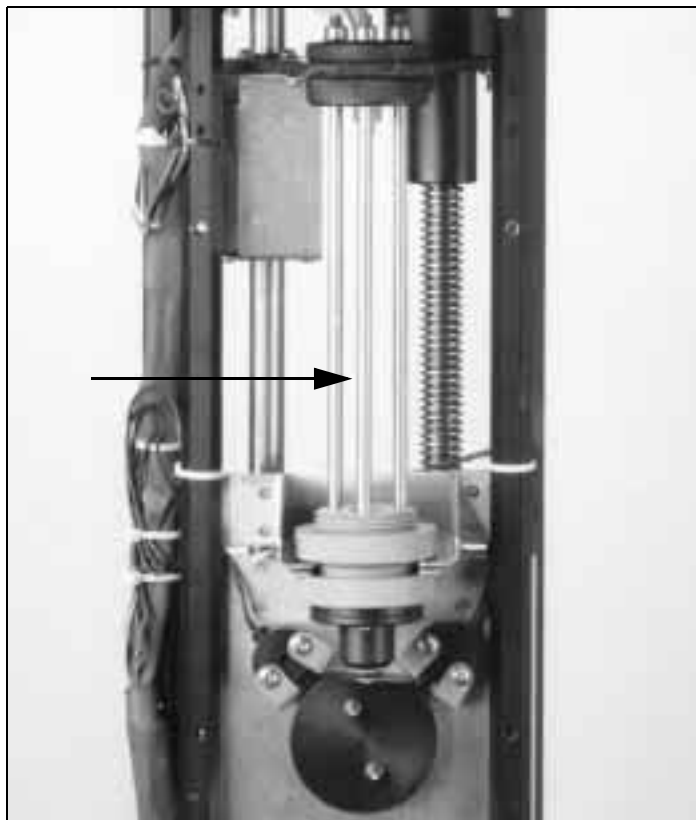


Figure 4-1 Tower Mechanism Showing Location of the Needle Assembly

2. The needle assembly consists of the needle, a heavy coil spring, three long slide rods, and four plastic rings. The plastic rings are knurled (lines on their surface). These rings are the needle mounts.
3. To remove the needle assembly, loosen the guide nut, the top gray plastic nut in the middle of the assembly.
4. Remove the drain hose from the bottom of the assembly.
5. Push up on the ball on the lower end of the needle assembly to compress the ball and remove the top remaining nut.

 **Note**

There is spring pressure on the assembly forcing it down. Hold the assembly up while removing the nut, then release slowly to prevent damage to the needle assembly.

When pressure is released, disconnect the sample tube from the top of the needle and remove the assembly from the tower.

6. Remove the needle from the assembly by removing the three screws holding the guide rods to the needle on the bottom. DO NOT loosen the retaining nuts on the top end of the slide rods. Pliers may be required to hold the slide rods while removing the screws. Remove the slide rods and unscrew the needle from the top needle mount, then remove the guide and spring.
7. Reassemble in the reverse order. Make sure the needle assembly is seated against the top mount before tightening the nut. Align the drain tube fitting with the hose slot and make sure the slide rods are not twisted. Tighten the gray guide nut in the middle of the needle assembly until it contacts the mount. The assembly should still be able to move with light pressure applied to it.

 **Note**

When reassembling the needle and tower, do not use tools to tighten the plastic mounting rings. You only need to finger-tighten them. You can use pliers to tighten the needle into the top mounting ring, but do not apply excessive force.

4.2 Needle Alignment

When replacing the needle it is necessary to make sure that the needle aligns with the bottle to guarantee proper sealing and operation of the mechanism. Use the following procedure to ensure alignment.

