

# 730 Bubbler Module

## Instruction Manual



Part #60-9003-063  
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Revision F, March, 2001





## 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)
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





### Warnings and Cautions



The exclamation point within the triangle is a warning sign alerting you to important instructions in the instrument's reference manual.

### Warnungen und Vorsichtshinweise



Das Ausrufezeichen in Dreieck ist ein Warnzeichen, das Sie darauf aufmerksam macht, daß wichtige Anleitungen zu diesem Handbuch gehören.

### Symboles de sécurité



Ce symbole signale l'existence d'instructions importantes relatives au produit dans ce manuel.

### Advertencias y Precauciones



Esta señal le advierte sobre la importancia de las instrucciones del manual que acompañan a este producto.



**Warning:** This instrument has not been certified for use in "hazardous locations" as defined by the National Electrical Code.



**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; this will increase your risk of injury.

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

**⚠ WARNING**

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

This product is often installed in confined spaces. Some examples of confined spaces are man-holes, pipelines, digesters, and storage tanks. These spaces may become hazardous environments that can prove fatal for those unprepared. These spaces are governed by OSHA 1910.146 and require a permit before entering.

Material Safety Data Sheets (MSDS) for all chemical products supplied or recommended for operating this product can be found in the MSDS appendix. These sheets provide information regarding the hazards of chemical agents used in this product.

This manual will identify and alert the user of known hazards that might occur while operating or servicing this product. However, it is impossible to identify every possible hazard because of the wide range of applications. Hazard alerts will be presented in one of three ways:

Hazard Alert:

Example:

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



**Electrical shock hazard. DO NOT service the UV lamp while the unit is running. Remove power before working inside the cabinet. Failure to do so will result in death or serious injury.**

**WARNING** – identifies a potentially hazardous situation, which if not avoided, could result in death or serious injury.



**Pinch and crush hazard. The pump rollers can cause serious injury if the pump runs. Remove power before servicing.**

**CAUTION** – identifies 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.



**Heating desiccant may produce irritating fumes when heated. Observe the following precautions:**

- Use a vented oven in a well ventilated room.
- Do not remain in the room while the regeneration is taking place.
- Use the recommended temperature.

# 730 Bubbler Module

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## Introduction

The 730 Bubbler Module is one of Isco's interchangeable modules for the 6712 Series Samplers. The module uses a differential pressure transducer and a flow of bubbles to measure liquid levels *up to ten feet*. The bubbler is unaffected by wind, fluctuations in air or liquid temperatures, turbulence, steam, foam on the surface, corrosive chemicals, debris, oil, floating grease, or lightning. You can install the module only on a 6712 controller. The bubble line can be used in nearly any location with a known level-to-flow relationship.

## Installing the Module

To install the module:

1. Turn the sampler off.
2. Remove the connector cap in the module bay and move it aside.
3. Slide the module into the bay.
4. Push against the module to be sure the connector is firmly seated.

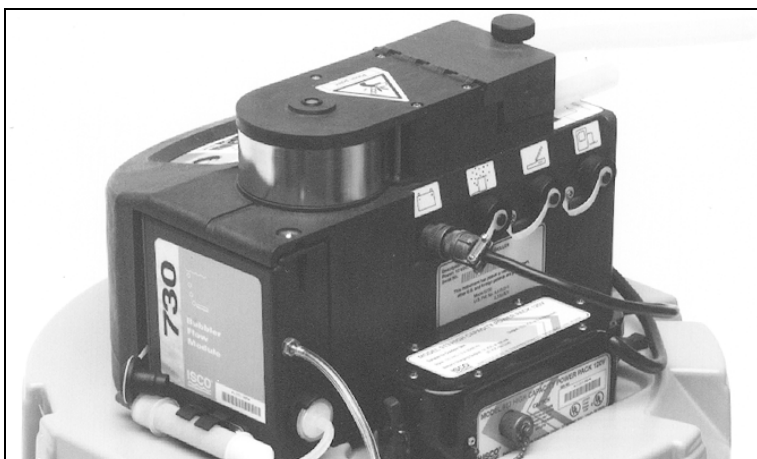
To remove the module, turn the sampler off. Press the silver button and pull the module from the bay. Replace the connector cap in the module bay.

### **WARNING**

The module has not been approved for use in hazardous locations as defined by the National Electrical Code. Installation of this module in a hazardous location may cause fire or explosion resulting in death, personal injury, or property damage. Before installing any device in a dangerous location, review safety precautions in your sampler manual. Check applicable guidelines, codes and regulations of federal, state, city, and county agencies.

## Installation Checklist

1. Check the desiccant cartridge. Make sure the desiccant is active (blue in color) and **remove the red cap**.
2. Install the module and turn the sampler on.
3. Install the bubble line in the flow stream.
4. Connect the bubbler line to the module.
5. Program the sampler and calibrate the module's level reading.
6. Run the program.



# Calibrating the Bubbler Module

After the sampler, module, and bubble line have been installed at the site, calibrate the module by measuring the depth of the water and adjust the reading to match.

It is possible to calibrate the module in a container of water. Use a bubble line of the same length as the one at the installation site to get an accurate and reliable calibration.

## Programming Notes

You should install the module before turning the controller on. When the controller is turned on, it looks for a module. The controller will not recognize a newly installed module if it is not seen during this power-up routine. If you install a module while the controller is already on, turn the controller off and then on again to reconfigure the controller for use with the module.

When the controller is configured with the module, it adds the necessary screens for programming. The screens appear in **Figures 1** through **3**. These figures outline the steps for module programming and calibration. For 6712 programming and general programming information see the sampler manual.

## Programmed Enable

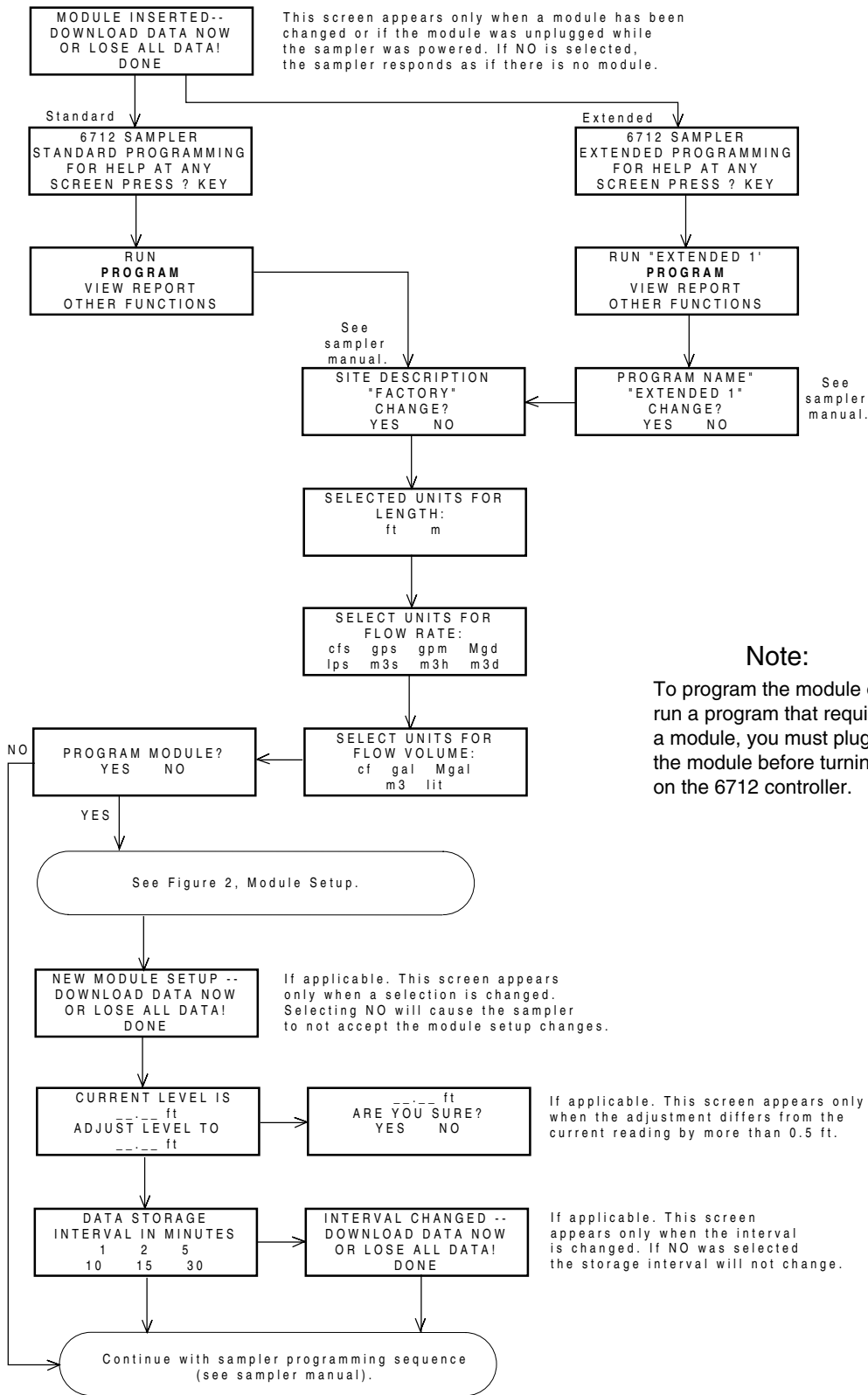
When a Bubbler Module is installed, additional enable options are available. If programmed for LEVEL ONLY the option will be LEVEL. If programmed for FLOW METER the options will be LEVEL and FLOW. For more information about programming, see the sampler manual.

