Teledyne Isco Mounting Rings

Installation and Operation Guide

TELEDYNE ISCO
A Teledyne Technologies Company

Part # 60-3203-061

Revision E, October 2004

Foreword

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

Although Teledyne 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 e-mail the Teledyne 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.

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

Teledyne 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)
	(800) 228-4373	(Samplers and Flow Meters)
Fax:	(402) 465-3022	
E-mail address:	info@isco.com	
Web site:	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

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.

⚠ AVERTISSEMENT

Éviter les usages périlleux! Si vous utilisez cet instrument d'une manière autre que celles qui sont specifiées 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.
	Pinch point. These symbols warn you that your fingers or hands will be seriously injured if you place them between the moving parts of the mechanism near these symbols.
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.
	Risque de pincement. Ces symboles vous avertit que les mains ou les doigts seront blessés sérieusement si vous les mettez entre les éléments en mouvement du mécanisme près de ces symboles
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 Sei vor "gefährlichen Spannungen" im Inneren des Produkts warnt.
	Vorsicht Quetschgefahr! Dieses Symbol warnt vor einer unmittelbar drohenden Verletzungsgefahr für Finger und Hände, wenn diese zwischen die beweglichen Teile des gekennzeichneten Gerätes geraten.

Mounting Rings

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Teledyne Isco Mounting Rings

Section 1 Preparation

1.1 Introduction

This manual describes the preparation and use of Teledyne Isco's sensor mounting systems.

Table 1-1, on page 1-8, depicts the possible mounting combinations and provides references to the sections of this manual that apply to your sensor and mounting system. For example, to install a submerged probe in a round pipe using the street level installation system, locate the probe in the sensor column. As you follow the row to the right, you should note that a carrier is required. Continue to follow the row over to the Street Level Installation System and the table refers you to page 1-2, to attach the probe to a carrier, and page 4-2, to complete the installation.

1.2 Sensor Carriers

When Table 1-1 indicates that a carrier is required, you must first attach the sensor to the carrier and then slide the carrier onto the tabs of a compatible mounting system.

A carrier is an adapter plate that firmly holds the sensor to the mounting ring, yet allows you to easily attach or remove the sensor from the mounting system.

Most carriers share the same base plate that has a hole in front and a notch in the back (Figure 1-1). These recesses fit the tabs found on the mounting rings (Figure 1-2).

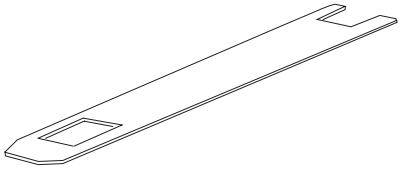


Figure 1-1 Carrier Base Plate

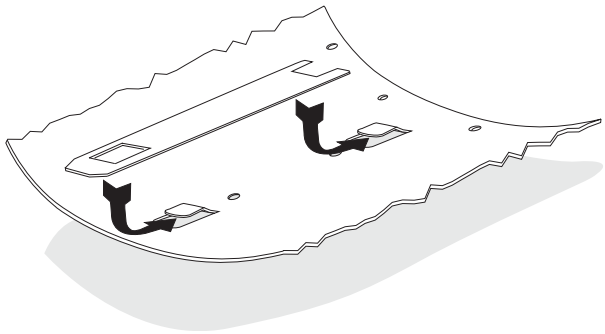


Figure 1-2 Mounting the Carrier on a Ring

Sensor mounting hardware is on top of the carrier base plate. The hardware will differ for each type of carrier and some will accept more than one sensor. All of the carriers are shown in Table 1-1.

Not every type of sensor requires a carrier. The following sections provide detailed mounting instructions or preparation notes for each type of sensor.

1.3 Submerged Probe

Before mounting a Submerged Probe Level Sensor on a ring, you must first attach it to a submerged probe carrier (Teledyne Isco Part # 60-3204-005). This carrier has clamps that hold the sides of the probe and a stud that fits through the probe's mounting hole.

Refer to Figure 1-3 for the following assembly instructions.

1. Hold the submerged probe with the recessed mounting hole on top.
2. Align the mounting hole with the 4-40 stud on the carrier and press the probe onto the carrier.
3. To secure the probe to the carrier, use the 4-40 nut and #4 washer from the hardware kit (part number 60-2504-035, shipped with each mounting ring).

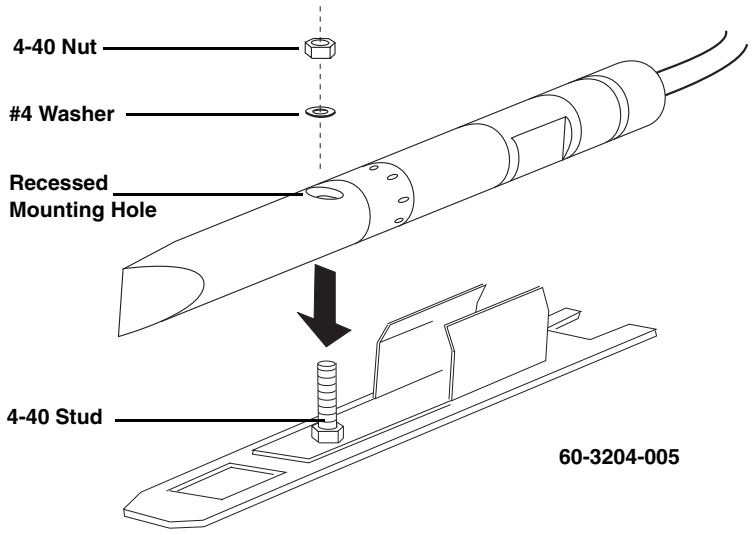


Figure 1-3 Attaching the Submerged Probe Carrier

Once secured to the carrier, the submerged probe can then slide onto the tabs of any of the compatible mounting systems shown in Table 1-1. To continue with attaching the probe and carrier to the mounting system, refer to the section on your specific mounting system.