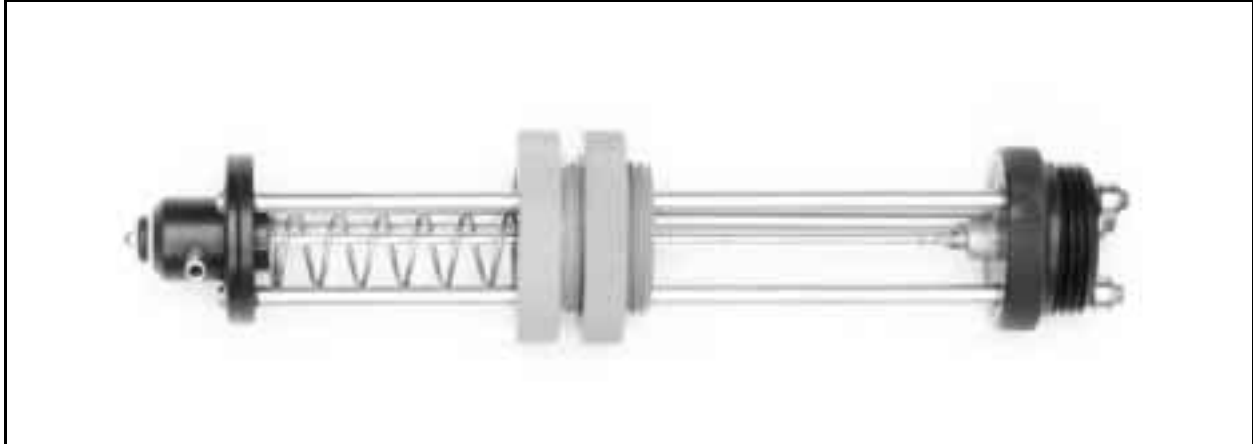


Figure 4-2 Needle Assembly Completed

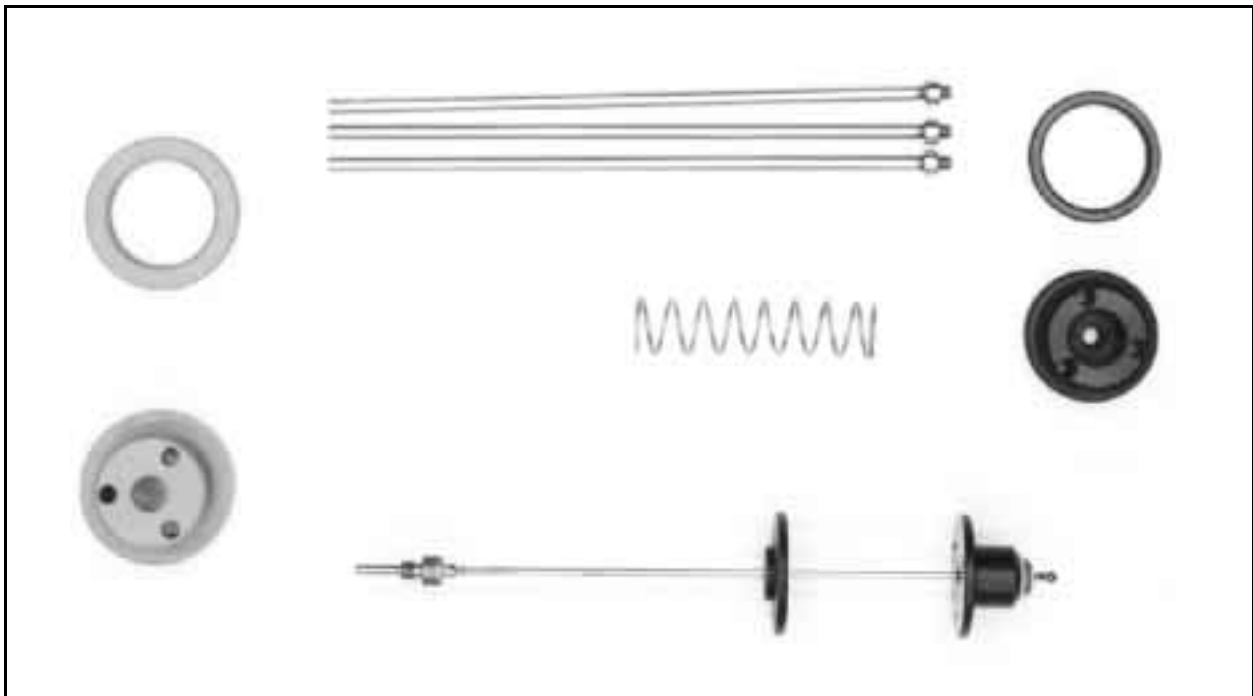


Figure 4-3 Needle Assembly Parts

1. With the front shell still removed and the sample supply turned off, visually align the needle over the bottle rack, both side-to-side and front-to-back, leaving the gray nut at the needle support loose. Set the sampler to run a single bottle manual sample with no strainer purge.

 **WARNING**

In performing the needle alignment, be very careful to keep your fingers out from under the needle tip and away from any other moving parts. Do *not* put your fingers between the needle tip and top of the bottle.

2. Initiate the sample. As the needle moves downward onto the bottle, manually guide it into the bottle.
3. When the needle has seated on the top of the bottle, jiggle it slightly to make sure it is centered. The top of the bottle valve is conical. While the needle is still seated on the bottle, tighten the gray nut only enough to provide resistance to movement. **Do not overtighten.** Run one more sample and visually verify the alignment.
4. Replace the front shell.

4.3 Hard Reset

The term **Hard Reset** refers to a feature that allows you to de-program the 6100CR to the factory-installed default program. The usual reason for doing a hard reset is when the microprocessor locks up and you cannot access the program to make changes or run an existing program.

 **CAUTION**

Hard reset will erase all programming selections you have made. It will also erase all entries made to the history log. Do not perform a hard reset casually or without good reason.

To **Hard Reset** the 6100CR:

1. Turn the unit off with the **On/Off** key.
2. Press and hold the **9** and **Right Arrow** keys at the same time.
3. While still holding the **9** and **Right Arrow** keys down, press and hold the **On/Off** key until the sampler starts to beep.
4. Release the **On/Off** key.
5. Release the other keys.
6. Turn the unit back on with the **On/Off** key.

4.4 Replacing the Desiccant Bags

The 6100CR has two desiccant containers inside to protect the electronics from moisture damage. One is located inside the sampler motor housing. The other is located beneath the control panel assembly.

Both units are deep inside the unit and will generally last a long time. There is an indicator on the base by the tower, with a window and numbers inside, that shows the condition of the desiccant. The numbers refer to the relative humidity inside the enclosure, with 20 standing for 20%, 30 standing for 30%, etc. As long as the window looks blue, the desiccant is still functioning.

When the window turns pink around all three numbers, the desiccant needs to be replaced, as humidity inside the enclosure exceeds **40%**. Replacement desiccant bags are available from Isco.

 **CAUTION**

You must disassemble the control panel to access the desiccant. Mechanical and electrical components will be exposed in the process. Do not disturb the wiring or change the mechanical linkages in any way or you may cause substantial damage to the sampler.

Isco suggests replacing both desiccants at the same time. To replace the desiccant in the control housing do the following:

1. Disconnect the power source.
2. Note the sampler motor housing under the unit. This enclosure houses the electronics.
3. The desiccant cartridge is located on the left side of the sampler motor housing opposite the electrical connections. Remove the desiccant cartridge by unscrewing the large hex nut.
4. The cartridge can be regenerated by removing the desiccant and replacing it with new or regenerated desiccant. Remove the desiccant by unscrewing the plastic tube from the hex nut. Never try to regenerate the desiccant while it is still inside the plastic cartridge.
5. Reassemble the cartridge and the sampler in the reverse order.

Isco supplies two different chemicals in the cartridges. Before regenerating them, you must identify the chemical used with your unit. Both chemicals are blue when activated and pale pink to amber when saturated.

- One chemical looks like irregular chips or flakes of tinted plaster. This is anhydrous calcium sulfate and you regenerate it by heating at 400° to 440°F (200°-225°C)
- The other chemical looks like glassy beads or pellets. This is silica gel, and you also regenerate it by heating, but at a lower temperature, 212° to 350° (100° to 175°C)

MSDS (Material Safety Data Sheets) for these chemicals can be found in Appendix B.

To replace the desiccant bag under the keypad, do the following:

1. Remove the ten screws attaching the plastic bezel to the keypad and remove the bezel.
2. Lift the keypad assembly out of the tower housing. Do not disconnect any of the wiring.
3. The desiccant bag is in the well beneath the keypad. Remove and replace the bag.
4. Reassemble the unit in reverse order.

4.4.1 Regenerating the Desiccant Bags

You should recharge the desiccant bag when the area marked "30" on the paper humidity indicator on the base turns pink.

1. Remove the bag from the 6100CR as described in the previous section.
2. Place a sheet of brown paper on a flat metal sheet. You can use a brown grocery sack and an ordinary cookie sheet.
3. Place the bags on the brown paper. Do not stack the bags on top of each other, nor allow them to touch.
4. Place the tray in a vented, circulating forced air, convection oven in a well-ventilated room. Allow two inches of air space between the top of the bags and the next metal tray above the bags.
5. Keep the tray a minimum of 16 inches from the heating element. Heat the bags at a temperature of 240° to 250°F (116° to 121°C) for 12 to 16 hours.
6. At the end of the time period, remove the bags and place them immediately in an airtight container for cooling.
7. The desiccant will recharge to 80 – 90% of its previous capacity. After several recharges, the desiccant bag may have lost enough capacity to require replacement.
8. Some bags can have the temperature and the recharging time for the desiccant printed on the bag. If the values printed on the bag differ from those given above, use the temperature and time printed on the bag.

4.5 FLASH Memory Updates

Many Isco instruments use a new type of memory called a Flash EPROM. Unlike earlier EPROMs that require UV erasure and were not easily field-replaced, the Flash EPROM lets you upgrade the software in the instrument without opening the unit or returning it to the factory. You can now update the software with a disk from Isco, an IBM® compatible personal computer and a connect cable.