## Nickel-Cadmium Batteries

The Bubbler Module consumes a considerable amount of power. A Nickel-Cadmium battery may not be sufficient to finish a sample routine. For example, the battery should be expected to complete three sampling routines of 24 samples, each sample 200 ml, at one sample per hour with a 10 foot suction line and a 5 foot head. But if the routine is changed to 24 samples, 4 samples per bottle, each sample 250 ml, at 15 minute intervals, with the same suction line and head height, *the battery does not have the capacity to complete one routine*. Isco recommends using a Lead-Acid battery or a new 913 or 923 power pack when using the 730 Bubbler Module.

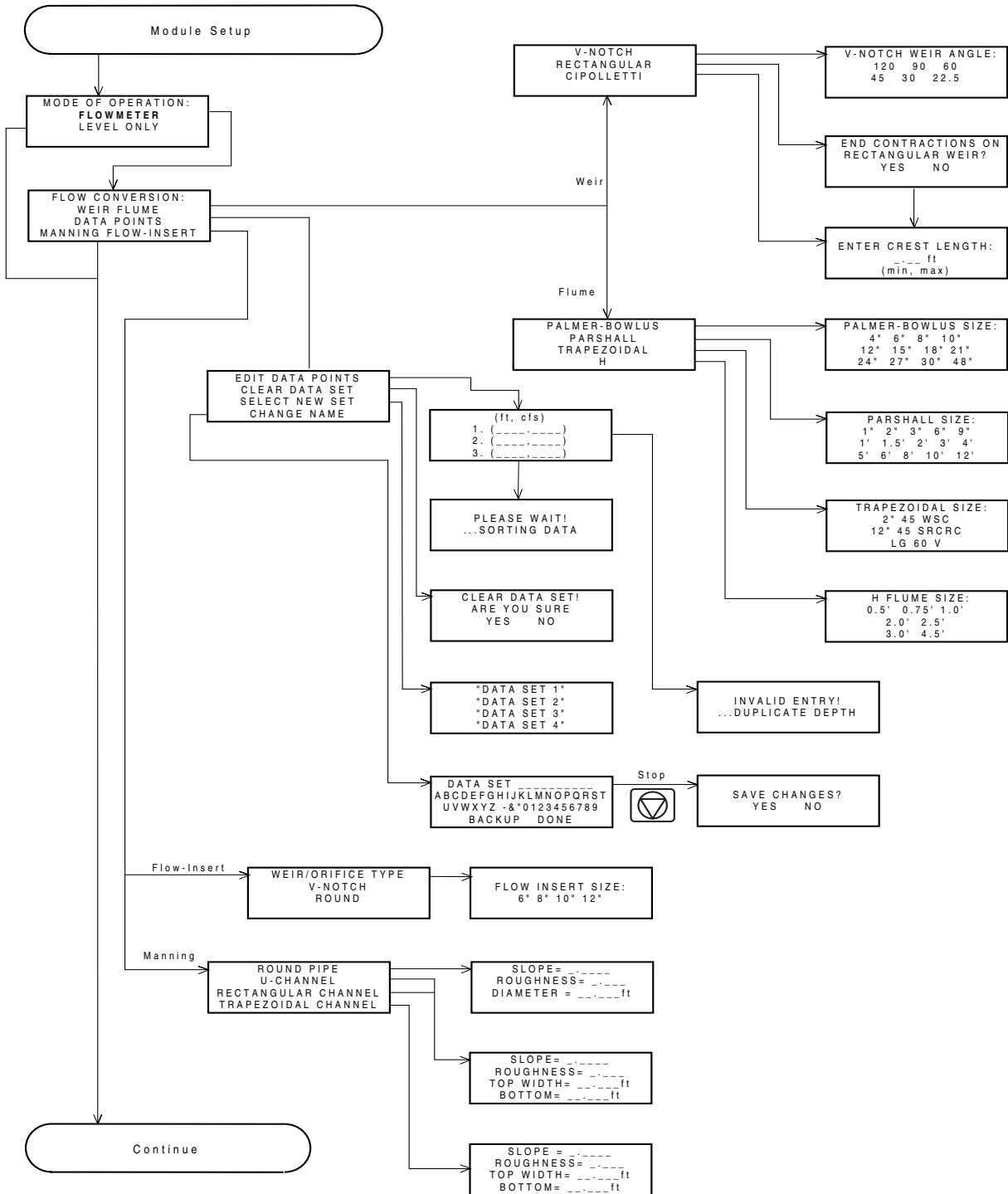
# 730 BUBBLER MODULE

**Figure 1 Programming the 6712 to use the 730 Module**



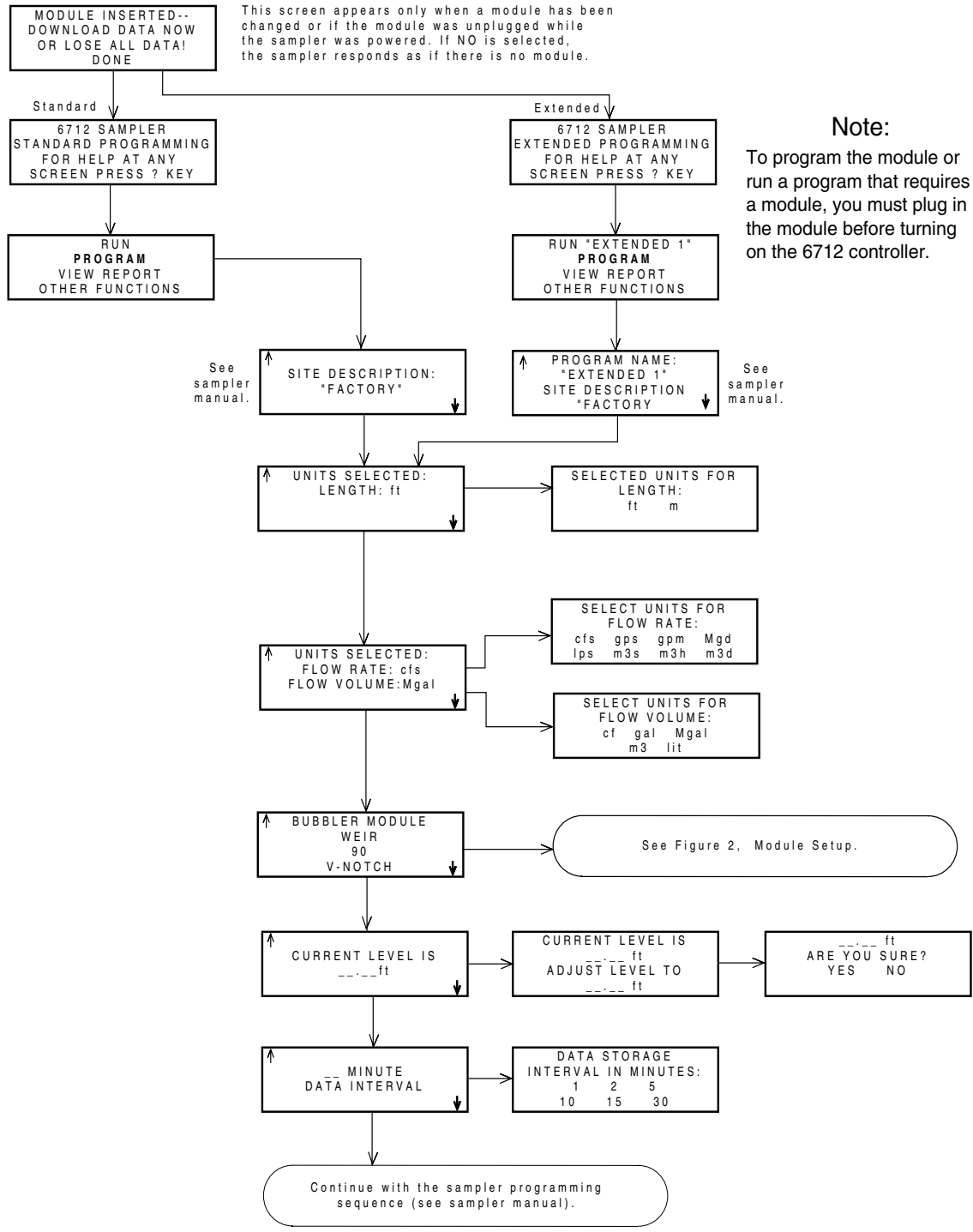
# 730 BUBBLER MODULE

**Figure 2 Programming the 6712 to use the 730 Module; Module Setup**



# 730 BUBBLER MODULE

**Figure 3 Quick View; Programming the 6712 to use the 730 Module**



# Operation of the Bubbler System

When measuring flow rate, the module is used with a primary measuring device (typically a weir or a flume) or other open channel flow arrangement where a known relationship exists between level and flow rate (Refer to **Table 1**, *Flow Conversion Types*). The level measuring device is a bubbler which measures the liquid level in the flow stream. The level reading is converted into a properly scaled flow rate value.

The module contains microprocessor-controlled circuitry to calculate level from the signals produced by the pressure transducer, and communicate with the 6712 controller.

The module's bubbler system works as follows: A small compressor pumps air into a reservoir. This air is slowly released by an orifice into a bubble line. The other end of this tube is submerged in the flow stream. Inside the module, the bubble line also connects to one side of a differential pressure transducer. As air is released slowly into the bubble line by the orifice, pressure builds inside the line to force the air out of the line into the flow stream. When there is enough pressure to counteract the hydrostatic pressure of the flow stream, a bubble will be forced from the end of the line. The amount of pressure required to force the bubble from the end of the line is directly dependent on the hydrostatic pressure of the flow stream over the end of the bubble line.

The pressure transducer inside the module senses this pressure and converts it into an electrical signal that the module converts into level. The 6712 controller then calculates flow rate and total flow from the level measurement and lookup tables for the primary device you are using.