1.4 Standard and Extended Range Area Velocity Sensors

This section is applicable to both Standard and Extended Range Area Velocity (A-V) Sensors (10' and 30' models). These sensors have an integral mounting plate (Figure 1-4) and no carrier is needed.

These sensors will slide onto the tabs of any compatible mounting system shown in Table 1-1. To complete the installation, refer to the section on your specific mounting system.

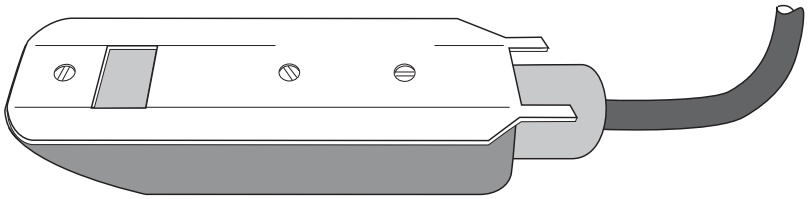


Figure 1-4 Standard and Extended Range Area Velocity Sensor

1.5 Low Profile Area Velocity Sensor

The Low Profile Area Velocity (A-V) Sensor is attached to the mounting ring with two 4-40 countersunk screws. This maintains a height suitable for measuring flow rates and velocities at very low liquid levels.

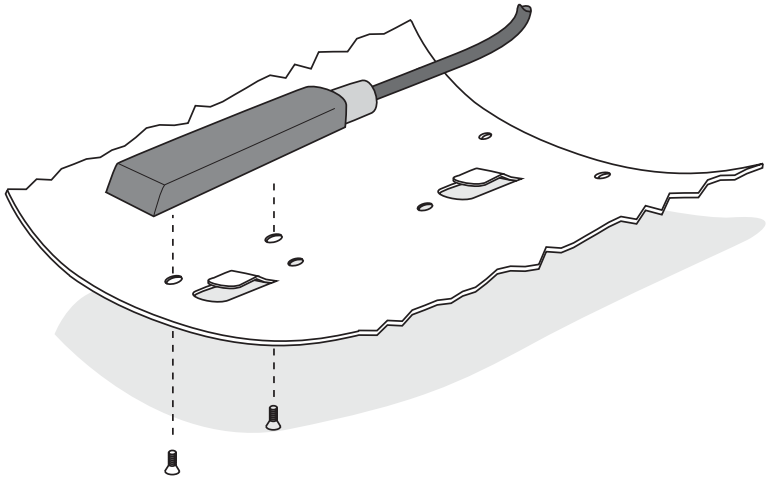


Figure 1-5 Low Profile Area Velocity Sensor Mounting

The Low Profile A-V Sensor can also be mounted on a carrier (Teledyne Isco Part # 60-3204-029). Refer to Figure 1-6.

☑ Note

Attaching the Low Profile A-V Sensor to a carrier raises the sensor, limiting its measurement capabilities at low liquid levels. Teledyne Isco recommends using the mounting ring without a carrier for applications that must measure level and velocity at depths as low as 1 inch (25 mm).

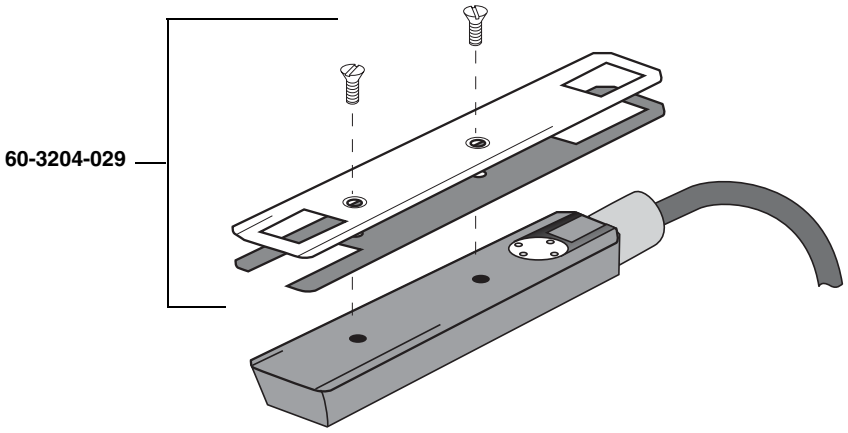


Figure 1-6 Attaching the Low Profile Sensor to the Optional Carrier

Once secured to the carrier, the Low Profile A-V Sensor can then slide onto the tabs of any compatible mounting system shown in Table 1-1. To complete the installation, see the section on your specific mounting system.