The disk contains UPDATE, a program specifically for Flash memory, and a set of software files to update the Flash EPROM.

The disk is labeled with:

- The instrument series number
- The software revision number for each instrument in the series
- The part number of the disk

This instruction sheet assumes that:

- You know how to run the computer and are familiar with Microsoft® Windows®. UPDATE uses standard Windows mouse and keyboard commands. If you are not familiar with Windows, please consult the Windows user manuals.
- You have a cable to connect the computer to the instrument. If you do not, you can order one from your

Isco sales representative, or from the factory. The part number is listed in Table 4-1.

Before attempting to update a system please read the following:

 **CAUTION**

Updating the instrument will erase the data stored in memory. This includes both programming selections and measurements recorded by FLOWLINK[®], Isco's data storage and acquisition software. The program will revert to the default (factory) settings, and other stored data will be lost altogether.

Before you run UPDATE, record your program selections. Then you can reprogram the machine easily after you have installed the update. If the instrument uses FLOWLINK, collect the stored data first.

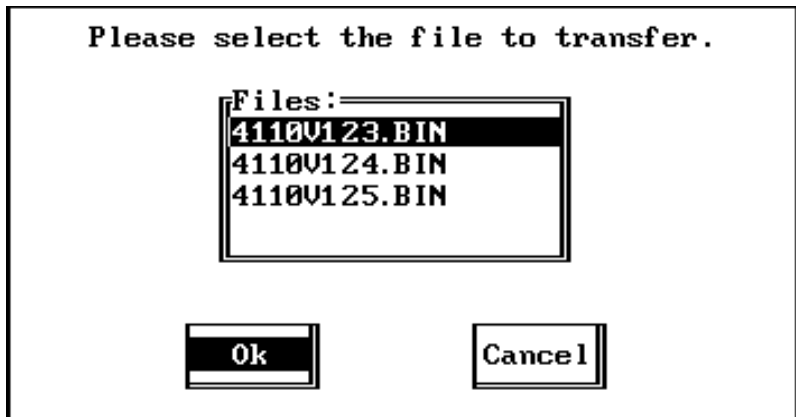
4.5.1 Running UPDATE

1. Plug the computer connect cable into the serial port on your computer and the Interrogator connector on the instrument. (The interrogator connector label shows the drawing of a lap-top computer.)
2. Insert the UPDATE disk in the computer's floppy disk drive, and change the DOS prompt to the floppy drive's prefix, for example: C:\> B:
3. At the DOS prompt, type: UPDATE. The windows in UPDATE contain the instructions for updating the instrument.

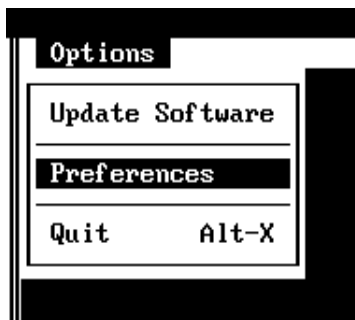
These instructions for running UPDATE assume you are running UPDATE from the UPDATE disk. If you copy the disk's contents to your hard drive, first create a directory for the files. The UPDATE program and the instrument software files must be in the same directory. Furthermore, the directory containing UPDATE and the update files must be the current directory when you run UPDATE.

If you receive several update disks over time, always copy the update files and the UPDATE program to the directory you have created for this on your computer. That will ensure you always have the current version of the UPDATE program as well as the new instrument software files.

Isco ships UPDATE and the update software on 3¹/₂-inch, high density disks. To obtain the disks or other assistance, contact the Customer Service Department. Contact information may be found in the Foreword at the front of this manual.



This window appears only when the directory or disk contains more than one version of the update files and the Preferences option for Show Update File is All Update Files. It lists the update files in the directory. The first four numbers in the file name are the instrument's model number. The numbers following the "v" are the software version. If several versions appear in the window, select the file with the highest version number.



Options Menu

4.5.2 Setting Preferences

Update has preference-settings that appear in the window below. To change them:

1. Click CANCEL in the Introduction window.
2. Select Preferences from the OPTIONS menu. The notes below explain the selections in the window. Select OK when done.
3. Select the UPDATE SOFTWARE from the OPTIONS menu, and follow the instructions in each window.

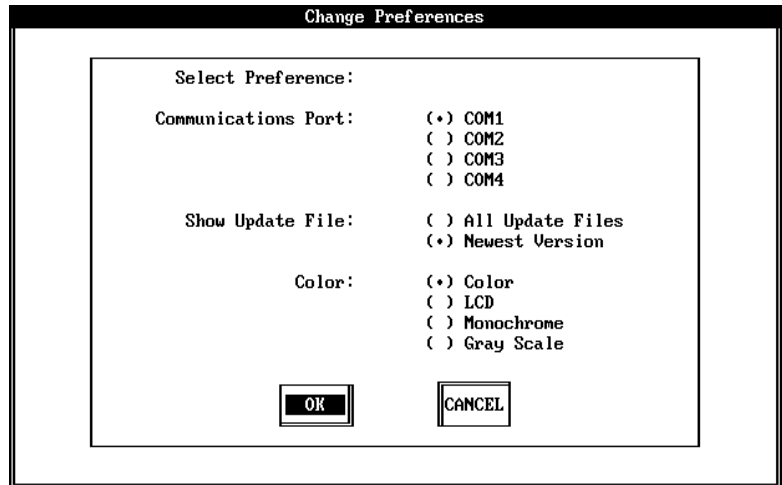


Figure 4-4 Preferences Screen

Note

Select the COM PORT you are using for the Computer Connector Cable.

Select NEWEST VERSION to see only the most recent update files in a directory: Select ALL UPDATE FILES to see all update files.

Select the color scheme that best matches your monitor

Table 4-1 Minimum DOS and Computer Hardware Requirements for FLASH Update

DOS	DOS 3.3 or later versions	DOS 5.0 or later versions recommended. Microsoft Windows not required.
CPU	80286, 80386, 80486	IBM PC or compatible. 80386 or 80486 recommended. (Must operate at 19,200 baud when communicating through the serial port.)
	640 kilobytes RAM (Random Access Memory), minimum	
	Serial port	For connecting the computer to Isco flow meters, flow loggers, or samplers.
Keyboard	Any compatible keyboard	
Hard disk	Not applicable	Not required.
Floppy disk	3½-inch floppy drive (1.44 megabytes)	At least one floppy disk drive.
Monitor	LCD, Gray Scale, Color, or Monochrome	IBM CGA, EGA, or VGA compatible.
Mouse	Microsoft®-compatible mouse	Optional. Mouse recommended.
Cabling	Isco Computer Connect Cable (9-pin: part #60-2544-044) (25-pin: part #60-2544-040)	For connecting the computer to flow meters, flow loggers, or samplers.

