

Isco 3780 Zone 1-rated Sampler

Installation and Operation Guide



Part #60-3783-002
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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.

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)
	(800) 228-4373	(Samplers and Flow Meters)
Fax:	(402) 465-3022	
Email address:	info@isco.com	
Website:	www.isco.com	
Return equipment to:	4700 Superior Street, Lincoln, NE 68504-1398	
Other correspondence:	P.O. Box 82531, Lincoln, NE 68501-2531	

General Warnings

Before installing, operating, or maintaining this equipment, it is imperative that all hazards and preventive measures are fully understood. While specific hazards may vary according to location and application, take heed in the following general warnings:

 **WARNING**

Avoid hazardous practices! If you use this instrument in any way not specified in this manual, the protection provided by the instrument may be impaired.

 **AVERTISSEMENT**

Éviter les usages périlleux! Si vous utilisez cet instrument d'une manière autre que celles qui sont spécifiées dans ce manuel, la protection fournie de l'instrument peut être affaiblie; cela augmentera votre risque de blessure.

Hazard Severity Levels

This manual applies *Hazard Severity Levels* to the safety alerts. These three levels are described in the sample alerts below.

 **CAUTION**

Cautions identify a potential hazard, which if not avoided, may result in minor or moderate injury. This category can also warn you of unsafe practices, or conditions that may cause property damage.

 **WARNING**









Warnings identify a potentially hazardous condition, which if not avoided, could result in death or serious injury.

 **DANGER**

DANGER – limited to the most extreme situations to identify an imminent hazard, which if not avoided, will result in death or serious injury.

Hazard Symbols

The equipment and this manual use symbols used to warn of hazards. The symbols are explained below.

Hazard Symbols	
Warnings and Cautions	
	The exclamation point within the triangle is a warning sign alerting you of important instructions in the instrument's technical reference manual.
	The lightning flash and arrowhead within the triangle is a warning sign alerting you of "dangerous voltage" inside the product.
Symboles de sécurité	
	Ce symbole signale l'existence d'instructions importantes relatives au produit dans ce manuel.
	Ce symbole signale la présence d'un danger d'électocution.
Warnungen und Vorsichtshinweise	
	Das Ausrufezeichen in Dreieck ist ein Warnzeichen, das Sie darauf aufmerksam macht, daß wichtige Anleitungen zu diesem Handbuch gehören.
	Der gepfeilte Blitz im Dreieck ist ein Warnzeichen, das Sie vor "gefährlichen Spannungen" im Inneren des Produkts warnt.
Advertencias y Precauciones	
	Esta señal le advierte sobre la importancia de las instrucciones del manual que acompañan a este producto.
	Esta señal alerta sobre la presencia de alto voltaje en el interior del producto.

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Isco 3780 Zone 1-rated Sampler

Section 1 Introduction

1.1 Overview

The new Isco 3780 Sampler is designed for hazardous location installation and carries the IEC (International Electrotechnical Commission) rating for Zone 1 (compliant with UL Class I, Division 1 requirements) operation. It provides users with a viable alternative to manual sample collection in hazardous locations. It has also been given approval for Zone 1 installation by TUV, an internationally recognized testing lab.

The IEC Zone 1 classification refers to areas where ignitable concentrations of explosive gases are likely to exist periodically under normal operating conditions. IEC standards are accepted in the US, and operate in parallel with the UL/CSA Division ratings system.

The 3780's Zone 1 rating is achieved using specialized batteries and a cast aluminum case that contains the controller components. In addition, a unique programming interface eliminates the need for complex keypad entry of program parameters, and serves to maintain the operational safety required for Zone 1 applications.



Figure 1-1 Isco 3780 Zone 1-rated Sampler

The 3780 stores up to 10 different programs which can be initiated at the press of a button.

A peristaltic pump delivers samples at timed intervals (volumes can be flow-proportional, if desired) to the containers.

With its extremely small 16 in. "footprint," the 3780 easily fits into the smallest of manholes.

1.1.1 Options

Options and accessories available for the 3780 include:

- Battery chargers
- Suction lines
- Sample containers:
 - twelve one-liter plastic bottles
 - twelve 500 mL glass bottles
 - one 10-liter plastic container

1.1.2 Features

- Operation by selection switch with ENTER key
- Automatic error check
- Status inquiry, during operation
- 10 stored programs, field changeable
- Automatic calculation of optimal fill volume
- Rollover storage for error data
- Conditional and two-part programs

Table 1-1 Isco 3780 Zone 1-rated Sampler Technical Data

Size (Height × Diameter)	28 × 16 in. Includes external battery
Weight	53 lb. Includes external battery and empty bottles
Power Supply	12 VA maximum
Battery Operation	12VDC, 10 Ah external maintenance-free lead-acid rechargeable battery
Current Consumption	max. 2 A, approx. 45mA in standby mode. The battery is charged with an external AC adapter/battery charger
Degree of Protection	IP 65 (with applied protective cover) Sampler: EExd (ib) IIB T5 for risk areas 1 and 2. Explosion-protected AC adapter: EEx de IIC T6 for risk areas 1 and 2. Explosion-protected rechargeable battery: EEx de IIC T6 for risk areas 1 and 2. Battery charger: IP 65 (not for use in hazardous areas).
Flow Mode Input	0–20mA or 4–20mA
Parts in contact with sample	
Suction line	PVC, reinforced
Tubing connector	ABS
Pump tube	Silicone
Liquid sensor	POM or PTFE optional electrodes
Electrodes	Hastelloy C22
Distributor	PVC
Bottles	PE or glass
Tube diameter	.3 in. internal diameter
Tube length	max. 65ft, custom length available upon request
Suction height	20 ft
Required conductivity of sample water	
Standard version	350 - 3000 μS/cm
Operation time with 10 Ah Battery	Battery (10 Ah): 40 hours at 68 °F, 3 ft suction height and 5 min intervals between samples
User Controls	Operation with a 24-position rotary selector dial and one confirmation button. Water resistant, degree of protection IP 65
Display	8 digit alphanumeric LED display in dialogue mode. One of four languages can be selected: German, English, French, Dutch
Time display	Time, date, weekday
Program storage	10 user programs (programmable)
Sampler initiation	1. Immediately 2. After 1 min - 199 hrs 59 minute timed delay. 3. At time specified, from 1 minute to 1 year in advance.
Sampling duration (Program Length)	1 - 999 hrs, selectable in one minute increments 1 min - 999 hrs and 59 min