The module produces the pressurized air supply, regulates the rate of air to the bubbler tube, measures the pressure in the bubbler tube, purges the air line, compensates for drift, and other functions.

### **Purges**

Periodically, the module releases a high pressure, unregulated burst of air directly into the bubble line. This is done to clear the line and prevent any build-up of debris at the bubble line outlet.

### **Automatic Drift Compensation**

The module measures the output of the pressure transducer at zero pressure. When the module is first turned on, and every 15 minutes after that, the processor actuates the automatic drift compensation valve, which connects the input port of the pressure transducer to the reference port. With the two ports connected, it then measures the output offset.

The module stores this offset reading in memory and uses it in level calculations. The repetition of this process causes any pressure transducer or amplifier drift to cancel out, eliminating the most significant cause of drift, especially when operating at low water levels.

## 730 BUBBLER MODULE

**Table 1 Flow Conversion Types**

<b>CONVERSION TYPE</b>	<b>DEVICE, FORMULA, OR TABLE</b>	<b>SIZE OR PARAMETERS</b>
<b>WEIR</b>	V- Notch Weir	22.5, 30, 45, 60, 90, 120 degrees.
	Rectangular Weir with End Contractions	Crest length.
	Rectangular Weir without End Contractions	Crest length.
	Cipoletti Weir	Crest length.
<b>FLUME</b>	Palmer-Bowlus Flume	4, 6, 8, 10, 12, 15, 18, 21, 24, 27, 30, 48 inches.
	Parshall Flume	1, 2, 3, 6, 9 inches. 1, 1.5, 2, 3, 4, 5, 6, 8, 10, 12 feet.
	Trapezoidal Flume	Large 60-degree V. 2-inch, 45-degree WSC. 12-inch, 45-degree SRCRC.
	"H" Flume	0.5, 0.75, 1, 1.5, 2, 2.5, 3, 4.5 feet.
<b>MANNING EQUATION</b>	Round Pipe	Slope, Roughness, Diameter.
	U-Channel Pipe	Slope, Roughness, width.
	Rectangular Pipe	Slope, Roughness, Width.
	Trapezoidal	Slope, Roughness, Bottom Width, Top Width.
<b>INTERPOLATION TABLE</b>	User-developed tables for level-to-flow rate. Includes data points from a user-derived flow profile.	3 to 50 data points.
<b>FLOW POKE METERING INSERT</b>	V-Notch	6, 8, 10, 12 inch.
	Round	6, 8, 10, 12 inch.

## General Mounting Considerations for the Bubbler

### Bubble Lines

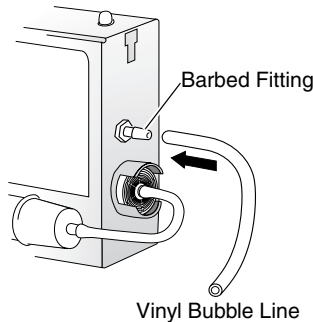
A standard 25 foot (7.6 m) length of  $\frac{1}{8}$ " (0.32 cm) ID vinyl line is shipped with the module. We recommend that you do not use lengths longer than 25 feet. Please consult with the factory if your installation requires a nonstandard setup.

### Use the Shortest Length Possible

Cut the bubble line to the shortest usable length. This will minimize friction head effects in the line and also will reduce the amount of line exposed to cuts, kinks, etc. This will also improve the response time to changing levels and make the purge more effective.