1.6 Bubble Line

Vinyl bubble lines attach easily to standard mounting systems with a bubble line carrier (Teledyne Isco Part # 60-3204-007). The carrier correctly orients the bubble line outlet once it has been slid onto the tabs of any compatible mounting system.

To attach the vinyl bubble line to the carrier, simply push at least ½ inch (1.3 cm) of line onto the longer extension of metal tubing. Refer to Figure 1-7. Continue the installation with the section on your selected mounting system.

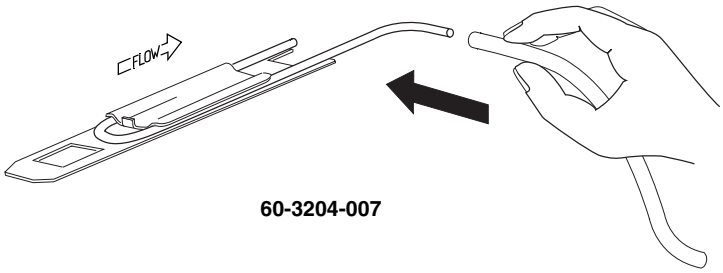


Figure 1-7 Connecting the Bubble Line

1.7 Dissolved Oxygen Sensor

To install a Dissolved Oxygen (D.O.) sensor, you must first attach it to a carrier (Teledyne Isco Part # 60-3204-006). This carrier has clamps to hold the sides of the D.O. sensor and correctly position it on the mounting system. The carrier also includes a set of mounting holes to attach a temperature probe. (Attaching a temperature probe is discussed later in this section.)

☑ Note

Before attaching the D.O. sensor to a carrier, it must be prepared with the membrane and
electrolyte.

Refer to Figure 1-8 while following these assembly instructions.

1. Position the D.O. sensor as shown and press sensor into the clamp.
2. Push the sensor towards the back until it meets the stop at the back of the clamp.

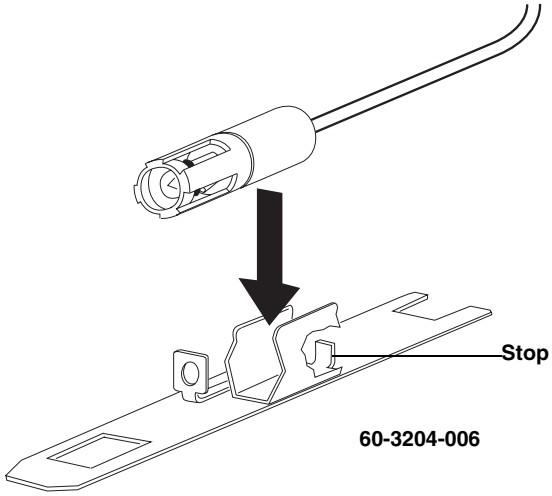


Figure 1-8 Attaching the D.O. Sensor

Once secured on the carrier, the D.O. sensor can then slide onto the tabs of any compatible mounting system shown in Table 1-1. To complete the installation, refer to the section for your specific mounting system.

☑ Note

Remove the protective cover from the end of the D.O. sensor before installing it in the flow stream.

1.8 pH Probe

The pH probe requires a carrier to attach it to Teledyne Isco's mounting systems. This carrier has clamps that hold the sides of the pH probe to correctly position it on the mounting system.

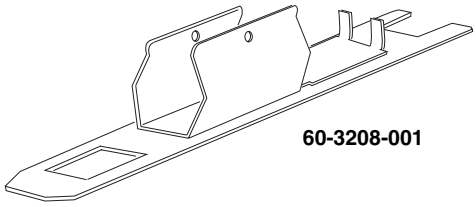


Figure 1-9 pH Probe Carrier

☑ Note

For best results, calibrate the pH probe before each installation.

To attach a pH probe to a carrier, refer to Figure 1-10 and follow these assembly instructions.

1. Position the pH probe so the flat sides are vertical and press the sensor into the clamp.
2. Rotate the probe 1/4 turn so that it fits tight within the clamps.
3. Push the probe towards the back until it meets the stops at the back of the clamp.
4. If the stream velocities exceed 5 feet per second, insert retaining hardware through the holes on the clamp. A stainless steel 1 3/8 inch 4-40 screw, 4-40 nut, and #4 lockwasher will hold the probe in place.

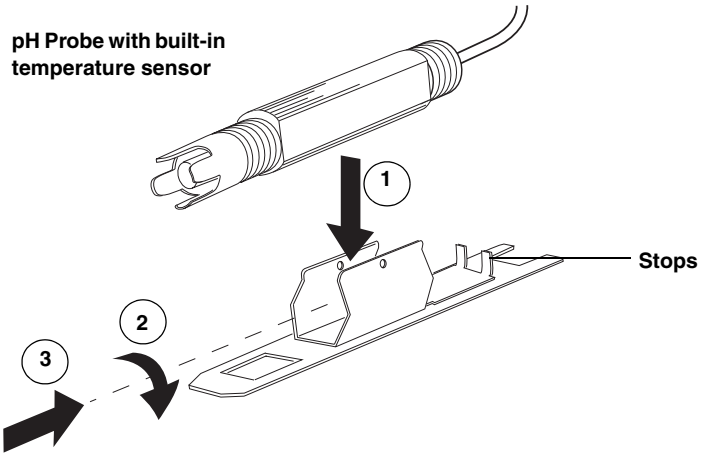


Figure 1-10 Attaching the pH Probe

Once secured on the carrier, the pH probe will then slide onto the tabs of any compatible mounting system shown in Table 1-1. To complete the installation, see the section relating to your specific mounting system.