Table 1-1 Isco 3780 Zone 1-rated Sampler Technical Data (Continued)

Sample interval	1 min - 999 hrs & 59 min, selectable in 0.1 min increments 0.1 min - 999 hrs & 59.9 min
Number of bottles	1 or 12. Sampler stops after last bottle.
Sample volume	Microprocessor calculates sample volume on selected sampling duration, sampling interval, number of bottles and bottle volume. It can be reduced or increased by up to 50%.
Current Limits	<ol style="list-style-type: none"> 1. Switching between flow-activated and timed sampling. 2. Sampling stops when the signal falls below the bottom value and will start automatically when signal exceeds the top value. Both values can be deactivated by setting them at 0.0 mA.
Errors storage	Stores up to 50 errors in the order in which they occur, with automatic overflow, indicating date and time of beginning and end of error.
Battery voltage	When a test cycle is in progress, the battery voltage under load is displayed.
Suction purge	The suction purge function can be activated or deactivated for each program. This is important for sampling in pressurized tubes.
Sampling Types	
Time mode T1	Time mode with selectable sampling duration and interval
Flow mode F mA	Timed, flow proportional sampling via analog input 0–20 mA or 4–20 mA with selectable range.

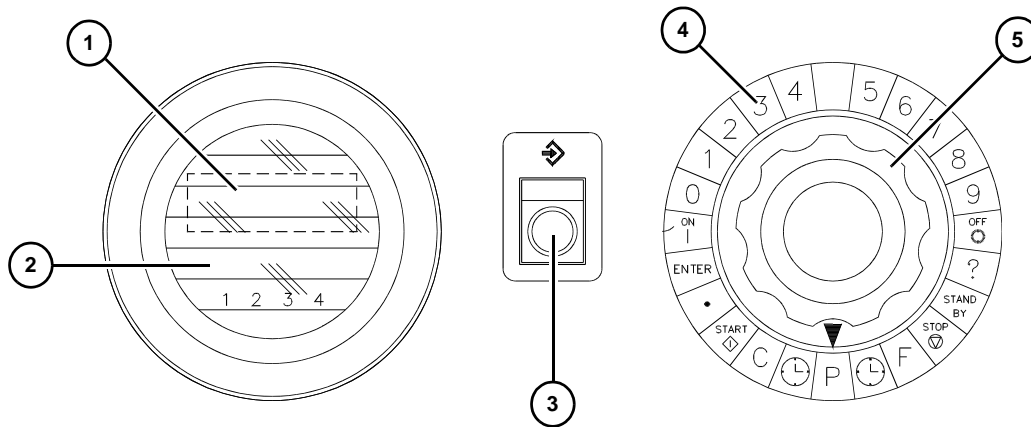


Figure 1-2 View of the 3780 Sampler Control Panel

- 1 Display
- 2 LEDs
- 3 Confirmation Button (ENTER)
- 4 Function fields for programming or displaying
- 5 Rotary Switch

Table 1-2 LED Functions			
LED #	Color	Indication	Meaning
1	GREEN	blinks rapidly	Sampler is on.
		on continuously	Standby mode
		blinks slowly	Program is running
		flashes	Program is running, but delay has not yet elapsed
2	YELLOW	blinks intermittently	Sampler is proportioning.
		on continuously	Sampler is collecting sample.
		flashes	Sampling interrupted by bottle change
3	YELLOW	blinks intermittently	Suction line is being purged.
4	RED	blinks intermittently	Malfunction (Error F3, F9).

Isco 3780 Zone 1-rated Sampler

Section 2 Installation

2.1 Overview

Section 2 explains principal setup and sampler operation, including physical placement and connections for power and external input, basic function and sample collection.

2.2 Placement of the Sampler

To avoid the formation of air slugs and to ensure that the correct quantities are sampled, place the sampler above the sample source on solid, level ground so that the suction line slopes downward to the source. The standard suction line is equipped with a weighted strainer at its opening which prevents large particles from entering the tube, and the tube from rising to the surface. For cold weather operation, additional tube insulation may be necessary.

2.3 Battery Operation

During battery operation, the sampler is run by an external battery. It is essential to charge the battery prior to starting the sampler. An external battery charger (not Zone 1 rated) can be used.

The battery charger may under no circumstances be used in risk areas. The charging time depends upon the remaining charge of the battery. A fully discharged battery must be charged for at least 24 to 48 hours.

For trickle charging, the battery should be connected continuously to the battery charger since the charging process is regulated automatically. The battery is protected by means of a switch, which prevents deep discharge. If the voltage becomes too low, the sampler switches off automatically.

 WARNING
--

The battery must be recharged after using battery operation mode.

The battery must NOT be charged using the battery charger in places with high explosion risk, since the battery charger itself is not ex-protected.

When the sampler is powered by an external battery, it can be used immediately after the battery has been exchanged. The used battery can then be recharged.

2.4 Connecting the Ex-protected Connector

Sampler models designed for operation with an external battery or the ex-protected AC-charger are suitably equipped with an ex-protected connector.

To connect it properly, rotate it a quarter-turn clockwise while exerting slight pressure. The connector should click into position.

To disconnect, rotate it a quarter-turn counterclockwise, again exerting slight pressure.

 **CAUTION**

The connector must not be turned by force. Isco cannot assume liability for damage resulting from misuse.