### Secure the Bubble Line

The bubble line should be routed and secured so that it does not disturb the flow. Do not kink the tubing or restrict the airflow by over-tightening the mounting hardware.



Attaching the Bubble Line

### Attaching the Bubble Line to the Module

The vinyl bubble line attaches directly to the barbed fitting. Simply push the tubing over the fitting.

### Installing the Bubble Line in a Primary Device

Primary devices such as weirs or flumes will usually specify a head (level) measurement point. It is important to place the bubble line outlet at this point to convert levels to flow rates correctly. For more details about locating the head measurement point, refer to the *Isco Open Channel Flow Measurement Handbook*, or to information provided by the primary device manufacturer.

### Bubble Line Position in the Stream

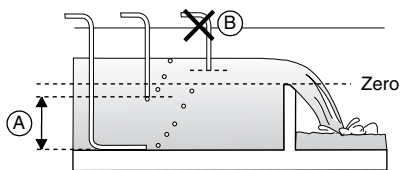
The bubble line outlet does not need to be at the bottom of the stream. In fact, positioning the bubble line outlet above the bottom can be beneficial if the stream carries large amounts of solids or is subject to silting. The simplest installation method attaches the bubble line to the side of the flow stream with the bubble line outlet positioned below the lowest expected level.

To measure the liquid level down to the actual “zero” level of the primary device, Isco recommends placing the bubble line outlet at least 1 to 2 inches (2.5 to 5.1 cm) **below** the primary device “zero” level to avoid measurement failures when the liquid level is even with the outlet. *The module cannot accurately measure levels that are even with or below the bubble line outlet.*

### Flume Bubble Line Fittings

Because of the variety of primary measuring devices and installations, no comprehensive bubble line installation instructions are practical. However, there are valid general observations on bubble line installation that can be made. You can have most flumes specified to include a bubbler fitting. In new construction, this is highly recommended. It may even be possible to modify an existing installation to include a permanent bubbler fitting.

### Recommended Bubble Outlet Depth



- A. The recommended depth ranges from the bottom to 1 inch below the zero level.
- B. This position would be unable to measure low levels through the primary device.

## 730 BUBBLER MODULE

### Tip

For more details on stilling wells, refer to Chapter VI, Section 93, of the *Water Measurement Manual*, published by the United States Department of the Interior, Bureau of Reclamation (1967).

### Note

When installing the bubble line in a high-velocity flow stream (exceeding 5 ft/sec or 1.5 m/sec), please consult with the Isco Customer Service Department for recommendations.

### Stilling Wells

If the primary device includes a stilling well, you should install the bubble line in the stilling well. However, not all stilling wells are suitable for bubble line installation. If the well is subject to silting or build-up of foreign material, you should probably avoid it and mount the bubble line in the flow stream proper.

### Bubble Line Extensions

For some applications a stainless steel tube may be easier to install in the flow stream than the plastic bubble line because of its relative rigidity. The vinyl bubble line attaches by simply slipping the vinyl tube over the end of the extension. Contact your Isco representative about purchasing a stainless steel bubble line extension.

A copper extension to the bubble line is advantageous in applications where algae tends to grow in the bubble line. The copper salts released by the tubing are algicidal agents that tend to inhibit the growth of algae. However, the copper tubing may not be compatible with the flow stream. Attach the copper bubble line extensions to the bubble line in the same way as the stainless steel extensions.

### Open Channel Installation

Attach the bubble line to the side of the flow channel or flume. Make the attachment so it causes a minimum amount of disturbance to the flow stream. If possible, cut a groove in the side of the channel, place the bubble line in the groove, and then grout over the groove.

Alternatively, you can attach the bubble line to the side of the channel, and then grout over the line to form smooth, sloped lead-in and lead-out surfaces. However, you may simply attach the bubble line to the side of the channel or the upstream side of a weir.

## Installation in Round Pipes

Isco offers four systems for installing bubble line in round pipes:

- Flow Metering Inserts
- Isco Spring Rings for pipe diameters of 15 inches or less
- Scissors Rings for pipe diameters from 18 to 72 inches
- Street Level Installation System

### Flow Metering Inserts

Flow metering inserts are available for use with the module that you can *temporarily* install inside round pipe sewers and flow streams to create a primary device inside the pipe. These inserts are available to fit 6", 8", 10", and 12" pipes and install from street level.

The inserts create a restriction in the flow stream and may cause clogging. Where this could be a problem, we suggest using one of the other three installation systems instead.

## 730 BUBBLER MODULE

Because the flow metering inserts are installed from street level, it is not possible to measure the level as described previously in “*Calibrating the Bubbler Module.*” Instead, you must set the level to zero before installing the flow metering insert in the pipe. Set the level to zero using the following instructions:

1. Install the module in the 6712 Sampler, (See “*Installing the Module*” on page 1) and **REMOVE THE RED CAP FROM THE DESICCANT CARTRIDGE.**
2. Assemble the flow metering insert to the length that will be installed.
3. Attach the bubble line to the module. **The inside of the bubble line must be dry and unobstructed.**
4. Turn on the sampler and wait 2 – 3 minutes to allow the bubbler’s air system to stabilize.
5. Select Program from the sampler’s main menu and step through the screens until the “Current Level” screen appears. (Detailed programming instructions appear in the sampler manual.)
6. Adjust the level to read zero (0.00 feet or meters).

You may exit the programming after setting the current level to zero. When you install the flow metering insert, the bubbler module will then provide liquid level readings based on this zero level.

7. Proceed with installing the insert into the pipe.

**Figure 4 Spring and Scissors Rings**



**Spring Ring  
(6 to 15 inches)**



**Scissors Ring  
(18 to 72 inches)**

### Spring Rings

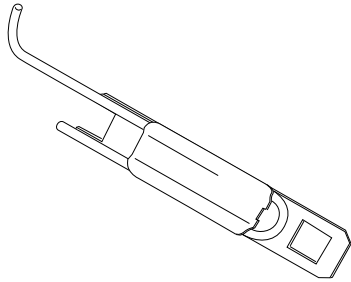
Stainless steel spring rings simplify probe installation in 6 to 15 inch round pipes. Isco offers five diameter sizes: 6, 8, 10, 12, and 15 inches (150, 200, 250, 300, and 380 mm). A typical spring ring is shown in **Figure 4**.

This self-expanding device compresses to slide into a pipe. When released, the ring secures itself against the wall with an inherent outward force.

#### Preparing the Spring Ring

First attach the bubble line to the bubbler carrier assembly (contact your Isco representative to purchase the bubbler carrier). Then fit the carrier onto the mounting tabs of the ring, making sure the tabs completely engage the slots in the carrier. This method of attaching the bubble line to the ring allows for easy removal in case service is needed later.

Route the vinyl bubble line away from the carrier and along the spring ring's edge with holes. Secure the line in position by placing plastic ties through the holes and then locking them around the line. To prevent debris from collecting, attach the line so that it offers as little resistance to the flow as possible. Avoid loops or slack sections. Attach it neatly and closely to the spring ring.



**Bubbler Carrier**

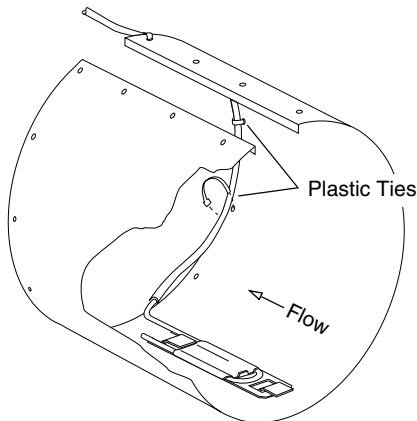
#### Installing the Spring Ring

After the bubble line and carrier have been attached to the spring ring, the actual installation procedure is fairly simple. First, lower the spring ring assembly into the area of the pipe. Next, grasp the spring ring and compress it into a tight circle. Then push the ring up into the pipe the desired distance.