6100CR Refrigerated Sampler

Appendix A Replacement Parts List

A.1 Replacement Parts

Replacement parts are called out in the following pages. Refer to the call-out in the adjacent table to determine the part number for the item.

Replacement parts can be purchased by contacting Isco's Customer Service Department.

Isco, Inc.

Customer Service Department

P.O. Box 82531

Lincoln, NE 68501 USA

Phone: (800) 228-4373

(402) 464-0231

FAX:(402) 465-3022

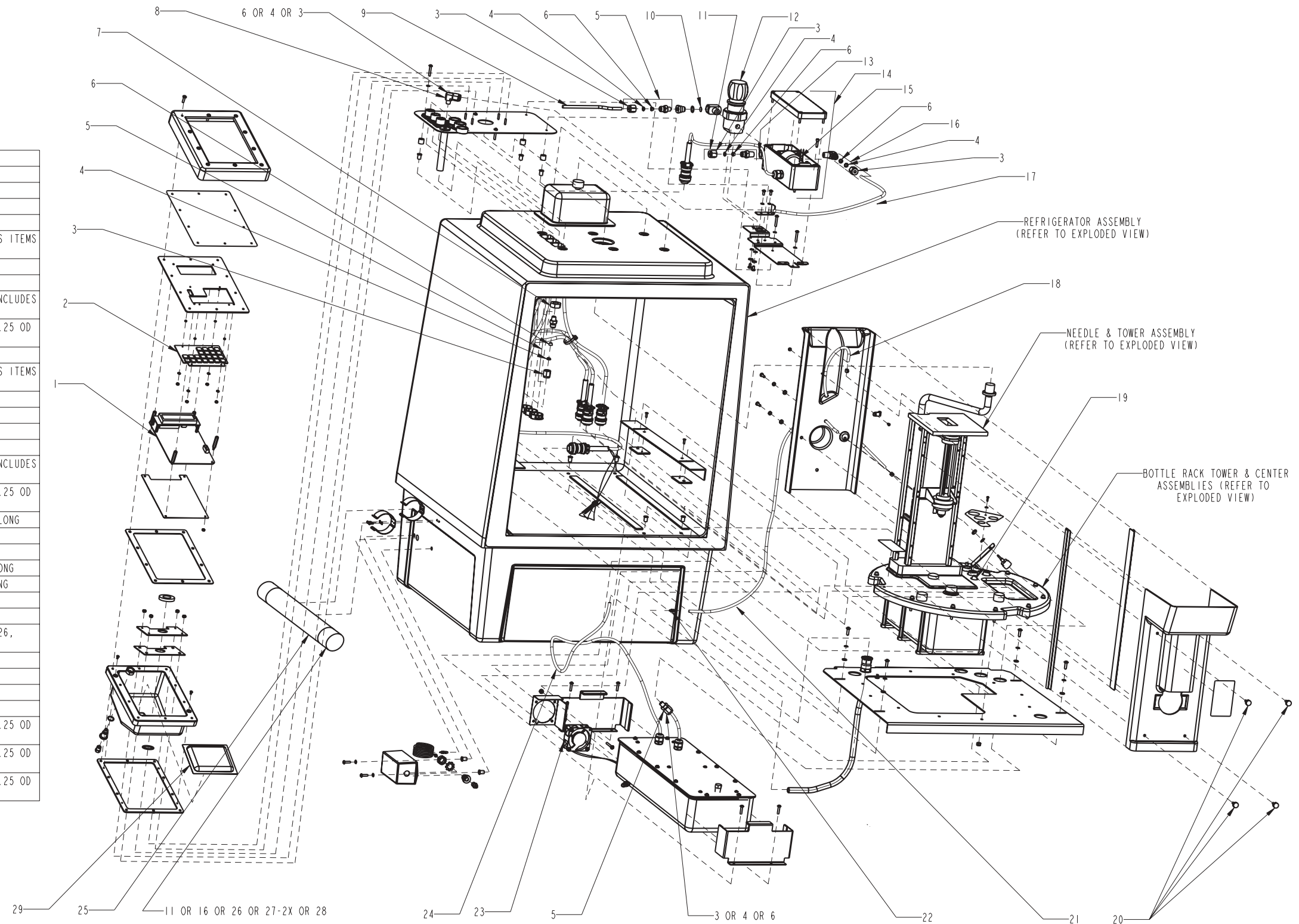
E-mail:info@isco.com

MODEL 6100CR
REFRIGERATED VOC SAMPLER
W/ COOLING COIL

(DWG 60-6102-008 REV. B)