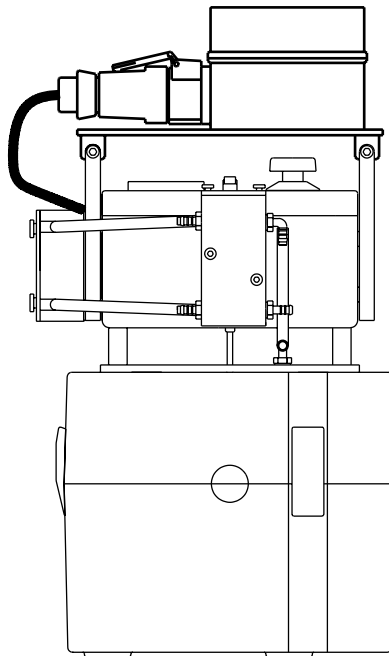


Figure 2-1 Sampler with battery in place

2.5 Sampler Connections

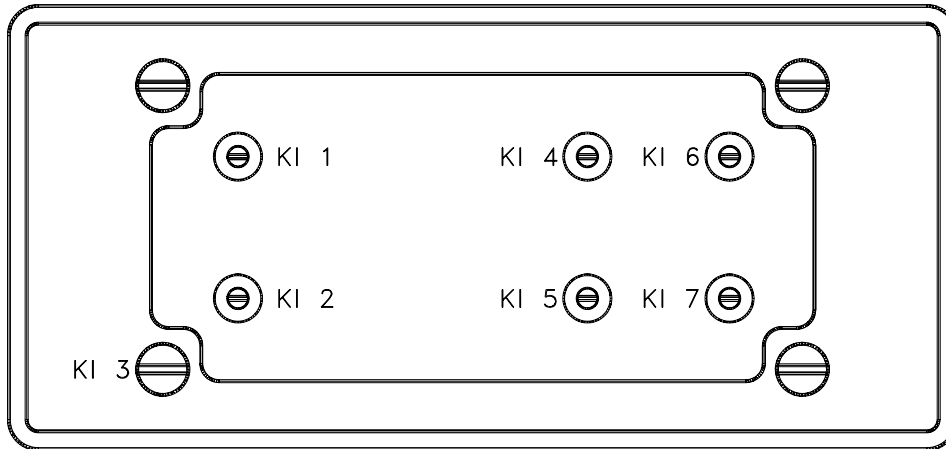


Figure 2-2 Sampler Connections

- KI 1 not connected
- KI 2 not connected
- KI 3 Battery ground
- KI 4 + Input signal:
0-20 mA or 4-20 mA (flow proportional)
- KI 5 - Input signal:
0-20 or 4-20 mA (flow proportional)
- KI 6 Liquid Sensor
- KI 7 Liquid Sensor

 **WARNING**

In risk areas, only self-protected circuits may be used!

 **WARNING**

To ensure safe operation in hazardous location areas, all wiring must be performed by a qualified electrician in accordance with governing directives.

 **Note**

In the connector box, the brown wire is "+" and blue "-".

 **WARNING**

Any flow meter or external device to be operated with the sampler in an ex-area must be self-protected.

 **WARNING**

If the sampler is to be operated in manholes or in the open, the protective cover must be placed over the control housing for splash protection. Only when the protective cover is in place will the sampler have the protection degree IP 65.

2.6 Basic Function and Design

The sampler allows sequential or composite samples to be taken of waste water from lakes, rivers, and other waters at timed intervals, with the option of flow-proportional sample volumes. The sampler is equipped with a peristaltic pump. Each sample is collected according to the following sequence:

1. Suction Line Purge
2. Water drawn until detected at sampling head
3. Delivery of preset sample volume
4. Suction Line purge

The sample time is stored by the control module.

In subsequent collections, if the sampling head does not identify water after 1.25 times the duration of the first sample collection, the suction line will be purged, error 5 will be displayed, and a new sample process will be initiated for the next sample collection.

The samples are deposited either into one single vessel (composite sampling), or into 12 bottles by means of a distributor arm (sequential sampling).

For sequential sampling: Before switching the sampler on, manually set the distributor arm to bottle 12. The reason for this is that when the sampler is switched off, the controller always advances to the next field; i.e., the next bottle in sequence will be set as bottle #1.

Isco 3780 Zone 1-rated Sampler

Section 3 Operation

3.1 Overview

The following section contains information on how to operate the Isco 3780 Sampler. It includes definitions of abbreviations, and errors, and contains the basic key functions and instructions for how to turn the sampler on and start a program. This section also explains how to edit a program, restore default settings, and set suction line length.

Table 3-1 Displayed Abbreviations

Code	Explanation
T1	time mode
T2 5x2	qualified sampling with five collections and pause of two minutes between each collection
F mA	flow mode using external input 0–20mA or 4-20 mA
V IMP	THIS PROGRAM NOT SUPPORTED
E1	THIS PROGRAM NOT SUPPORTED
E2	THIS PROGRAM NOT SUPPORTED
BV	bottle volume, bottle content in liters
BN	bottle number
SI	sample interval
SD	sampling duration (program length)
SV	sample volume in ml or liters
PU	suction line purge ON or OFF
SO	switch-over value
SX	switch-off value
UL	THIS PROGRAM NOT SUPPORTED
LL	THIS PROGRAM NOT SUPPORTED
PS	THIS PROGRAM NOT SUPPORTED
J WT	THIS PROGRAM NOT SUPPORTED
L FT	THIS PROGRAM NOT SUPPORTED
DT	delay in hours and minutes
DT REAL?	delay in real time (date and time)
DT REL.?	delay in relative time (hours and minutes)
P0start?	start program 0?
ERRORS!	errors are still stored

Table 3-1 Displayed Abbreviations (Continued)

Code	Explanation
F BLANK!	errors and events storage is empty
F END!	no further error or event
code??	enter code (all codes are listed below) 4955 to program (section 3.13) 0990 for preset function (section 3.14) 4918 to select language (section 3.15) 1234 to indicate the program type (section 3.16) 2614 to enter maximum suction line length (allowing the maximum suction time to be calculated) (section 3.17)
P0 edit?	change program 0?
PRESET?	start preset function?
PRES. 4?	preset function for program 4?
PRES. 4!	preset function for program 4 executed

3.2 Operation

The sampler is operated by means of a 24-position rotary selector switch and one confirmation button.

 **Note**

This manual often refers to pressing “keys.” In reality, this translates to selecting the indicated number or function with the rotary selector switch and then pressing the ENTER button.

Example:

- instruction: To switch on the sampler, press the (ON) key.
- execution: Select green field (ON) with the rotary selector switch and then press the ENTER button.

3.3 Switching On the Sampler

To switch on the sampler, the (ON) key must be pressed. The version of the control unit should be indicated briefly.