When you have the ring where you want it, release the ring, allowing it to expand outwardly. It may be necessary to rotate the ring to position the bubble line outlet in the bottom center of the pipe. This completes the installation procedures.

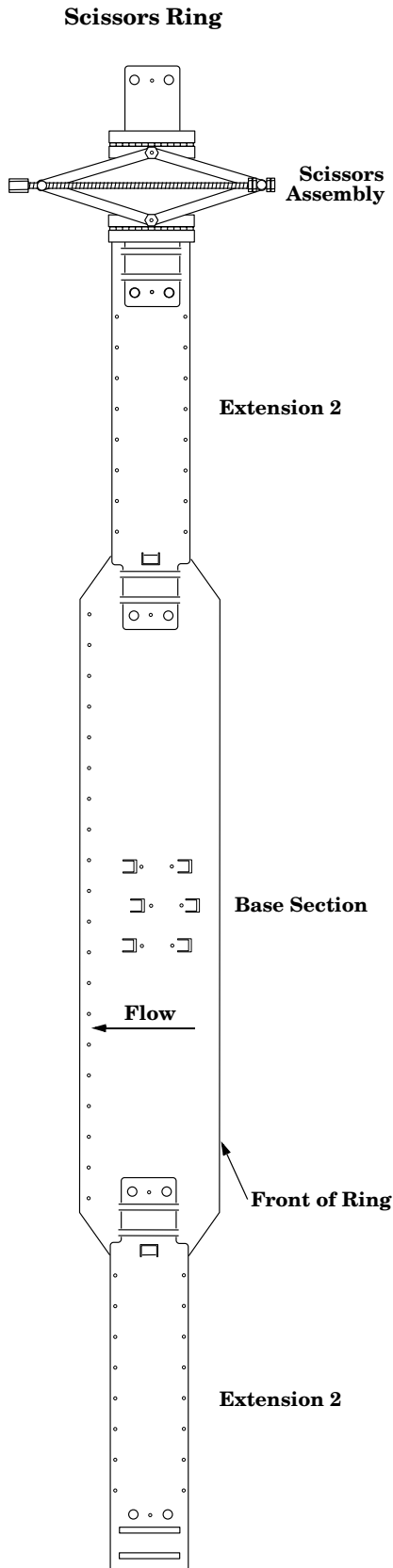
Under conditions of high velocity (greater than five feet per second or 1.5 meters per second), the spring ring may not have sufficient outward force to keep it tight against the pipe. The flow could lift the ring off the bottom of the pipe, or even carry it downstream.

This problem is more prevalent in the larger diameter pipes (10, 12, and 15 inch) and in pipes with a smooth inside surface. If any of these conditions are present, or if movement of the spring ring is detected or suspected, you must anchor the ring in place. You can do this by shooting studs through the ring into the pipe or by other appropriate means. In some cases, it may be sufficient to increase the outward force of the ring by bending it into a less-round shape.



**Spring Ring Preparation**

## Scissors Rings



The adjustable Scissors Ring is available for pipes 18 inches (457 mm) in diameter and larger. The Scissors Ring is sold in sets assembled from seven basic parts: base section, a scissors mechanism, four different sized extensions, and a hardware kit. This device mounts Isco Bubbler carriers, flow probes, and parameter probes in closed cylindrical, process or sewer pipes. The assembled rings can fit pipe diameters from 18" to 72". Ring sections are made of .040" thick 1/2 hard 301 stainless steel sheet. All other parts are also stainless steel, except for the plastic cable ties in the hardware kit.

The scissors mechanism provides approximately 11 1/2" of adjustment, used to tighten the ring assembly. Each extension, 1, 2, 3, and 4, adds 7.5", 20", 30", or 40", respectively, to the circumference of the ring. Used alone, the base section fits an 18" diameter pipe. The 7.5" (the smallest) extension is used to take up or remove slack in larger pipe sizes where variations in circumference can occur. Refer to **Table 2** for the recommended configurations for various pipe diameters. The scissors mechanism will work best if the respective assembly is installed to allow the scissors to expand approximately in the middle of the adjustment.

**Table 2 Recommended Scissors Ring Configurations**

Diameter	Parts (all configurations include the Scissors Assembly)
18"	Base Section
21", 24"	Base + (2) 7.5" Extensions
30"	Base + (2) 20" Extensions
36"	Base + (2) 20" Extensions + (2) 7.5" Extensions
42"	Base + (2) 30" Extensions + (2) 7.5" Extensions
48"	Base + (2) 40" Extensions + (2) 7.5" Extensions
60"	Base + (4) 30" Extensions + (2) 7.5" Extensions
72"	Base + (4) 40" Extensions + (2) 7.5" Extensions

### Assembling the Scissors Ring

#### **CAUTION**

**Use gloves and eye protection when assembling and installing the rings. Though deburred, the edges of the stainless steel can cut if improperly handled.**

When assembling the ring sections, make sure the tongue sections are correctly inserted into the slotted sections. Note the accompanying diagram. A flat blade screwdriver may help slide the tongue sections through the slots and over the securing buttons. In large pipes, you may find it useful to assemble the base and extensions above ground, (without connecting into a circle), before entering the manhole. Then you can pass it down the manhole. Do not drop it; a large assembly could be badly bent.

The three sets of mounting tabs on the base section are for mounting the Isco flow and parameter probes. The vinyl bubble line is first attached to a carrier and then will slide onto any set of tabs. **Make sure both tabs properly and completely engage the slots of the carrier.**

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The hardware kit provides plastic cable ties to secure the bubble line along the back of the ring. It also includes flat head bolts and nuts you can use to bolt sections of the ring assembly together. This is recommended when installing the ring into the larger pipe sizes, while significant flow exists. The ring can thrash around during installation, (before you can tighten the scissors mechanism), if there is high flow. Bolting the tongue sections together can greatly increase safety and prevent the assembly from being torn apart.