☑ Note

Remove the protective cover from the end of the pH probe before placing it in the flow stream.

1.9 Temperature Probe

To install a temperature probe on Teledyne Isco's mounting systems, first attach it to one of the two available carriers. (See Figure 1-11.) The carriers have holes to attach the probe and correctly position it on the mounting system.

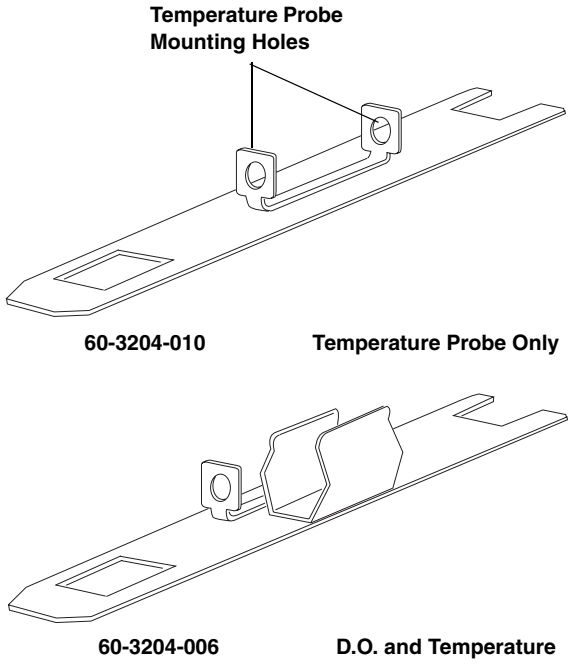


Figure 1-11 Temperature Probe Carriers

To attach a temperature probe to a carrier, refer to Figure 1-11 and follow these assembly instructions.

1. Remove the large retaining nut from the probe.
2. Insert the probe through the back mounting hole, the retaining nut, and then the front mounting hole.
3. Tighten the retaining nut to secure the probe against the back mounting hole.

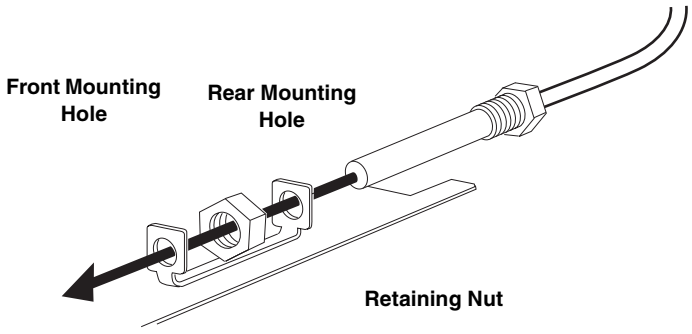
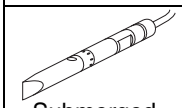
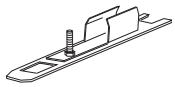
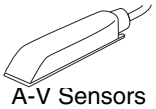
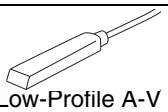
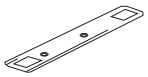
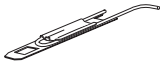
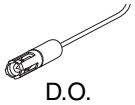
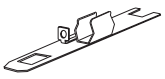
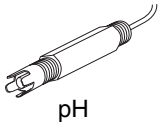
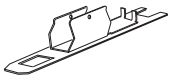
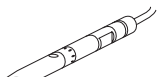
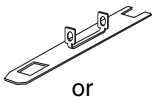
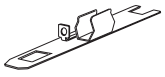


Figure 1-12 Attaching the Temperature Probe

Once secured on the carrier, the temperature probe will then slide onto the tabs of any compatible mounting system. To complete the installation, refer to the section for your specific mounting system.

Table 1-1 Sensors and Mounting Systems

Sensor	Carrier	Spring Ring	Scissors Ring	Street Level Installation System	Mounting Plate	Probe Extension
 Submerged	+ 	Pages 1-2 and 2-1	Pages 1-2 and 3-1	Pages 1-2 and 4-1	Pages 1-2 and 5-1	Not Recommended
 A-V Sensors	attached	Pages 1-3 and 2-1	Pages 1-3 and 3-1	Page 1-3 and 4-1	Pages 1-3 and 5-1	Not Recommended
 Low-Profile A-V	+  Optional	Pages 1-3 and 2-1	Pages 1-3 and 3-1	Pages 1-3 and 4-1	Pages 1-3 and 5-1	Not Recommended
 Bubble Line	+ 	Pages 1-4 and 2-1	Pages 1-4 and 3-1	Pages 1-4 and 4-1	Pages 1-4 and 5-1	Not Recommended
 D.O.	+ 	Pages 1-4 and 2-1	Pages 1-4 and 3-1	Pages 1-4 and 4-1	Pages 1-4 and 5-1	Pages 1-4 and 5-1
 pH	+ 	Pages 1-5 and 2-1	Pages 1-5 and 3-1	Pages 1-5 and 4-1	Pages 1-5 and 5-1	Pages 1-5 and 5-1
 Temperature	+  or 	Pages 1-6 and 2-1	Pages 1-6 and 3-1	Pages 1-6 and 4-1	Pages 1-6 and 5-1	Pages 1-6 and 5-1

Teledyne Isco Mounting Rings

Section 2 Spring Rings

Stainless steel spring rings simplify sensor installation in closed cylindrical pipes. Five diameter sizes are available: 6, 8, 10, 12, and 15 inches (150, 200, 250, 300, and 380 mm).