3.4 Viewing Errors

If the sampler displays [ERRORS!], some errors from the last program sequence are still stored in the error file. To see these errors, press (F). Errors are displayed in reverse chronological order, *i.e.* the last error which occurred is displayed first. The error number, date, and time of start and end of error are displayed, in that order. After this, the display reads [CONTIN.?]. By pressing (F), the next error can be seen. If there are no further errors in the file, the message [F END!] appears. The display of the contents of the error file can only be stopped by pressing (F) repeatedly until the message [CONTIN.?] is displayed and (C) is pressed. A program cannot be restarted until the errors are cleared. To clear the errors, press (C) again, and

when the message [CLEAR ?] appears, press [ENTER]. To save the errors, let the message time out. The message [ERRORS!] then appears again.

Table 3-2 Errors

Error	Meaning	Troubleshooting
BU	Clock is defective	Please contact our service department. *
U 1	Switchover value reached (for flow mode)	—
A 2	Switch-off value reached (for flow mode)	—
F 3	Internal fluid sensor is short-circuited.	Clean fluid sensor with brush (included)
W 4	No water at external fluid sensor (optional)	Clean fluid sensor.
W 5	No water during maximum suction phase	Ensure that suction line is in the water. Check suction line for kinks or damaged or blocked sections. Ensure that suction line is properly connected. Clean electrodes of the fluid sensor with a wire brush or fine abrasive paper.
T 7	Deep discharge protection triggered.	Remove battery and connect it to the battery charger for 24 hours. Connect the sampler to a fully charged battery. If the problem persists, please contact our service department. *
F 9	Motor or light barrier defective	Switch on sampler and press the (.) key. If you hear the motor running but the rotor does not turn, tighten the screw in the center of the rotor. If no sound from the motor is heard, please contact our service department. *
F10	Wrong parameters.	

* Contact information for Isco's Service Department can be found at the back of this manual.

3.5 Starting a Program

When sampler is started, it displays the last program used. For example, [P0start?]. This program can be started directly by pressing (START).

If the displayed program number is pressed, the sampler displays the start and stop time with date and time of day of the last program sequence. To start another program, select the required program by pressing the corresponding program number and pressing the (START) key.

3.6 Starting a Program with Start Delay

To start a program at a certain time, or after a certain period of time has elapsed, a delay in relative or real time can be entered by pressing the (GREEN_CLOCK) key. When this key is pressed repeatedly, the display is switched between these two delays. Thus, when the (C) key is pressed, the delay input function can be exited without having to enter any data.

When the display reads [DT REL.?] a relative delay can be entered. The desired delay can now be entered in hours (hrs) and minutes (min), the longest possible time being 199hrs and 59min.

When the display reads [DT REAL?] a real delay, that is, date and time of day, can be entered. To enter a real time, press

(ENTER), then press the relevant keys for the desired start date and the time.

Numbers must be entered as two-digit numbers, *e.g.*, for 1hrs 50min, enter 01hrs 50min

The date and time of day have to be confirmed by pressing (ENTER). To correct wrong inputs press the (C) key. The delay can be programmed to a maximum of one year in advance.

The delays entered are always valid only for one program sequence. When the program ends or is aborted, the delays will be deleted. After delay is set, the sampler can be started by pressing (START). After the relative time has elapsed, or the start time has been reached, the program will start automatically. After a program begins, entering further delays using the (GREEN_CLOCK) is no longer possible.

3.7 Test and Rinse Cycle

Prior to the start of a program, a test cycle of the pump can be made by pressing the (.) key. During the test cycle, the battery voltage under load is displayed. This function can also be used to take manual samples.

3.8 Displaying and Setting the Clock

To display time, date and weekday, press (RED_CLOCK). To switch to the next display, press (RED_CLOCK) again.

To set the clock, press the (C) key when time, date and weekday appear. Enter the date, weekday, and time in that order. To change the date and the time, use the number keys (0 - 9). To change the weekday, use the (C) key. Press (ENTER) after each entry.

If the time is confirmed with (ENTER), the seconds are set to 00. This enables the clock to be set to the second, *i.e.* if a reference clock is used (ENTER) must be pressed at the moment at which the reference clock turns to zero. All numbers have to be entered as two-digit numbers, *e.g.* for 1hr 50min enter 01hr 50min.

The time cannot be changed while a program is running.

3.9 Viewing a Selected Program

To display program parameters, press the (?) key. To switch to the next parameter display, press the (?) key again. Depending on the program type and the options available, different parameters will be displayed.

First, the type of sampling will be displayed:

- [VST 1] Distributor steps.
- [T1 >] For time mode.
- [T2 5x2>] For qualified sampling (see Technical Data).
- [F mA>] For flow mode via analog input 0-20 mA or 4-20mA.

 Note

The arrow [>] occurs only during the purging process.

Display of bottle volume:

[BV 0.5l] means bottle volume = 500 ml.

Display of number of bottles:

[BN 12] means 12 bottles.

Display of sampling duration remaining:

[24h30m] means program running time 24 hours 30 minutes.

Display of actual signal current (only in the case of F mA):

[17.8mA] means at present the current is 17.8mA.

Display of measuring range (only in the case of F mA):

[4-18.8mA] means that a measuring range of 4-18.8mA has been selected. The upper limit of the range (100%) is 18.8mA.

Display of the switch-over value (only in the case of FmA):

[SO 4.7mA] means that when the measuring current is 4.7mA, the time mode function is activated.

[SO 0.0mA] means that the switch-over value is inactive. Switching does not take place.

Display of switch-off value (only in the case of F mA):

[SX 4.1mA] means that when the current is 4.1mA, samples will not be taken.

[SX 0.0mA] means that the switch-off value is inactive.

3.10 Viewing a Running Program

(GREEN_CLOCK) key:

- delay remaining in real or relative time if delay has not yet elapsed.
- running time of program.

(RED_CLOCK) key:

- current time
- current date
- current weekday
- time remaining in program in hours (hrs) and minutes (min)
- next change of bottles in hours (hrs) and minutes (min)

(?) key:

- see section 3.9

(F) key:

- see section 3.4

Errors can not be deleted while program is running!

Number key (0 - 9) according to current program:

- date and time at which the program was started.