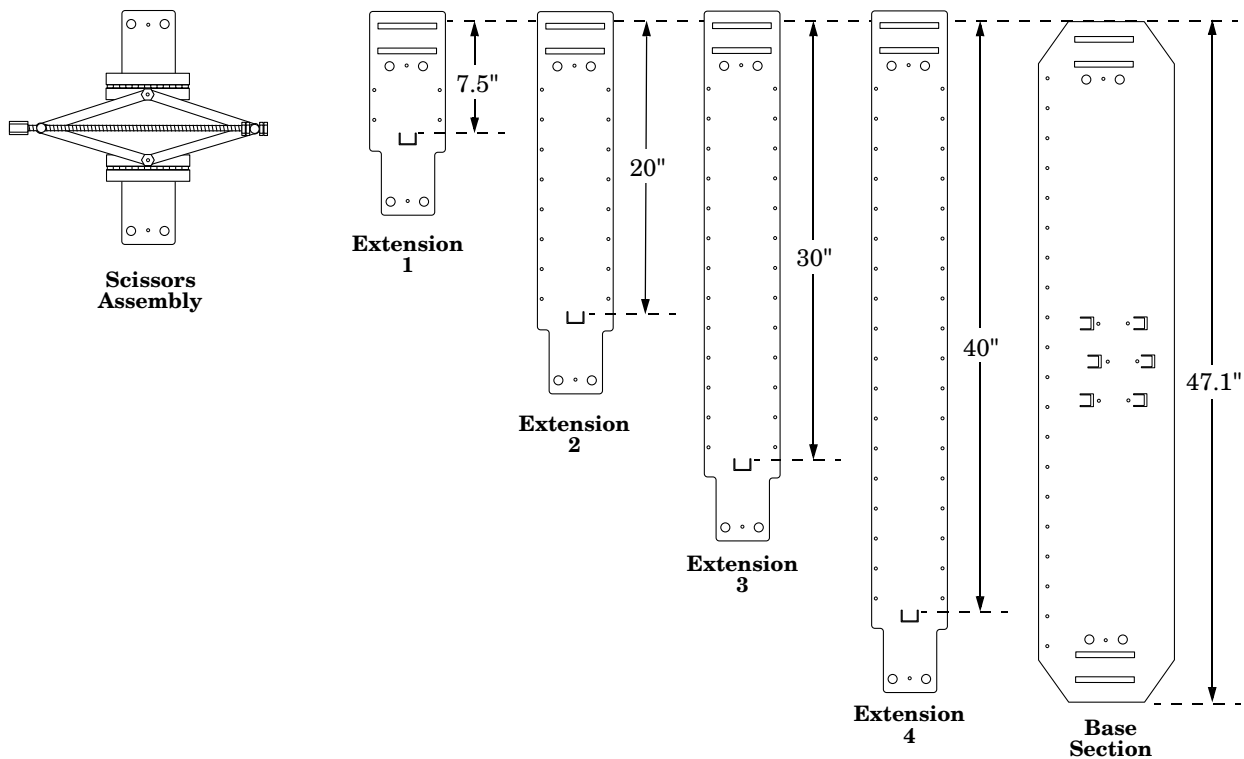
### **Note**

There are **countersunk holes** on the base section near the mounting tabs for the probes. These holes are for mounting the **Isco Probe Extension**.

### Installing the Scissors Ring

Fit the assembled scissors ring into the pipe and push it upstream the desired distance. It may be necessary to rotate the ring to position the sensor in the bottom center of the pipe. Once in position, secure the assembly in place by gently tightening the supplied scissors mechanism with a  $\frac{5}{8}$ " socket wrench or other suitable tool. **Do not overtighten** the mechanism: it is designed to flex somewhat to provide a positive lock once moderately tightened. Route the sensor cable out of the pipe so that it does not collect debris or disturb the flow.

**Figure 5 Scissors Ring Components**



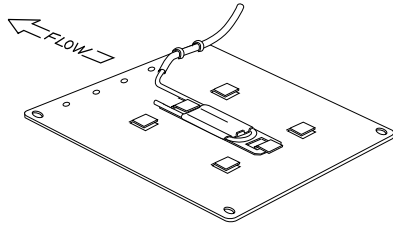
## 730 BUBBLER MODULE

### Street Level Installation System

The Street Level Installation System provides a way to install the probe in a round pipe without entering a manhole. This system uses multi-section poles and expansion rings that fit 6, 8, 10, 12, and 15 inch round pipes in manholes as deep as 15 feet. The system includes an instruction manual.

### Other Installation Methods

Isco's mounting hardware can be installed or adapted for use in many channels. The paragraphs below list additional bubble line installation methods.



**Sensor Mounting Plate**

#### Rectangular, Trapezoidal, and Earthen Channels

Isco offers the Sensor Mounting Plate for these channels. The stainless steel plate has tabs to mount up to three sensors. The bubble line carrier also attaches to the tabs (see figure in the left margin). It is secured in concrete channels by driving studs into the channel bottom and bolting the plate to the studs. In an earthen channel, the plate can be held in place by driving in stakes.

#### U-Channels

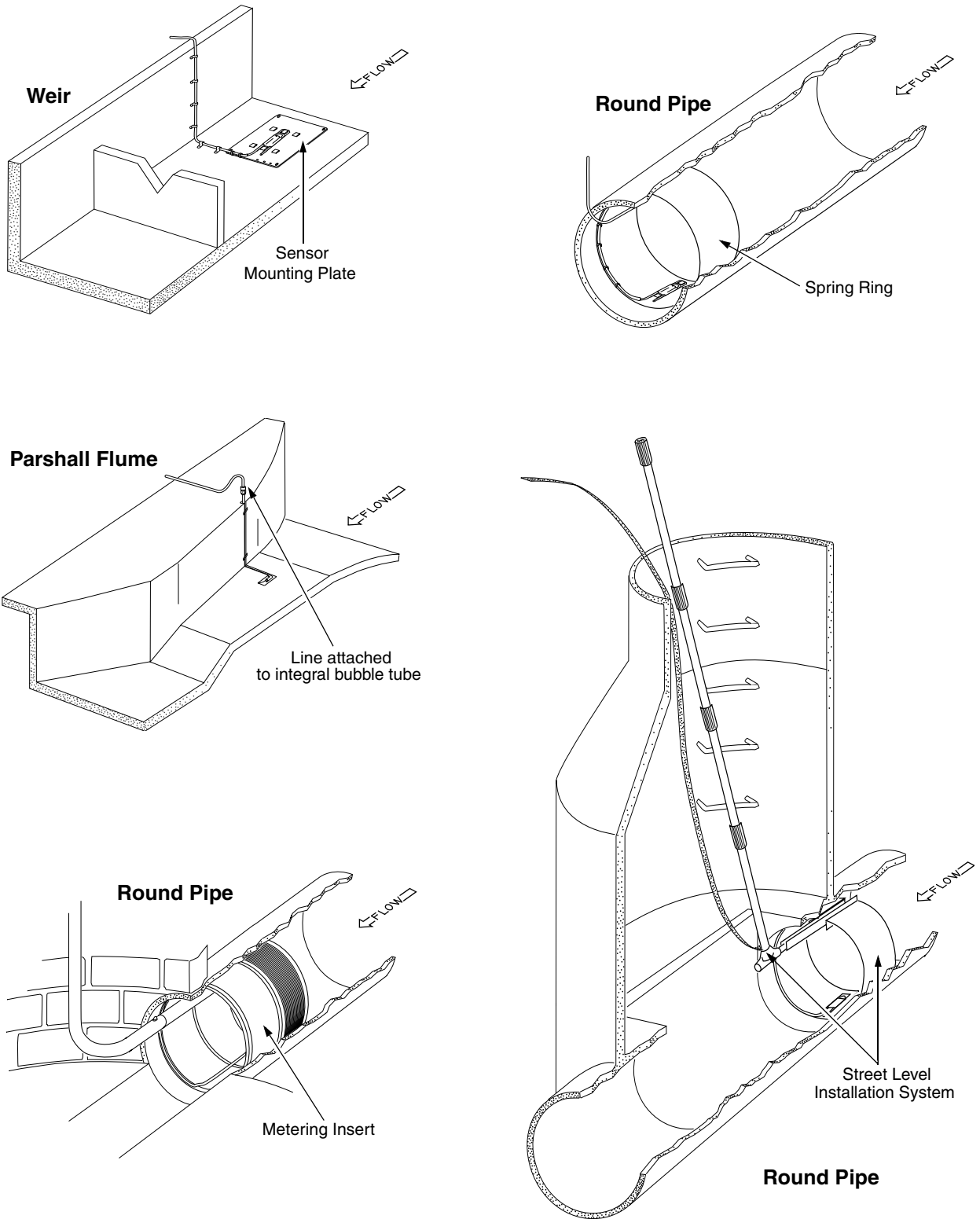
It is possible to mount the bubble line retainer in a U-channel with a scissors ring base section. Attach the base section to the channel wall with studs fired from a power-activated stud gun. Consult the factory for more information, if you must mount the bubble line in a U-channel.