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

⚠ CAUTION

Use gloves and eye protection when assembling and installing the rings.

2.1 Preparation

Carriers and the Standard and Extended Range Area Velocity Sensors mount directly to the standard spring ring. Fit the slots onto the mounting tabs of the ring, making sure the tabs are fully engaged.

The Low Profile Area Velocity Sensor mounts directly to the spring ring with two 4-40 countersunk screws, or using the optional carrier.

☑ *Note*

Mounting rings have countersunk holes near the mounting tabs. These holes are for mounting the Teledyne Isco Probe Extension. See Table 1-1 for compatibility and refer to Section 5 for mounting instructions.

Route the cable (or bubble line) along the spring ring's edge with holes. Note that you can route the cable either to the left or right on the ring. Secure the cable in position by placing plastic ties through the holes and then locking them around the cable.

To prevent debris from catching on the cable, attach the cable so that it offers as little resistance to the flow as possible. Avoid loops or slack sections in the cable. Attach it neatly and closely to the spring ring.

2.2 Installation

After the carrier and cable 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. Place the cable on a secure surface. 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 sensor in the bottom center of the pipe.

Some applications may require anchoring the spring ring. Under high velocity conditions (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 (plastic, for example). If any of these conditions are present, or if movement of the spring ring is 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 simply increase the outward force of the ring by bending it into a less round shape.

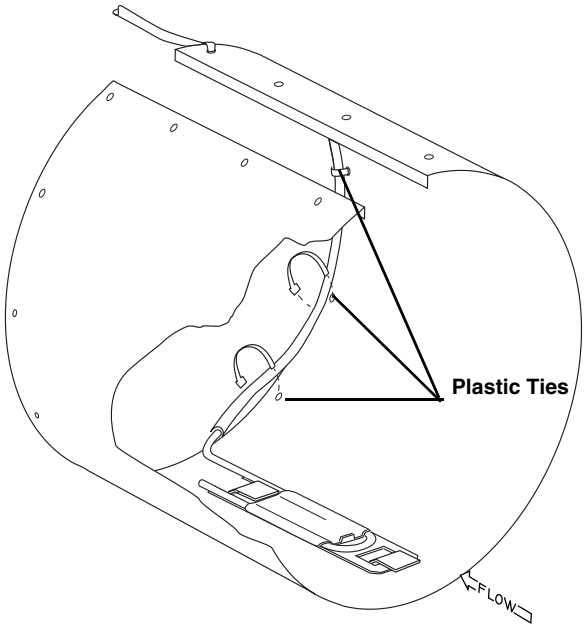


Figure 2-1 Preparing the Standard Spring Ring

Table 2-1 Spring Ring Part Numbers

Diameter	Part Number
6” (150mm)	68-3200-007
8” (200mm)	68-3200-008
10” (250mm)	68-3200-009
12” (300mm)	68-3200-010
15” (380mm)	68-3200-011

Teledyne Isco Mounting Rings

Section 3 Scissors Rings

3.1 Mounting in Pipes

The adjustable Scissors Ring installs in 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. The assembled rings can fit pipe diameters from 18" to 72". Ring sections are .040" thick ½ hard 301 stainless steel. All other parts are also stainless steel, except for the plastic cable ties in the hardware kit. This device mounts Teledyne Isco flow probes and parameter probes in closed cylindrical pipes.

The scissors mechanism provides approximately 11½" 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 the table in Figure 3-2 for the recommended configurations for various pipe diameters. The scissors mechanism will work best if the completed assembly allows the scissors to secure the ring near the middle of its adjustment range.

The base will accept all carriers, the Standard and Extended Range A-V Sensors with the integral mounting plate, and the Low Profile A-V Sensor with or without a carrier.

3.2 Mounting in U-Channels

The scissors ring base section is also useful for mounting sensors in U-channels. 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 a sensor in a U-channel.

3.3 Assembly

When assembling the ring sections, make sure the tongue sections are correctly inserted into the slotted sections. Note the accompanying diagram in Figure 3-1. A flat blade screwdriver may help slide the tongue sections through the slots and over the securing buttons.

⚠ CAUTION

Use gloves and eye protection when assembling and installing the rings.