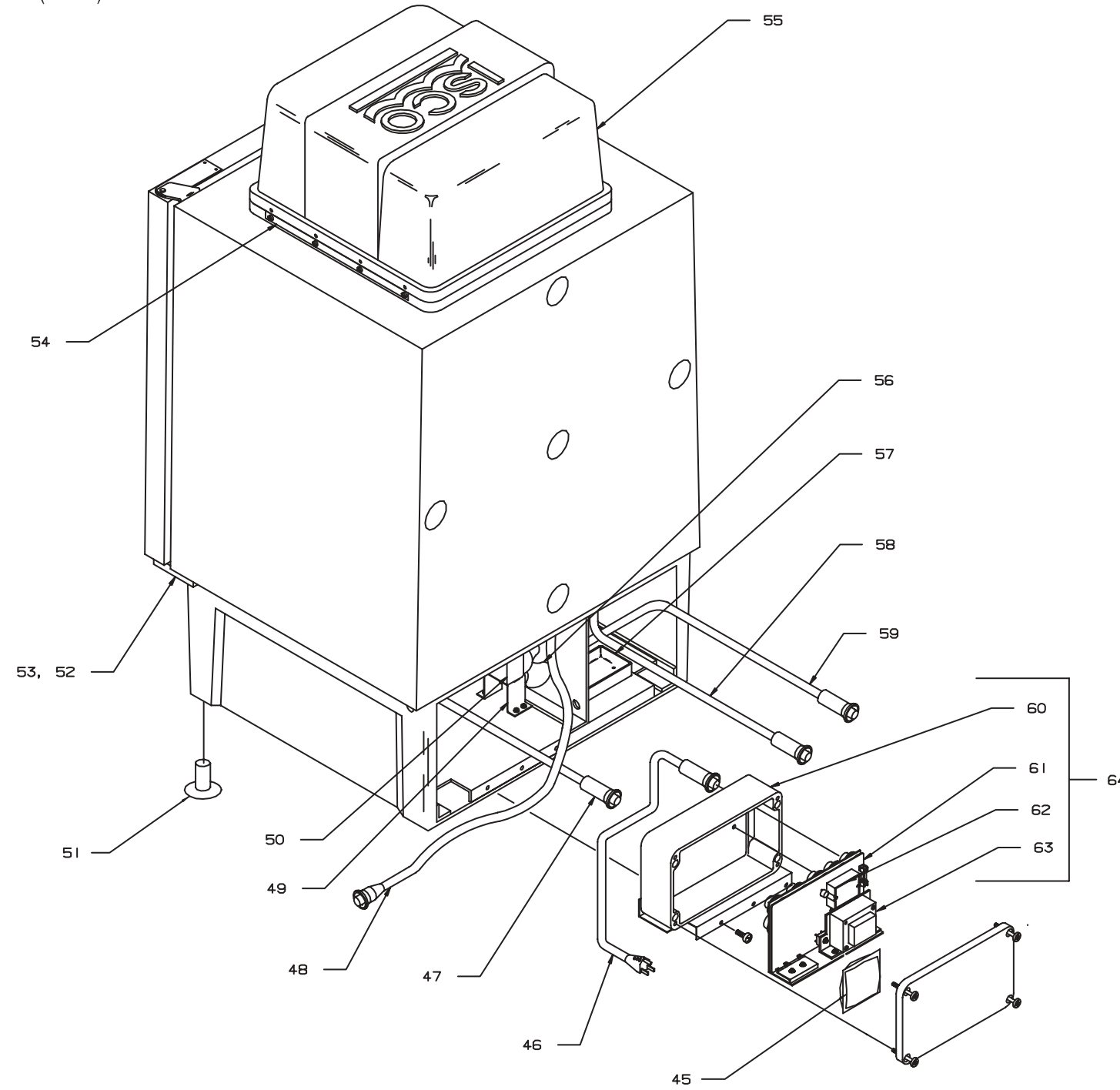
ITEM	PART NO.	DESCRIPTION
1	60-6004-015	CPU PCB ASSEMBLY
2	60-6004-013	KEYBOARD PCB ASSEMBLY
3	209-0163-62	TUBING FITTING NUT, 1/4 TUBING
4	209-0163-63	BACK FERRULE, 1/4 TUBING
5	209-0162-36	TUBE FITTING, 1/8 NPT, 1/4 TUBING (INCLUDES ITEMS 3, 4 & 6)
6	209-0163-64	FRONT FERRULE, 1/4 TUBING
7	232-1197-02	JAM NUT, 5/8-18
8	209-0167-66	ELBOW TUBE FITTING, 1/8 NPT, 1/4 TUBING (INCLUDES ITEMS 3, 4 & 6)
9	60-6103-040	POLYETHYLENE TUBING, FEP LINED, .125 ID X .25 OD - 50 INCHES LONG
10	60-6103-033	SECONDARY FILTER SCREEN
11	209-0162-38	TUBE FITTING, 1/4 NPT, 1/4 TUBING (INCLUDES ITEMS 3, 4 & 6)
12	60-6105-017	PRESSURE REGULATOR, 30 PSI, 1/4 NPT
13	60-6105-009	3-WAY BALL VALVE, MANUALLY ACTUATED
14	60-6104-008	VALVE ASSEMBLY (INCLUDES ITEMS 13 & 15)
15	60-6104-014	VALVE MOTOR ASSEMBLY W/ COUPLER & FLAG
16	209-0162-24	ELBOW TUBE FITTING, 1/4 NPT, 1/4 TUBING (INCLUDES ITEMS 3, 4 & 6)
17	60-6103-039	POLYETHYLENE TUBING, FEP LINED, .125 ID X .25 OD - 20.5 INCHES LONG
18	60-6103-015	SAMPLE TUBE, .125 ID X .25 OD - 21 INCHES LONG
19	411-0311-72	FUSE, 5A, 250V, SLO-BLO
20	60-2724-021	THUMBSCREW ASSEMBLY
21	60-6103-038	VINYL TUBING, .125 ID X .25 OD - 20 FEET LONG
22	209-0170-08	CAPILLARY FITTING, 1/8 TUBING TO 1/16 TUBING
23	60-6104-012	FAN ASSEMBLY
24	60-6104-021	BALLAST BOX TUBING W/ INSTALLATION GUIDE
25	60-6104-013	STRAINER ASSEMBLY (INCLUDES ITEMS 11, 16, 26, 27 - 2 PLACES & 28)
26	60-6105-008	FILTER
27	202-3002-18	O RING, 1.234 ID, 1.512 OD
28	202-3071-16	O RING, .737 ID, .943 OD
29	099-0002-08	DESICCANT BAG, 4 OZ
*30	60-6103-034	POLYETHYLENE TUBING, FEP LINED, .125 ID X .25 OD - 25 FEET LONG
*31	60-6103-035	POLYETHYLENE TUBING, FEP LINED, .125 ID X .25 OD - 50 FEET LONG
*32	60-6103-036	POLYETHYLENE TUBING, FEP LINED, .125 ID X .25 OD - 100 FEET LONG

NOTE: * ITEM IS NOT SHOWN IN ILLUSTRATION.



6100CR Refrigerated Sampler
Replacement Parts List

MODEL 6100CR
REFRIGERATOR ASSEMBLY
(BACK)