#### Non-Standard Installations

If you are not using a primary device, or if your primary device is not listed in Table 1, please consult with the Isco Customer Service Department for installation recommendations.

# 730 BUBBLER MODULE

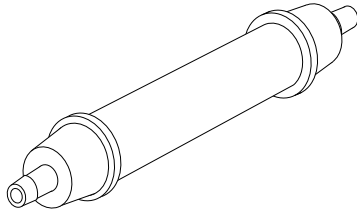
Figure 6 Typical Installation Methods





## Maintenance

### Desiccant Reactivation

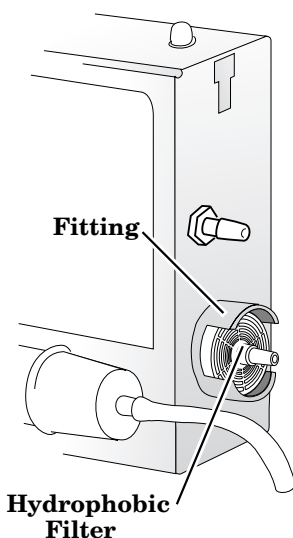


Desiccant Cartridge

#### Note

A saturated desiccator will let moisture into bubbler system. This can cause several undesirable effects including:

- The moisture may block internal tubing and cause reading errors.
- The air in many installations contains fumes that will form acids in the presence of moisture. These acids may corrode internal components.
- At temperatures near or below freezing, there could be permanent damage if ice forms inside the air pump.



Hydrophobic Filter

There is a cartridge on the side of the module to dry the air used by the bubbler. It contains a silica gel desiccant with a color indicator that changes from blue to pink when saturated. Pink desiccant cannot remove moisture and must be replaced or reactivated.

#### **CAUTION**

Desiccant may produce irritating fumes when heated. Observe the following precautions:

- Use a vented oven in a well ventilated room.
- Do not remain in the room while the regeneration is taking place.
- Use the recommended temperature. Avoid heating the desiccant at higher than recommended temperatures.

There have been reports of irritating fumes coming from the desiccant during reactivation. While our attempts to duplicate the problem have been unsuccessful, we still urge you to use caution. Material Safety Data Sheets are in the back of this manual.

To reactivate the desiccant, pour the desiccant out of the cartridge into a heat resistant container. Never heat the plastic cartridge; it will melt. Heat the silica gel in a vented convection oven at 212° to 350° F (100° to 175° C) for two to three hours, or until the blue color returns. Allow the desiccant to cool and then refill the cartridge.

The desiccant's ability to remove moisture may decrease with each saturation/reactivation cycle, resulting in a need for more frequent service. After several cycles, the desiccant will no longer be effective as it becomes saturated too quickly. At this point, replace the desiccant.

The cotton filters in the end caps keep small pieces of the desiccant material from falling out of the cartridge. When they become soiled, replace them with ordinary cotton balls.

### Hydrophobic Filter

The hydrophobic filter prevents water from entering the module. Any amount of water will plug the filter. If the filter becomes plugged replace it. To remove the filter, turn it counterclockwise while making sure the black fitting does not rotate.

## **730 BUBBLER MODULE**

### **Bubble Line Maintenance**

Periodically inspect the bubble line to make sure that it has not become kinked or damaged in any way. If you find damage to the bubble line, replace it. A leaking or obstructed line will cause inaccurate level readings and lower battery life. (The pump must run more frequently.) If you need to replace the bubble line, install a new line the same way you installed the original. Generally, the new line should be the same length as the old.

If you replace the bubble line or if you change the outlet either by cutting off the tip or by installing a bubble line extension, you must recalibrate the level.

Inspect the outlet of the bubble line regularly for any signs of clogging. Sediment or debris from the flow stream and algae can all clog the line. If the line is blocked, you can either clean it out, or simply cut off the tip.

If algae growth is a problem, consider using a copper bubble line extension. The copper salts formed on a copper line will prevent algae growth.

### **Repairing The Module**

The module has no user-serviceable parts. Its case is completely sealed to protect the internal components. To repair the unit, the case must be broken open and replaced. If you think your module requires repair, contact Isco's Customer Service Department for information on returning it to the factory.

### **Flash Memory and Software Upgrades**

The module has Flash memory to store its software. With Flash technology, you can upgrade your module's software without sending it back to the factory or replacing a chip.

To update the module software, install the module in a 6712 Sampler. Then connect the sampler power source and turn the sampler on. Connect the sampler to a computer and follow the instructions received with your Flash Update program.

### **How to Get Help**

Contact Isco's Technical Repair Department:

Isco Technical Repair Department  
P.O. Box 82531  
Lincoln, NE 68501

Telephone:

Within U.S.A. and Canada (toll free):(800) 228-4373  
Outside U.S.A: (402) 464-0231  
FAX: (402) 465-3022

## 730 BUBBLER MODULE

### Accessories

730 Bubbler Module . . . . .	60-6700-050
<i>(Includes module, bubble line, and manual)</i>	
Bubble Line 25' . . . . .	60-9003-281
Bulk Bubble Line 100' . . . . .	68-1700-003
4' SST Extension . . . . .	60-1873-043
Bubbler Carrier Assembly . . . . .	60-3204-007
Accessory Package . . . . .	60-9004-144
<i>(Includes desiccator cartridge and hydrophobic filter)</i>	
Spring Ring 6" Dia. . . . .	68-3200-007
Spring Ring 8" Dia. . . . .	68-3200-008
Spring Ring 10" Dia. . . . .	68-3200-009
Spring Ring 12" Dia. . . . .	68-3200-010
Spring Ring 15" Dia. . . . .	68-3200-011
<i>(Includes plastic ties to attach bubble line)</i>	
Scissors Ring for 18"-26" Pipe . . . . .	68-3000-042
Scissors Ring for 26"-38" Pipe . . . . .	68-3000-043
Scissors Ring for 38"-44" Pipe . . . . .	68-3000-044
Scissors Ring for 44"-48" Pipe . . . . .	68-3000-045
Scissors Ring for 48"-60" Pipe . . . . .	68-3000-046
Scissors Ring for 60"-72" Pipe . . . . .	68-3000-047
Scissors Ring for 18"-60" Pipe . . . . .	68-3000-048
<i>(Includes base section, scissors mechanism, extensions, plastic ties, and installation instructions)</i>	
Mounting Ring Base Assembly . . . . .	60-3004-169
<i>(Includes plastic ties, and installation instructions)</i>	
Scissors Mechanism . . . . .	60-3004-170
Pair of 7.5" Extensions for Scissors Ring . . . . .	68-3000-038
Pair of 20" Extensions for Scissors Ring . . . . .	68-3000-039
Pair of 30" Extensions for Scissors Ring . . . . .	68-3000-040
Pair of 40" Extensions for Scissors Ring . . . . .	68-3000-041
Street Level Installation System Multi-section Pole . . . . .	60-3204-012
<i>(Includes instruction manual. To complete your system, you must also order a Street Level Mounting Ring)</i>	
Street Level Mounting Ring for 6" diameter pipe . . . . .	60-3204-014
Street Level Mounting Ring for 8" diameter pipe . . . . .	60-3204-015
Street Level Mounting Ring for 10" diameter pipe . . . . .	60-3204-016
Street Level Mounting Ring for 12" diameter pipe . . . . .	60-3204-017
Street Level Mounting Ring for 15" diameter pipe . . . . .	60-3204-018
6" Metering Insert . . . . .	68-3230-005
8" Metering Insert . . . . .	68-3230-006
10" Metering Insert . . . . .	68-3230-007
12" Metering Insert . . . . .	68-3230-008
<i>(Includes poles, pump, hose, attachable 60 degree V-notch weir plate, and instruction manual)</i>	
Probe Extension . . . . .	68-3200-012
Sensor Mounting Plate . . . . .	68-3000-051