3.11 Pausing a Program

For maintenance and monitoring, the (STAND BY) key must be pressed in order to stop the pump and the distributor arm. The display then shows the message [STDBY!!].

A sample which is currently being taken, or a step being carried out by the distributor arm, will not be interrupted. In this case, the display will show first the message [WAIT!!] and then [STDBY!!].

To exit standby mode, press either (START) or (ENTER). When (START) is pressed, steps not yet carried out by the distributor arm due to the program pause will be performed. Sampling, however, will not. When (ENTER) is pressed, missed samples will also be collected.

3.12 Halting a Program in Progress

To stop a program prematurely, press the (STOP) key. The display then reads [REALLY?]. To “really” stop a program, press (ENTER). To reject the program stop, press the (C) key.

3.13 Editing User Programs

To edit user programs, stop the current program, press the (P) key; [code??] will be displayed. Enter the code number 4955. The display then reads, for example, [P5 edit?], the program number always being that of the last program executed; in this case, program number 5. To edit the suggested program, press (ENTER). To edit another program, select the program you wish to change by pressing the corresponding number key (0-9) and (ENTER).

To quit the editing mode, press the (C) key. The display now reads again [code??].

If you have selected a program number and confirmed this with (ENTER), the sampler now begins to display several program parameters, which are different for each sampler model.

1. Select the type of program. You can choose between two program types:

[T1 ?]	Time Mode
[F mA ?]	Flow Mode with 0-20 mA or 4-20 mA
[V IMP?]	THIS PROGRAM NOT SUPPORTED
[E1 ?]	THIS PROGRAM NOT SUPPORTED
[E2 ?]	THIS PROGRAM NOT SUPPORTED

Using the (C) key allows you to switch between different types of programs. When the type of program you wish to edit appears in the display, press (ENTER).

Depending upon the type of program selected, the display will show the program-specific parameters used so far. To retain these parameters, press (ENTER). To edit them, press the number keys (0-9), the (C) key and (ENTER).

2. Selecting Bottle Volume. The following bottle volumes can be chosen:

[BV 0.5L?]	Bottle Volume 500 ml
[BV 10L?]	Bottle Volume 10 liters (2.6 gal)

To switch between bottle volumes, press the (C) key. When the desired bottle volume appears, press (ENTER).

 **Note**

The additional volumes displayed are not currently supported by Isco.

3. Entering the Number of Bottles. An amount of 1 or 12 bottles can be selected.

[BN 12]

To enter the number of bottles, use the number keys [1,2] and (ENTER). To correct wrong entries, press the (C) key.

4. Entering the Sample Interval. The sample interval can range from 0.1 minute to 999 hrs and 59.9 minutes.

[SI 5m]

To enter the sample interval, use the number key [0-9] and (ENTER). To correct wrong entries, press the (C) key.

[SI 5.0m]

Use the number keys (0-9) to enter the sample interval in minutes and press (ENTER).

[SI 0h]

Use the number keys (0-9) to enter the sample interval in hours and minutes. Press (ENTER) to confirm each.

5. Entering the Sampling Duration (program length). The sampling duration can be programmed in hours and minutes and can range from 1 minute to 999 hours and 59 minutes.

Use the number keys (0-9) to enter the sampling duration in hours and (ENTER).

[SD 0m]

Use the number keys (0-9) to enter the sampling duration in minutes and press (ENTER). To correct wrong entries, press the (C) key.

6. Sample Volume. The sample volume is calculated from the entered values. Normally, the sample volume displayed should be accepted by pressing (ENTER).

- Sample volumes of less than 100 ml will be displayed to one decimal place.

- Sample volumes between 100 ml and 2500 ml will be displayed as **ml**.

- Sample volumes greater than 2500 ml will be displayed as **l**.

The sample volume can be manually decreased or increased by up to 50% (for example, in the case of extended suction height, where the calculated volume may fall short). To do this, use the number keys (0-9) to overwrite the displayed value, and press (ENTER) or the (C) key to correct your entry.

If you have changed the sample volume, the display shows the actual amount over or under the calculated sample volume as a percentage. If, for example, the sample volume [SV 20.8 ml] is reduced to 15.5 ml, the display will read [SV -25%].

For sample volumes below 2ml, the display reads [DQ < 2ml]. This indicates possible inaccuracy due to the sample volumes being so small. In all cases, the processor will suggest a sample volume between 5ml and 2500 ml.

7. Activating and Deactivating the Suction Purge. The suction purge function can be activated or deactivated after each collection in order to take samples in pressurized lines.

[PU ON ?] Suction line will be purged.

[PU OFF ?] Suction line will not be purged.

The (C) key toggles between these two options. To select the desired option, press (ENTER).

8. Entering the Measuring Range (Only possible for program F mA)

[0-20 mA]

Initially, the display blinks, signaling that the bottom value of the measuring range is to be entered. Either 0mA or 4mA can be selected.

Use the number keys (0, 4) to enter the desired value and press (ENTER).

Signal currents at or below the bottom value will result in 0ml sample volumes. After the bottom value has been entered, the display blinks again, signaling that the top value is to be entered. Use the number keys (0-9) to enter the desired value to one decimal place, and press (ENTER). Signal currents at or above the top value will result in sample volumes of 100%.

9. Switch-over Value (only required in the case of program F mA). The sampler is able to switch over to time mode when there is a permanently low flow of signal current. If the signal current is at or below the switch-over value, the maximum possible sample volume will be taken. If the signal current rises above the switch-over value, the sampler will switch again to the flow mode of operation.

If the sampler is to operate without a switch-over value, enter 0.0mA. Each time the signal current falls below the switch-over value will be stored in the error file.

[SO 0.0mA]

To enter the switch-over value, use the number keys (0-9). It can be entered in 0.1 mA increments within a range of 0 to 10mA. After entering a value, press (ENTER). To correct wrong entries, press the (C) key.

10. Switch-off Value (will only be viewed in the case of program F mA). If the signal current is at or below the

switch-off value, the sampler will not take any samples. If the signal current exceeds the switch-off value, the sampler will again automatically take flow proportional samples.

If the sampler is to operate without a switch-off value, enter 0.0mA. Each time that the signal current falls below the switch-off value will be stored in the error file.