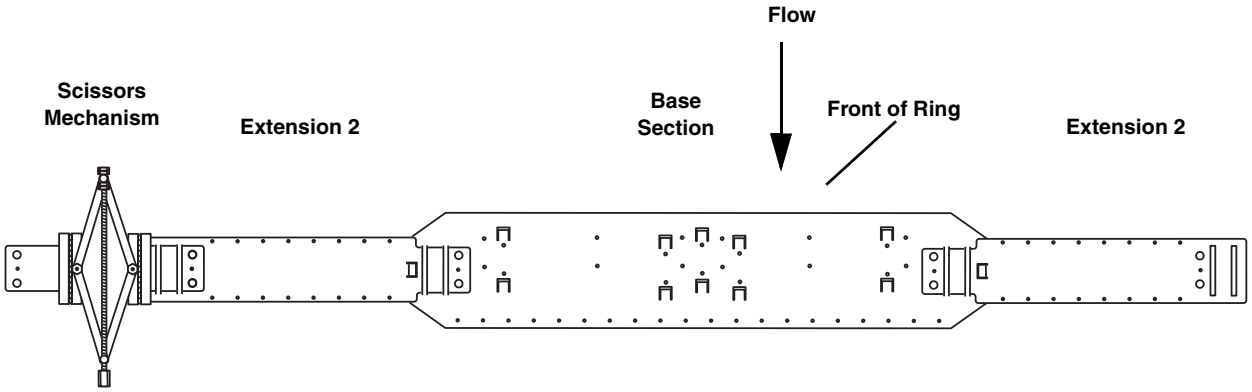


Figure 3-1 Scissors Ring

In large pipes, you may find it useful to assemble the base and extensions above ground, (without connecting it into a circle), before entering the manhole. Then you can pass it down the manhole to connect the final piece.

A hardware kit includes flat head bolts and nuts that you can use to bolt sections of the ring assembly together. This is recommended when installing the ring into the larger pipe sizes where significant flow exists. If there is high flow, the ring can thrash around during installation before you can tighten the scissors mechanism. Bolting the tongue sections together can greatly increase safety and prevent the assembly from being torn apart.

The base section has tab sets for mounting up to three carriers. However, if you are measuring level, velocity, or flow rate, use only one set. Adjacent sensors could disturb the flow and cause inaccurate readings.

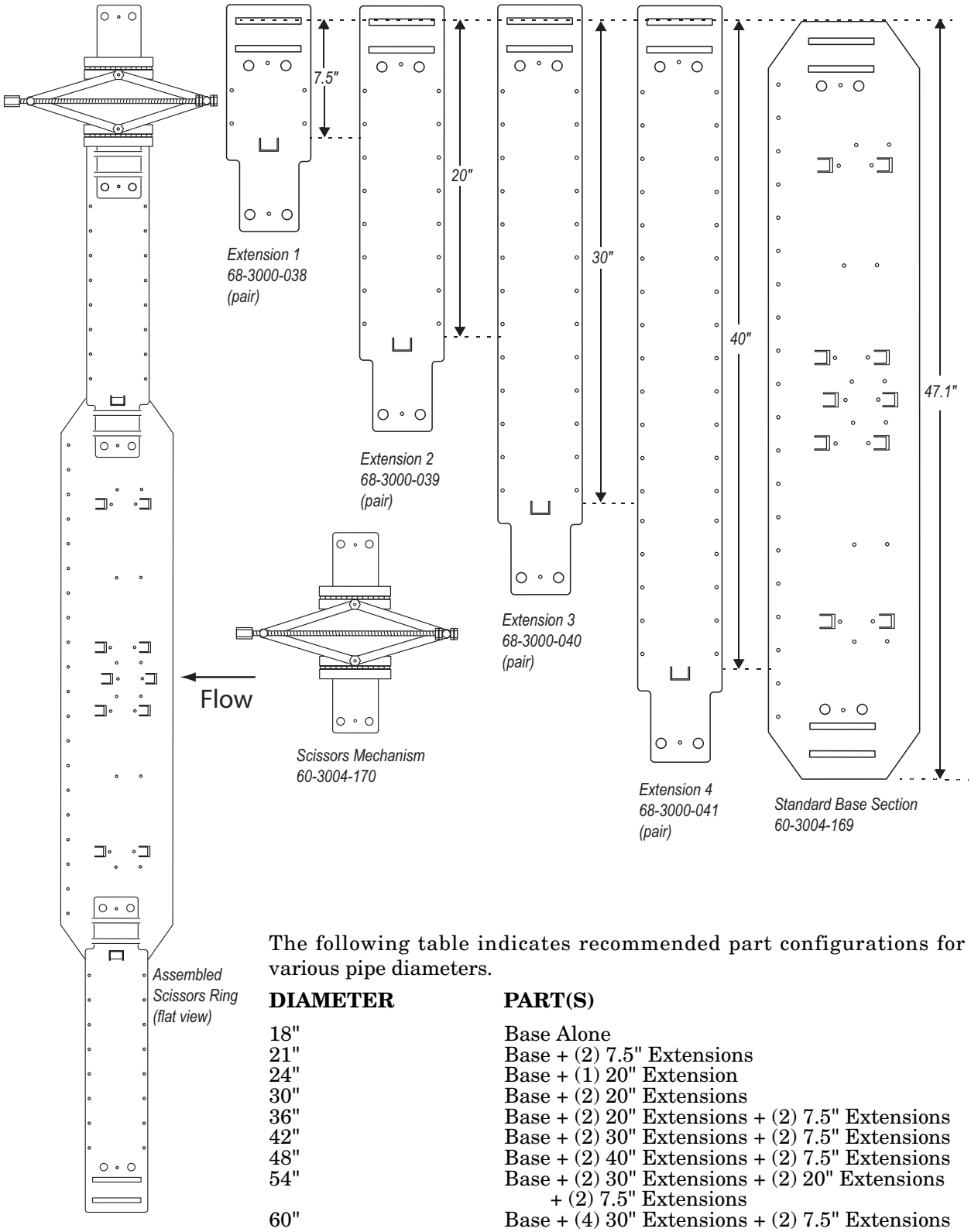
> ☑ ***Note***
>
> There are countersunk holes on the base section near the mounting tabs for the probes. These holes are for mounting the Teledyne Isco Probe Extension. See Table 1-1 for compatibility and refer to Section 5 for mounting instructions.