## 730 BUBBLER MODULE

# Technical Specifications

**Table 2 Technical Specifications for the 730 Bubbler Module**

<p>General Notes:</p> <ol style="list-style-type: none"> <li>All weights may vary <math>\pm 0.2</math> lb (<math>\pm 0.1</math> kg).</li> <li>All lengths may vary <math>\pm 0.25</math> inch (<math>\pm 0.64</math> cm).</li> </ol>	
Weight:	1.5 lbs (0.7 kg)
Dimensions:	4.9 × 5.7 × 2.0 Inches (12.4 × 14.5 × 5.1 cm)
Material:	Polystyrene
Operational Temperature:	32° to 120°F (0° to 49°C)
Storage Temperature	0° to 140°F (-18° to 60°C)
Enclosure:	NEMA 4X and 6, IP67
Power:	Provided by sampler.
Memory:	Nonvolatile programmable Flash. Can be field updated through the sampler.
Readings:	Programmable through the sampler at 1, 2, 5, 10, 15, and 30 minute intervals.
Bubble Line:	Vinyl: inside diameter: $\frac{1}{8}$ inch (0.32 cm) length: 25 feet (7.6 m)
Range:	0.010 ft (0.003 m) minimum water level above bubble outlet. 10 ft (3.048 m) maximum water level above bubble outlet.
Level Accuracy:	<p>0.010 to 5.000 ft: 0.010 ft                      0.010 to 10.000 ft: 0.035 ft                      0.003 to 1.524 m: 0.003 m                      0.003 to 3.048 m: 0.011 m</p> <p>Includes Linearity, Repeatability, and Hysteresis at 77° F (25° C). Does not include the Temperature Coefficient. Level is the distance between the bubble outlet and the liquid surface.</p>
Temperature Coefficient:	<p>0.010 to 5.000 ft: <math>\pm 0.0006 \times \text{level in feet} \times \text{temperature change from } 77^\circ \text{ F}</math>                      0.010 to 10.000 ft: <math>\pm 0.0005 \times \text{level in feet} \times \text{temperature change from } 77^\circ \text{ F}</math>                      0.003 to 1.524 m: <math>\pm 0.00108 \times \text{level in meters} \times \text{temperature change from } 25^\circ \text{ C}</math>                      0.003 to 3.048 m: <math>\pm 0.0009 \times \text{level in meters} \times \text{temperature change from } 25^\circ \text{ C}</math></p> <p>Temperature Coefficient is the maximum error within the operating temperature range per degree of temperature change. Add to Level Accuracy.</p>
Automatic Drift Correction:	$\pm 0.002$ ft ( $\pm 0.0006$ m) at 15 minute intervals
Level Resolution:	0.001 ft (0.001 m)

**730 BUBBLER MODULE**

**Material Safety Data Sheet**

Indicating Silica Gel

Identity (Trade Name as Used on Label)

Manufacturer : MULTISORB TECHNOLOGIES, INC. (formerly Multiform Desiccants, Inc.)	MSDS Number* : M75
Address: 325 Harlem Road Buffalo, NY 14224	CAS Number* :
Phone Number (For Information): 716/824-8900	Date Prepared: January 11, 1999
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
Silica Gel SiO <sub>2</sub>	99.5	6mg/m <sup>3</sup> (total dust)	10mg/m <sup>3</sup> (total dust)	
Cobalt Chloride	>0.05	0.05mg/m <sup>3</sup> (cobalt metal dust & fume)		
Non-Hazardous Ingredients				
<b>TOTAL</b>	100			

**Section 2 - Physical/Chemical Characteristics**

Boiling Point	N/A	Specific Gravity (H <sub>2</sub> O = 1)	2.1
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	Insoluble, but will adsorb moisture.	Water Reactive	Not reactive, but will adsorb moisture.
Appearance and Odor	Purple crystals, no odor.		

**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	Dry chemical, carbon dioxide and foam can be used.						
Special Fire Fighting Procedures	Water will generate heat due to the silica gel which will adsorb water and liberate heat.						
Unusual Fire and Explosion Hazards	When exposed to water, the silica gel can get hot enough to reach the boiling point of water. Flooding with water will reduce the temperature to safe limits.						

**Section 4 - Reactivity Hazard Data**

<b>STABILITY</b> <input type="checkbox"/> Stable <input type="checkbox"/> Unstable	Conditions To Avoid	Moisture and high humidity environments.
Incompatibility (Materials to Avoid)	Water.	
Hazardous Decomposition Products	Carbon dioxide, carbon monoxide, water	
<b>HAZARDOUS POLYMERIZATION</b> <input type="checkbox"/> May Occur <input type="checkbox"/> Will Not Occur	Conditions To Avoid	None.

\*Optional

Indicating Silica Gel

## 730 BUBBLER MODULE

Page 2

<b>Section 5 - Health Hazard Data</b>					
<b>PRIMARY ROUTES OF ENTRY</b>	<input type="checkbox"/> Inhalation <input type="checkbox"/> Ingestion <input type="checkbox"/> Skin Absorption <input type="checkbox"/> Not Hazardous				
<b>HEALTH HAZARDS</b>	<table style="width: 100%; border: none;"> <tr> <td style="width: 20%; border: none;">Acute</td> <td style="border: none;">May cause eye, skin and mucous membrane irritation.</td> </tr> <tr> <td style="border: none;">Chronic</td> <td style="border: none;">Prolonged inhalation may cause lung damage.</td> </tr> </table>	Acute	May cause eye, skin and mucous membrane irritation.	Chronic	Prolonged inhalation may cause lung damage.
Acute	May cause eye, skin and mucous membrane irritation.				
Chronic	Prolonged inhalation may cause lung damage.				
<b>Signs and Symptoms of Exposure</b>	Drying and irritation.				
<b>Medical Conditions Generally Aggravated by Exposure</b>	Asthma.				
<b>EMERGENCY FIRST AID PROCEDURES - Seek medical assistance for further treatment, observation and support if necessary.</b>					
<b>Eye Contact</b>	Flush with water for at least 15 minutes.				
<b>Skin Contact</b>	Wash affected area with soap and water.				
<b>Inhalation</b>	Remove affected person to fresh air.				
<b>Ingestion</b>	Drink at least 2 glasses of water.				

<b>Section 6 - Control and Protective Measures</b>	
<b>Respiratory Protection (Specify Type)</b>	Use NIOSH approved dust mask or respirator.
<b>Protective Gloves</b>	Light cotton gloves.
<b>Eye Protection</b>	Safety glasses.
<b>VENTILATION TO BE USED</b>	<input type="checkbox"/> Local Exhaust <input type="checkbox"/> Mechanical (General) <input type="checkbox"/> Special <input type="checkbox"/> Other (Specify)
<b>Other Protective Clothing and Equipment</b>	None.
<b>Hygienic Work Practices</b>	Avoid raising dust. Avoid contact with skin, eyes and clothing.

<b>Section 7 - Precautions for Safe Handling and Use/Leak Procedures</b>	
<b>Steps to be Taken if Material is Spilled Or Released</b>	Sweep or vacuum up and place the spilled material in a waste disposal container. Avoid raising dust.
<b>Waste Disposal Methods</b>	Dispose in an approved landfill according to federal, state and local regulations.
<b>Precautions to be Taken In Handling and Storage</b>	Cover promptly to avoid blowing dust. Wash after handling.
<b>Other Precautions and/or Special Hazards</b>	Keep in sealed containers away from moisture. The silica gel will readily adsorb moisture.

## 730 BUBBLER MODULE