[SX 0.0mA]

To enter the switch-off value, use the number keys (0-9). It can be entered in 0.1mA increments within a range of 0 to 10mA. The switch-off value must be 0.5mA lower than the switch-over value. After entering the desired value, press (ENTER). To correct wrong entries, press the (C) key.

3.14 Restoring Factory Default Settings

If original programs have been deleted or overwritten, they can be returned to factory settings using the preset function.

It may be necessary to first terminate a running program. First, press the (P) key.

The display then reads [code ??]. By entering the four-digit code number 0990, the preset function will be started.

The display now reads [PRESET?]. To start the preset function, press (ENTER). To exit it, press the (C) key.

If (ENTER) is now pressed, the display will ask for the number of the program to be reset [PRES.0?]. Use the number keys to enter the desired program number and press (ENTER). The display now asks for the bottle volume and the number of bottles with which the program is to be reset.

[BV 0.5L?]

To step through bottle volumes, press the (C) key. When the correct bottle volume appears, press (ENTER).

[BN 12]

To select the desired number of bottles, use the number keys (1,2) and press (ENTER). To correct wrong entries, press the (C) key.

After the number of bottles has been confirmed, the program will be reset and the display will read

[PRES.0!].

After this, the message [CONTINUE?] appears. To reset another program, press (ENTER) or a number key (0-9). To exit the preset function, press the (C) key.

 CAUTION
--

Resetting a program means that the selected user program will be overwritten with the original parameters indicated in Table 3-3.

The sample volume will be calculated from the bottle volume and number of bottles entered prior to the resetting of the program.

Table 3-3 Default Program Parameters

Program Number		1	2	3	4	5	6	7	8	9	0	
Program start		T1	T1	T1	T1	F	F	E1	E1	F	F	
Bottle volume [L]	BV											
Bottle number	BN											
Sample interval [min]	SI	5	5	5	5	5	5	—	—	5	5	
Sample interval [hrs]	SI	0	0	0	0	0	0	—	—	0	0	
Sampling duration [hrs]	SD	24	24	2	2	24	24	—	—	2	2	
Sampling duration [min]	SD	0	0	0	0	0	0	0	0	0	0	
Sample volume [ml]	SV											
Suction purge	PU	On	On	On	On	On	On	On	On	On	On	
Measuring range [mA]		—	—	—	—	0–20	0–20	—	—	0–20	0–20	
Pulse scaler	PS PROGRAM NOT SUPPORTED											
Switch-over value [mA]	SO	—	—	—	—	0,0	0,0	—	—	0,0	0,0	
Switch-off value [mA]	SX	—	—	—	—	0,0	0,0	—	—	0,0	0,0	
Upper limit	UL PROGRAM NOT SUPPORTED											
Lower limit	LL PROGRAM NOT SUPPORTED											
Wait time [s]	J WT PROGRAM NOT SUPPORTED								60	60		
Fall time [s]	L FT PROGRAM NOT SUPPORTED											
Delay time [hrs]	DT	0	0	0	0	0	0	0	0	0	0	
Delay time [min]	DT	0	0	0	0	0	0	0	0	0	0	

3.15 Language

To select another language for the display, it may first be necessary to terminate a running program. Next, press the (P) key. The display will then read [code?]. Activate the language function by entering code number 4918. One of four languages can now be chosen by using the (C) key, and confirmed with (ENTER).

After a language is selected, the display again reads [code?]. Enter another code number or exit by pressing (C).

3.16 Displaying Program Type

To display the program type (T1, F mA, V IMP, E1, or E2), it may first be necessary to terminate a running program. Next, press the (P) key. The display will then read [code?]. Enter the four-digit code number 1234. The program type will now be displayed. Then the display returns to [code?]. Enter another code number or exit by pressing (C).

3.17 Setting Length of Suction line

The maximum suction time prior to each calibration can be adapted to the length of the suction line.

First, terminate any running program.

Press (P). The display will read [code ??]. Enter code number 2614. The display will read [L= 6m].

A tube length between 3 ft and 65 ft can be selected by means of the number keys.

After (ENTER) is pressed, the display again reads [code ??].

Enter another code number or exit by pressing (C). For a standard tube length of 20 ft, the maximum suction time is approximately 1.5 minutes. The sampler must be restarted for the new setting to be recognized.

This function depends upon the battery voltage (motor speed). If alternate tube lengths are entered, the microprocessor will calculate a shorter or longer maximum suction time, which, if exceeded, will be identified as error no. 5.

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

After the new intake tube length has been entered, it will only be recognized after the sampler has been switched off and on.

Isco 3780 Zone 1-rated Sampler

Section 4 Maintenance

4.1 Overview

The following section contains routine maintenance instructions for the 3780 sampler, including regular cleaning steps, tubing replacement, battery maintenance, and recommended inspection intervals.

4.2 Maintenance

 **WARNING**

The controller housing may only be opened by the manufacturer or persons authorized by the manufacturer. Improper opening or closing of the housing results in loss of ex-protection.

 **WARNING**

Always disconnect power to the sampler before opening.

To ensure proper function, the sampler should be cleaned regularly, depending upon the degree and nature of pollution of the liquid:

1. Clean the fluid sensor using the enclosed brush.
If the water is highly polluted or oily, the fluid sensor may require daily cleaning.
2. Remove and clean distributor.
3. Rinse cycle:
 - a. Switch on the sampler.
 - b. Immerse suction line in a detergent.
 - c. Press the (.) key to start the rinse cycle.
 - d. Repeat rinse cycle several times.

The silicone tube in the pump head is subject to natural wear due to the pumping process. Furthermore, the tube life will depend a great deal on the composition of the sample liquid.

Replace pump tube with silicone tubing of .3 in. inside diameter, .5 in. outside diameter, and of 11 in. length. Other tube dimensions may result in lower transport velocities or damage to the pump.

 **WARNING**

When changing the pump tube, avoid pinching your fingers. Power to the sampler must be disconnected. The pump rotor can be turned clockwise. When operating the sampler, always make sure that the protective cover of the pump is attached.

4.3 Battery Maintenance

If the external battery will not be used for a long period of time, it should be charged once a month for 24 hours.

4.4 Safety Inspection for Ex-Protected Samplers

We have established a safety inspection service to ensure proper functioning of the sampler, and most importantly, its safety in risk areas. A safety inspection is recommended at two years after initial operation of the sampler, and annually thereafter.