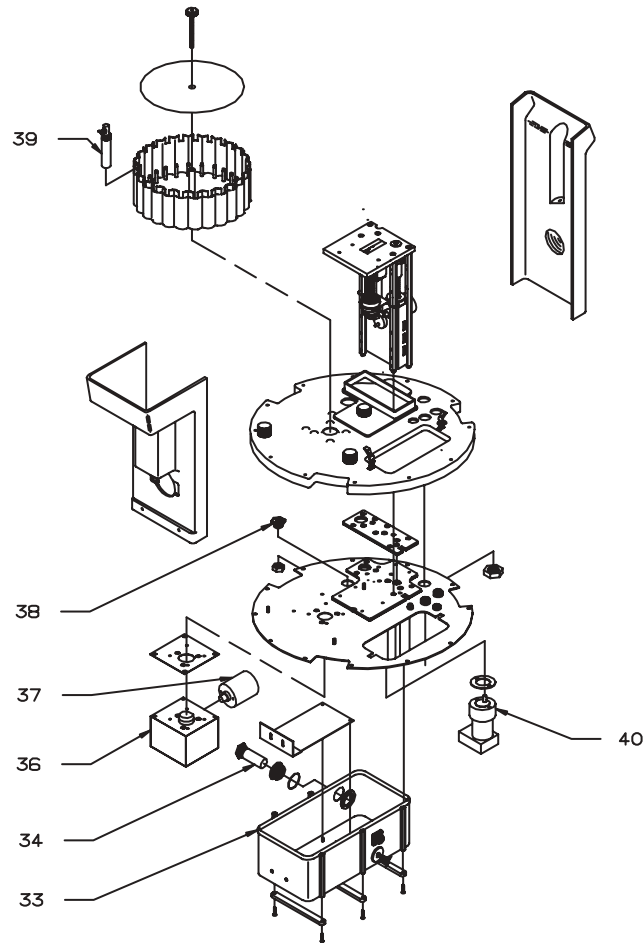


ITEM	INVENTORY NO.	DESCRIPTION
45	099-0002-00	DESICCANT BAG 8 OZ
46	60-9004-242	LINE CORD ASSEMBLY
47	60-9004-241	AMBIENT AIR TEMPERATURE SENSOR ASSEMBLY
48	60-9004-224	SAMPLER POWER WIRING ASSEMBLY
49	60-2723-133	FAN MOUNT
50	304-2300-09	FAN MOTOR
51	231-5159-64	ADJUSTING SCREW
52	60-2723-007	HINGE BUSHING
53	60-2724-066	DOOR HINGE ASSEMBLY, BOTTOM
54	60-2723-085	COVER HINGE
55	60-9004-100	TOP COVER (INCLUDES ITEMS 54 & 65)
56	209-0195-03	FAN BLADE
57	60-2723-068	DRIP PAN
58	60-9004-260	EVAPORATOR HEATER ASSEMBLY (INCLUDES ITEM 84)
59	60-9004-256	CRANKCASE HEATER ASSEMBLY (INCLUDES ITEM 84)
60	60-9003-479	TEMPERATURE CONTROL BOX
61	60-9004-257	PCB ASSEMBLY
62	366-0001-00	SOLID STATE RELAY
63	442-4899-03	TRANSFORMER
64	60-9004-208	TEMPERATURE CONTROL BOX ASSEMBLY
*65	109-0800-00	OVER CENTER DRAW LATCH

NOTE: * ITEM IS NOT SHOWN IN ILLUSTRATION

(DWG 60-6102-008 REV. B)

MODEL 6100CR
BOTTLE RACK
TOWER & CENTER
ASSEMBLIES



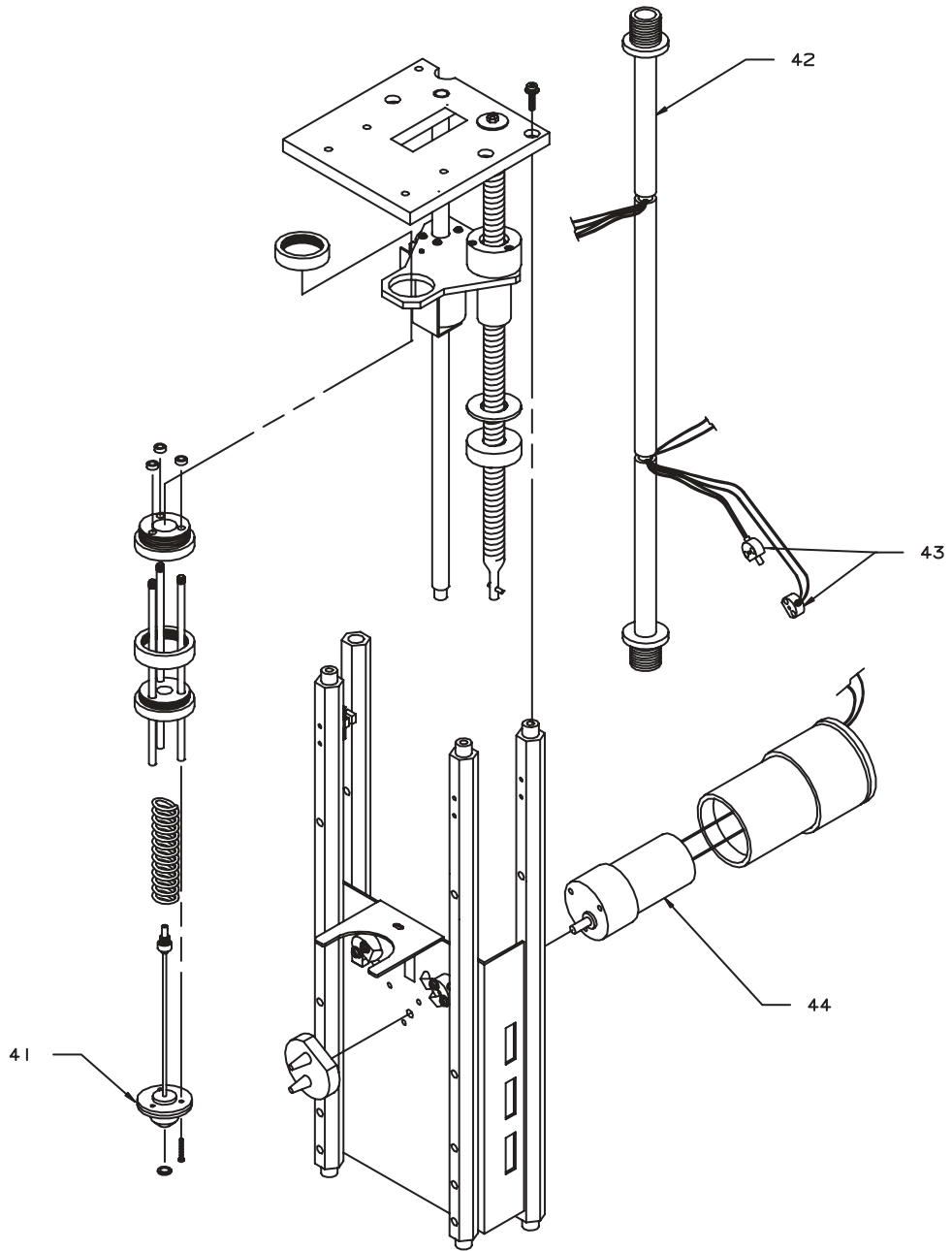
ITEM	INVENTORY NO.	DESCRIPTION
33	800-2303-01	LUBT V FS-34 (USE ON BOX GASKET WHEN EVER BOX IS REMOVED)
34	490-0010-01	DESICCATOR 3" WITH DESICCANT
*35	099-0011-03	DESICCANT, 1.5 LB CAN (USED IN ITEM 34)
36	60-6004-045	BOTTLE RACK DRIVE ASSEMBLY (INCLUDES ITEM 37)
37	60-2704-003	DISTRIBUTOR MOTOR ASSEMBLIY
38	490-0006-56	HUMIDITY IND. PLUG PLASTIC
39	68-6000-003	REPLACEMENT SAMPLE VIAL VALVE
40	60-6004-021	TOWER DRIVE MOTOR ASSEMBLY

NOTE: * ITEM IS NOT SHOWN IN ILLUSTRATION

(DWG 60-6102-008 REV. B)

6100CR Refrigerated Sampler
Replacement Parts List

MODEL 6100CR
NEEDLE & TOWER
ASSEMBLY



ITEM	INVENTORY NO.	DESCRIPTION
41	60-6104-018	NEEDLE SUB ASSEMBLY
42	60-6104-001	WIRING ASSEMBLY - PANEL (INCLUDES ITEM 43)
43	60-6104-020	PROXIMITY SENSOR ASSEMBLY
44	60-6003-217	MOTOR GEAR MOD

(DWG 60-6102-008 REV. B)

6100CR Refrigerated Sampler

Appendix B Material Safety Data Sheets

B.1 Material Safety Data Sheets

Material Safety Data Sheets are provided for reference. Isco cannot guarantee the accuracy of the data. Specific questions regarding the use and handling of the products should be directed to the manufacturer listed on the MSDS.

Material Safety Data Sheet

Natrasorb M (Clay-Paper Pouch)

Identity (Trade Name as Used on Label)

Manufacturer: MULTISORB TECHNOLOGIES, INC. (formerly Multiform Desiccants, Inc.)	MSDS Number* :
Address: 325 Harlem Road Buffalo, NY 14224	CAS Number* :
Phone Number (For Information): 716/824-8900	Date Prepared: April 19, 1996
Emergency Phone Number: 716/824-8900	Prepared By* : G.E. McKedy

Section 1 - Material Identification and Information

Components - Chemical Name & Common Names (Hazardous Components 1% or greater; Carcinogens 0.1% or greater)	%*	OSHA PEL	ACGIH TLV	OTHER LIMITS RECOMMENDED
Montmorillonite Clay	86-93	N/A	N/A	
Crystalline silica quartz	2-4	2mg/m ³ (respirable dust)	0.1 mg/m ³ (respirable dust)	
Non-Hazardous Ingredients Paper	5-10			
TOTAL	100			

Section 2 - Physical/Chemical Characteristics

Boiling Point	N/A	Specific Gravity (H ₂ O = 1)	2.0 (Montmorillonite Clay)
Vapor Pressure (mm Hg and Temperature)	N/A	Melting Point	N/A
Vapor Density (Air = 1)	N/A	Evaporation Rate (=1)	N/A
Solubility in Water	Not soluble, but will adsorb moisture.	Water Reactive	Not reactive, but will adsorb moisture.
Appearance and Odor	Paper pouch containing tan powder.		

Section 3 - Fire and Explosion Hazard Data

Flash Point and Methods Used	N/A	Auto-Ignition Temperature	N/A	Flammability Limits in Air % by Volume	N/A	LEL	UEL
Extinguisher Media	Water is best extinguishing medium, but dry chemical, carbon dioxide and foam can be used.						
Special Fire Fighting Procedures	None. The paper pouch will burn, but the clay will not.						
Unusual Fire and Explosion Hazards	None.						

Section 4 - Reactivity Hazard Data

STABILITY <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Unstable	Conditions To Avoid	Moisture, clay will adsorb moisture.
Incompatibility (Materials to Avoid)	None.	
Hazardous Decomposition Products	Carbon dioxide, carbon monoxide, water	
HAZARDOUS POLYMERIZATION <input type="checkbox"/> May Occur <input checked="" type="checkbox"/> Will Not Occur	Conditions To Avoid	None

Section 5 - Health Hazard Data

PRIMARY ROUTES OF ENTRY	<input checked="" type="checkbox"/> Inhalation <input checked="" type="checkbox"/> Skin Absorption	<input checked="" type="checkbox"/> Ingestion <input type="checkbox"/> Not Hazardous	CARCINOGEN LISTED IN	<input type="checkbox"/> NTP <input type="checkbox"/> IARC Monograph	<input type="checkbox"/> OSHA <input checked="" type="checkbox"/> Not Listed
HEALTH HAZARDS	Acute	May cause eye, skin and mucous membrane irritation.			
	Chronic	Prolonged inhalation may cause lung damage.			
Signs and Symptoms of Exposure	Drying and irritation.				
Medical Conditions Generally Aggravated by Exposure	Asthma				
EMERGENCY FIRST AID PROCEDURES - Seek medical assistance for further treatment, observation and support if necessary.					
Eye Contact	Flush with water for at least 15 minutes.				
Skin Contact	Wash affected area with soap and water.				
Inhalation	Remove affected person to fresh air.				
Ingestion	No adverse effects expected.				

Section 6 - Control and Protective Measures

Respiratory Protection (Specify Type)	Use NIOSH approved dust respirator.				
Protective Gloves	Light cotton gloves.		Eye Protection	Safety glasses.	
VENTILATION TO BE USED	<input type="checkbox"/> Local Exhaust	<input type="checkbox"/> Mechanical (General)	<input type="checkbox"/> Special		
	<input checked="" type="checkbox"/> Other (Specify) None.				
Other Protective Clothing and Equipment	None.				
Hygienic Work Practices	Avoid raising dust. Avoid contact with skin, eyes and clothing.				

Section 7 - Precautions for Safe Handling and Use/Leak Procedures

Steps to be Taken if Material Is Spilled Or Released	Sweep or vacuum up the spilled material and place in a waste disposal container. Avoid raising dust.				
Waste Disposal Methods	Dispose in an approved landfill according to federal, state and local regulations.				
Precautions to be Taken In Handling and Storage	Cover promptly to avoid blowing dust. Wash after handling.				
Other Precautions and/or Special Hazards	Keep in sealed container away from moisture. Clay will readily adsorb moisture.				

H&S: 1,2-PROPANEDIOL 57-55-6

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NTP CHEMICAL REPOSITORY
1,2-PROPANEDIOL

-IDENTIFIERS
=====

*CATALOG ID NUMBER: 000047
*CAS NUMBER: 57-55-6
*BASE CHEMICAL NAME: PROPANEDIOL,1,2-
*PRIMARY NAME: 1,2-PROPANEDIOL
*CHEMICAL FORMULA: C3H8O2
*STRUCTURAL FORMULA: CH3CH(OH)CH2OH
*WLN: QY1&1Q

*SYNONYMS:
1,2-DIHYDROXYPROPANE
METHYLETHYLENE GLYCOL
METHYL GLYCOL
MONOPROPYLENE GLYCOL
PROPANE-1,2-DIOL
PROPYLENE GLYCOL
ALPHA-PROPYLENEGLYCOL
1,2-PROPYLENE GLYCOL
TRIMETHYL GLYCOL
DOWFROST
PG 12
PROPYLENE GLYCOL USP
SIRLENE
SOLAR WINTER BAN

-PHYSICAL CHEMICAL DATA
=====

*PHYSICAL DESCRIPTION: LITERATURE: Clear, colorless, viscous liquid
REPOSITORY: Clear, colorless, viscous liquid
*MOLECULAR WEIGHT: 76.10
*SPECIFIC GRAVITY: 1.0361 @ 20/4 C [017,047]
*DENSITY: 1.04 g/mL @ 20 C [371]
*MP (DEG C): -60 C [205,269,274]
*BP (DEG C): 188.2 C [042,055,058]
*SOLUBILITIES:
WATER : >=100 mg/mL @ 21 C (RAD)
DMSO : >=100 mg/mL @ 21 C (RAD)
95% ETHANOL : >=100 mg/mL @ 21 C (RAD)
METHANOL : Not available

H&S: 1,2-PROPANEDIOL 57-55-6

Page 2 of 7

ACETONE : >=100 mg/mL @ 21 C (RAD)

TOLUENE : Not available

OTHER SOLVENTS:

Benzene: Soluble [017,047]
Ether: Soluble [017,047,052,058,205]
Chloroform: Miscible [058,205]
Fixed oils: Insoluble [052]
Alcohols: Miscible [062]
Many organic solvents: Miscible [062]

*VOLATILITY:

Vapor pressure: 0.08 mm Hg @ 20 C [042,058]; 0.13 mm Hg @ 25 C [430]
Vapor density : 2.62

*FLAMMABILITY (FLASH POINT):

This chemical has a flash point of 99 C (210 F) [042,052,058,062,371]. It is combustible. Fires involving this material can be controlled with a dry chemical, carbon dioxide or Halon extinguisher. A water spray may also be used [058,371]. The autoignition temperature is 415 C (779 F) [058,062].