The inspection consists of a check of the pressure container, the seal, and function of the microprocessor-controller, the pump, and the fluid sensor.

You must contact the factory for a return authorization number, before returning the unit(s). Information on charges for the service are available from the factory. Non-USA customers must contact their respective Isco dealer for return instructions.

If you have obtained your sampler from your local dealer, we may not have your data on file. In this case, please provide your address and the sampler serial number(s) of your equipment, when requesting service.

Isco 3780 Zone 1-rated Sampler

Appendix A List of Program Parameters

A.1 Program Parameters

If the program parameters have been changed, it may be necessary to keep a record of the new parameters for reference in the field. The table on the following page can be photocopied and filled in as needed.

Isco 3780 Zone 1-rated Sampler

Appendix B Accessories and Replacement Parts

Figures B-1 and B-2 contain item numbers for each replacement part available for the 3780 sampler and its peristaltic pump. See tables B-1, B-2, and B-3 to find their corresponding inventory numbers and descriptions.

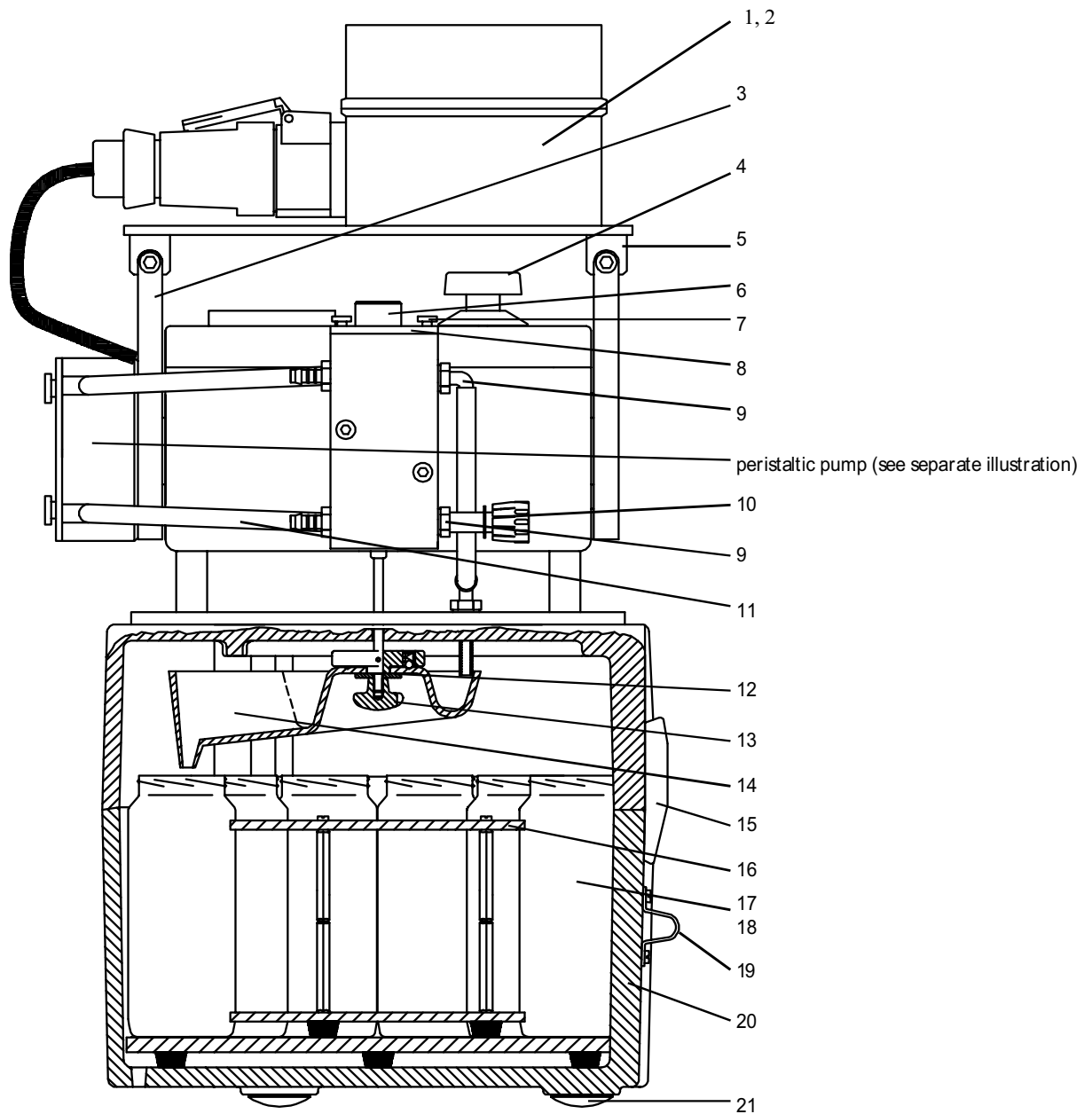


Figure B-1 Model 3780 Sampler Replacement Parts

Table B-1 Replacement Parts		
Item	Inventory Number	Description
1	69-3783-007	12 VDC 10AH Battery for Zone 1 Rated 3780 Sampler
2	69-3783-014	12 VDC 20AH Battery for Zone 1 Rated 3780 Sampler
3	511-0000-13	Handle, Vanadium Steel
4	511-0000-14	Rotary Knob
5	511-0000-15	Fastening Clip
6	511-0000-16	Protective Cap
7	511-0000-17	Wing Nut, M4, Vanadium Steel
8	511-0000-18	Cover, Liquid Sensor
9	511-0000-19	Tube Connector
10	511-0000-20	Quick Release Connector
11	69-3783-021	Pump Tube, 8 x 2, 5mm
12	511-0000-22	Washer
13	511-0000-23	Star Knob
14	511-0000-24	Distributor Funnel
15	511-0000-25	Clamp Assembly
16	69-3783-011	Retaining Ring for 500 ml Glass Bottle Set
17	69-3783-010	500 ml Glass Bottles for 3780 Sampler, Set of 12
18	69-3783-012	500 ml Polyethylene Bottles for 3780 Sampler, Set of 12
19	511-0000-26	Suspension Eye
20	511-0000-27	Sampler Base
21	511-0000-28	Base Foot
	511-0000-29	Suction Line, 2m, w/ Suction Inlet
	511-0000-30	Suction Line Extension, 2m
	60-3783-002	Instruction Manual for 3780 Sampler
	69-3783-013	10-liter Plastic Composite Bottle