*UEL: 12.6% [042,058]

LEL: 2.6% [042,058,371]

*REACTIVITY:

This compound can react with oxidizing materials [042,058,269]. It is incompatible with acid chlorides, acid anhydrides, chloroformates, and reducing agents [269]. It dissolves many essential oils [052,406]. A mixture of this compound with hydrofluoric acid and silver nitrate was put in a glass bottle which burst 30 minutes later [066].

*STABILITY:

This compound is hygroscopic [042,062]. It is sensitive to excessive heat (tends to oxidize at high temperatures) [052,058]. It is stable when stored protected from light for 2 weeks at temperatures up to 60 C [052].

*OTHER PHYSICAL DATA:

Specific gravity: 1.0381 @ 20/20 C [062]; 1.033 @ 25/4 C [430]
Specific gravity: 1.0362 @ 25/25 C [042]; 1.0331 @ 22/22 C [052]
Boiling point: 186.1 C @ 740.9 mm Hg [052]; 96-98 C @ 21 mm Hg [017,047]
Refractive index: 1.4320 @ 20 C
Practically odorless
Slightly acrid taste
Viscosity: 0.581 poise @ 20 C
Heat of combustion: -5728 cal/g
Latent heat of vaporization: 170 cal/g
Surface tension: 40.1 dynes/cm @ 25 C
log P octanol: -1.41/-0.30 (calculated)
Specific heat: 0.590 cal/g @ 20 C
Burning rate: 1.5 mm/minute
Evaporation rate: 0.005

-TOXICITY

=====

*NIOSH REGISTRY NUMBER: TY2000000

*TOXICITY: [\(abbreviations\)](#)

typ.	dose	mode	specie	amount	units	other
LD50		ims	rat	14	gm/kg	
LDLo		ims	rbt	6300	mg/kg	
LD50		ipr	mus	9718	mg/kg	

LD50	ipr	rat	6660	mg/kg
LDLo	ivn	ckn	27	gm/kg
LD50	ivn	dog	26	gm/kg
LD50	ivn	mus	6630	mg/kg
LD50	ivn	rat	6423	mg/kg
LDLo	ivn	rbt	4200	mg/kg
TDLo	orl	chd	79	gm/kg/56W-I
LD50	orl	dog	22	gm/kg
LD50	orl	gpg	19	gm/kg
LD50	orl	mus	24	gm/kg
LD50	orl	rat	20	gm/kg
LDLo	orl	rbt	14300	mg/kg
LDLo	scu	gpg	15500	mg/kg
LD50	scu	mus	17370	mg/kg
LD50	scu	rat	22500	mg/kg
LD50	skn	rbt	20800	mg/kg

*AQTX/TLM96: over 1000 ppm

*SAX TOXICITY EVALUATION:

THR: A skin and eye irritant. It affects the central nervous system in humans. LOW via oral, intraperitoneal, subcutaneous, intramuscular and skin routes. It is a substance which migrates to food from packaging materials.

*CARCINOGENICITY: Not available

*MUTATION DATA:

test	lowest dose	test	lowest dose
cyt-ham:fbr	32 gm/L	cyt-mus-scu	8000 mg/kg
dni-mus-scu	8000 mg/kg		

*TERATOGENICITY:

Reproductive Effects Data:
 TDLo: ipr-mus 100 mg/kg (11D preg)
 TDLo: ipr-mus 100 mg/kg (15D preg)

*STANDARDS, REGULATIONS & RECOMMENDATIONS:

OSHA: None
 ACGIH: None
 NIOSH Criteria Document: None
 NFPA Hazard Rating: Health (H): None
 Flammability (F): None
 Reactivity (R): None

*OTHER TOXICITY DATA:

Skin and Eye Irritation Data:
 skn-hmn 500 mg/7D MLD
 skn-hmn 104 mg/3D-I MOD
 skn-man 10%/2D
 eye-rbt 100 mg MLD
 eye-rbt 500 mg/24H MLD
 Review: Toxicology Review
 Status: EPA Genetox Program 1986, Negative: SHE-clonal assay
 EPA TSCA Chemical Inventory, 1986
 EPA TSCA Section 8(e) Status Report 8EHQ-0178-0041
 EPA TSCA Test Submission (TSCATS) Data Base, December 1986
 Meets criteria for proposed OSHA Medical Records Rule

-OTHER DATA (Regulatory)

=====

*OTHER: Not available

*STORAGE PRECAUTIONS:

You should protect this material from exposure to light and moisture. Keep it away from oxidizing materials and store it under refrigerated temperatures.

*SPILLS AND LEAKAGE:

If you should spill this chemical, use absorbent paper to pick up all liquid spill material. Seal the absorbent paper, as well as any of your clothing which may be contaminated, in a vapor-tight plastic bag for eventual disposal. Wash any surfaces you may have contaminated with a soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

*DISPOSAL AND WASTE TREATMENT: Not available

-EMERGENCY PROCEDURES

=====

*SKIN CONTACT:

IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.

If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment.

*INHALATION:

IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital.

Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

*EYE CONTACT:

First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.

Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.

IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

*INGESTION:

DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician.

If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

*SYMPTOMS:

Symptoms of exposure to this compound may include central nervous system depression [058,151,406,430]. Other symptoms may include convulsions [301]. It may cause irritation of the skin and eyes [042,058,269]. It may cause primary skin irritation in some people, possibly due to dehydration [430].

Prolonged contact may result in defatting of the skin [058]. It can cause skin sensitization [151,159]. Ingestion of large amounts can cause gastrointestinal upset and diarrhea [058]. A single drop in human eyes has caused immediate stinging, blepharospasm, and lacrimation followed by mild transient conjunctival hyperemia [099,430]. Severe inhalation of the mist may cause mild irritation of the upper respiratory tract [058]. In children, exposure can cause stupor, tachypnea, tachycardia, diaphoresis and seizures [151]. It can also cause hypoglycemia in children [430]. Very high doses in experimental animals have produced central nervous system depression, hemolysis, and minimal kidney changes [151].

-SOURCES

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