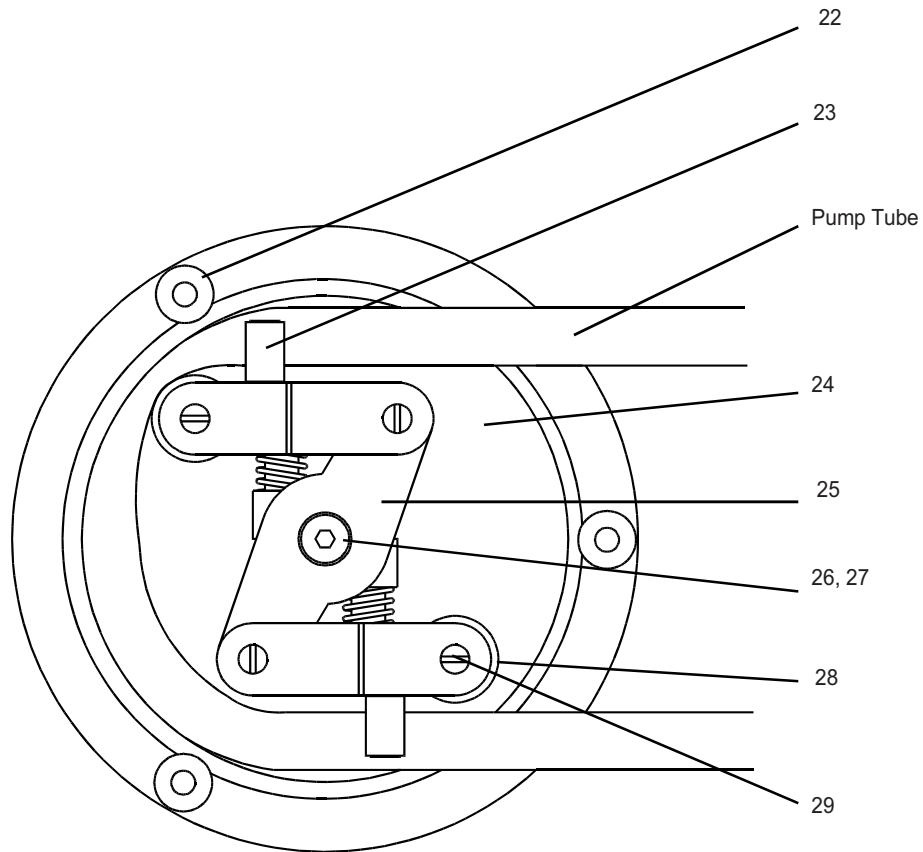


Figure B-2 Peristaltic Pump Replacement Parts

Table B-2 Peristaltic Pump Replacement Parts		
Item	Inventory Number	Description
22	511-0000-03	Knurled Nut
23	511-0000-04	Guide Roller with Axial Screw
24	511-0000-05	Cover Plate
25	511-0000-06	Rotor Assembly
26	511-0000-07	Allen Bolt
27	511-0000-08	Pump Rotor Secure Nut
28	511-0000-09	Pressure Roller
29	511-0000-10	Hinged Bolt

Table B-3 Accessories		
Item	Inventory Number	Description
	69-3783-008	Battery Charger for Zone 1 Rated Batteries
	69-3783-009	AC Power Supply
	69-3783-015	Suspension Harness for 3780 Sampler
	69-3783-016	Inlet Float for 3780 Sampler

One Year Limited Warranty *

Factory Service

Isco instruments covered by this warranty have a one-year limited warranty covering parts and labor.

Any instrument that fails during the warranty period, due to faulty parts or workmanship, will be repaired at the factory at no charge to the customer. Isco's exclusive liability is limited to repair or replacement of defective instruments. Isco is not liable for consequential damages.

Isco will pay surface transportation charges both ways within the 48 contiguous United States if the instrument proves to be defective within 30 days of shipment. Throughout the remainder of the warranty period, the customer will pay to return the instrument to Isco, and Isco will pay surface transportation to return the repaired instrument to the customer. Isco will not pay air freight or customer's packing and crating charges.

The warranty for any instrument is the one in effect on date of shipment. Warranty period

begins on the shipping date, unless Isco agrees in writing to a different date.

Excluded from this warranty are normal wear; expendable items such as charts, ribbon, tubing, and glassware; and damage due to corrosion, misuse, accident, or lack of proper maintenance. This warranty does not cover Isco on-line Process Analyzers and certain Isco SFE instruments, which are covered under different warranty terms, nor does it cover products not sold under the Isco trademark or for which any other warranty is specifically stated in sales literature.

This warranty is expressly in lieu of all other warranties and obligations and Isco specifically disclaims any warranty of merchantability or fitness for a particular purpose. Any changes in this warranty must be in writing and signed by a corporate officer.

The warrantor is Isco, Inc. 4700 Superior, Lincoln, NE 68504, U.S.A.

* This warranty applies to USA customers. Customers in other countries should contact their Isco dealer for warranty service.

Before returning any instrument for repair, please call, fax, or e-mail the Isco service department for instructions. Many problems can often be diagnosed and corrected over the phone, or by e-mail, without returning the instrument to the factory.

Instruments needing factory repair should be packed carefully, preferably in the original carton, and shipped to the attention of the service department. Small, non-fragile items can be sent by insured parcel post. **PLEASE BE SURE TO ENCLOSE A NOTE EXPLAINING THE DEFECT.**

Return instruments to: Isco, Inc. - Attention Repair Service
4700 Superior Street
Lincoln NE 68504 USA

Mailing address: Isco, Inc.
PO Box 82531
Lincoln NE 68501 USA

Phone: Repair service: (800)775-2965 (lab instruments)
(800)228-4373 (samplers & flowmeters)
Sales & General Information (800)228-4373 (USA & Canada)

Fax: (402) 465-3001

Email: service@isco.com