Slide the carrier (or A-V Sensor) onto the tabs. **Make sure both tabs properly and completely engage the slots of the carrier** (or screw the Low Profile A-V Sensor to the base using two 4-40 countersink screws).

After assembling the ring, route the cable (or bubble line) along the edge with holes. Secure the cable in position by placing plastic ties through the holes and then locking them around the cable. To prevent debris from catching on the cable, attach the cable so that it offers as little resistance to the flow as possible. Avoid loops or slack sections in the cable. Attach it neatly and closely to the ring. Note that you can route the cable either to the left or right on the ring.

3.4 Installation

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 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.



The following table indicates recommended part configurations for various pipe diameters.

DIAMETER	PART(S)
18"	Base Alone
21"	Base + (2) 7.5" Extensions
24"	Base + (1) 20" Extension
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
54"	Base + (2) 30" Extensions + (2) 20" Extensions + (2) 7.5" Extensions
60"	Base + (4) 30" Extensions + (2) 7.5" Extensions
72"	Base + (4) 40" Extensions + (2) 7.5" Extensions

Figure 3-2 Scissors Ring Parts

Teledyne Isco Mounting Rings

Section 4 Street Level Installation System

4.1 Introduction

The Street Level Installation System (patent applied for) provides a way to install various Teledyne Isco sensors in round pipe sewers without having to enter the manhole. This system includes an insertion tool with a multi-section pole and five differently-sized expansion rings (6, 8, 10, 12, and 15 inches, or 150, 200, 250, 300, and 380 mm) with an adjustable strap for each ring. The six pole extensions and the adjustable strap allow installation of the expansion rings in manholes as deep as 15 feet (4.57 m). The difficulty of installation depends on these factors:

- the depth of the manhole
- the size and slope of the pipe
- the depth and velocity of the flow
- the condition of the pipe inlet

The outfall from the upstream pipe must be well-finished (round), with no roughness or projections of mortar that could get in the way of the ring or prevent it from entering the pipe.

The insertion tool and poles snap together like the hose and pipes on a vacuum cleaner. The end of the insertion tool slides over a $^1/_2$-inch diameter stainless steel rod extending from the end of each expansion ring. Turning the insertion tool clockwise after engaging the stainless rod tightens the tool around the rod, securing it. Turning the rod counterclockwise releases the rod from the tool.

There are two types of expansion rings, a low profile ring and a standard ring. The low profile expansion ring is only for use with the Low Profile A-V Sensor. The standard expansion ring will accept all carriers, the Standard and Extended Range A-V Sensors with the integral mounting plate, and the Low Profile A-V Sensor when it is mounted on a carrier.

Also included is the hardware necessary to secure the expansion ring to the stainless steel rod. Note that angling the rod adjusts for the distance in front of you. Attaching the pole to the ring adjusts for the pipe outlet being off-center. Each ring assembly also includes a cable that connects both ends of the ring. This cable ends in a hook near the swivel point of the stainless rod. When the cable is pulled (by the polypropylene strap attached to the cable hook) the expansion ring collapses to a smaller diameter, allowing insertion into the pipe.

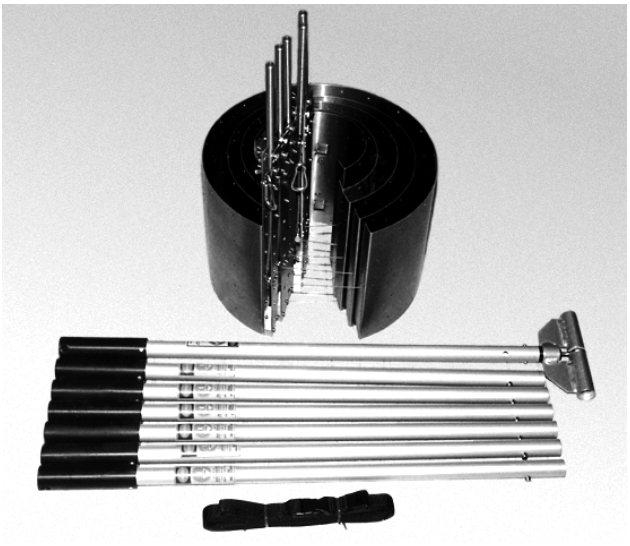


Figure 4-1 The Street Level Installation System Components

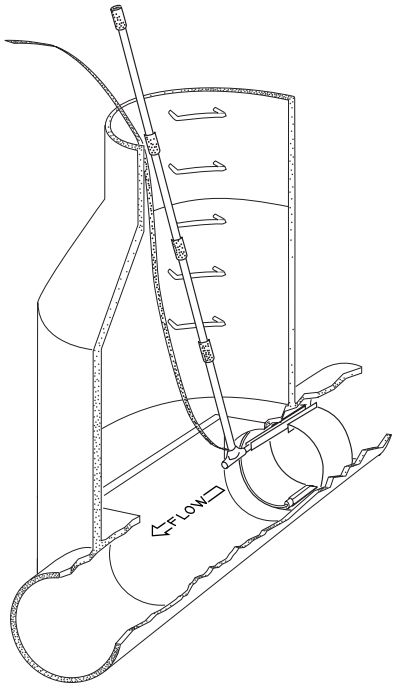


Figure 4-2 The Street Level Installation System in Use

4.2 Assembly

⚠ WARNING

Hazard of cuts and abrasions from ring hardware. Sharp edges on the rings are finished, but there is always the possibility of a mishap. If the ring has been in service and is contaminated by sewage, the risk of infection from the cuts increases. To minimize the hazards:

- **Wear leather gloves for protection.**
- **Clean the inserts between installations.**

⚠ WARNING

Observe all necessary safety precautions for non-entry work around a manhole, such as erecting traffic barriers, checking for hazardous gases, etc.

1. Mount a carrier (or A-V Sensor) directly to the standard expansion ring. Fit the slots onto the mounting tabs of the ring, making sure the tabs are fully engaged. The Low Profile A-V Sensor will mount directly to the low profile expansion ring with two countersunk 4-40 screws.
2. Route the sensor cable (or bubble line) along the back edge of the expansion ring. Secure the cable in position by placing plastic ties through the holes and then locking them around the cable. To prevent debris from catching on the cable, attach the cable so that it offers as little resistance to the flow as possible. Avoid loops or slack sections in the cable. Attach it neatly and closely to the spring ring. Note that you can route the cable either to the left or right on the ring.
3. Connect the nonadjustable end of the strap to the hook on the cable at the ring.
4. Set the ring on the ground so the stainless steel rod and cable are at top center.
5. Slide the insertion tool over the rod. Hold the insertion tool so it is standing upright.
6. Turn the handle clockwise to tighten the insertion tool on the rod. This alignment between the insertion tool and the ring is only suitable if the pipe invert is centered in the manhole or nearly so. If the pipe invert is off-center from the entrance to the manhole, you may have to tighten the handle of the insertion tool at some angle other than vertical so you can lower the ring to the invert.

⚠ WARNING

Do not use this tool in the vicinity of high-voltage power lines. You could be killed if the pole comes in contact with an overhead wire. This hazard is especially great when the weather is wet or the relative humidity is high.
Add enough extensions to the insertion tool to let you hold onto the handle from a full-standing position *beside* the manhole. Too short a pole will force you to lean or crouch over the manhole. Either position is unstable, and you could slip and fall into the manhole, sustaining severe, possibly fatal injuries.

7. Extend the length of the insertion tool by snapping on the extension poles necessary to make the tool long enough to reach the bottom of the manhole from a standing position.
8. Release the camlock on the strap and lengthen the strap to equal the length of the pole. Then close the camlock.

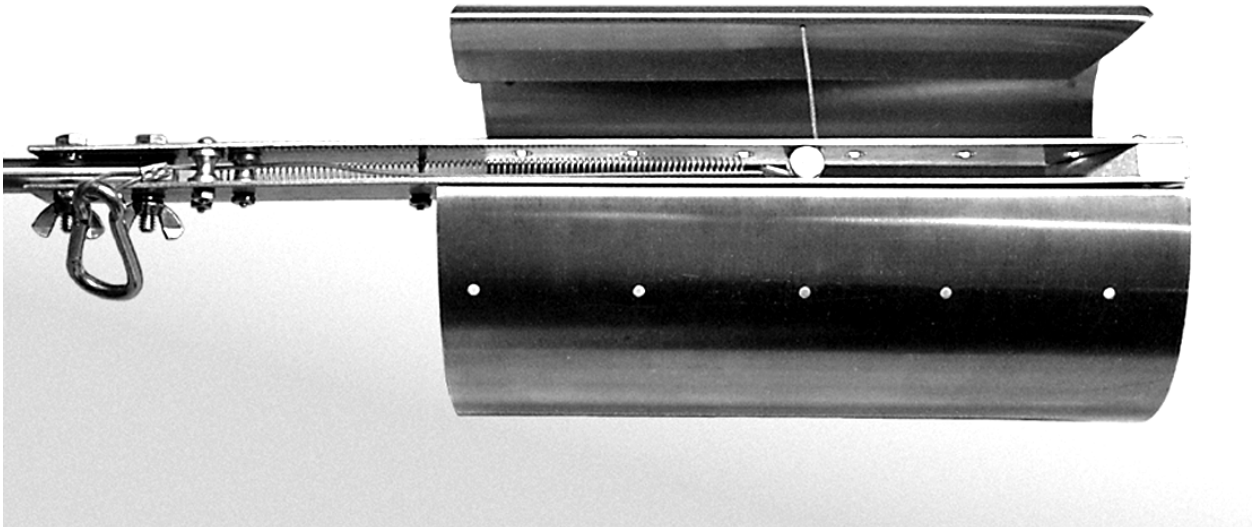


Figure 4-3 Close-up view: Standard 6" Ring, showing the cable and linkage

4.3 Installation

⚠ WARNING

Be particularly careful installing rings in the 12 and 15-inch pipes when the level is above one- half, or flow is moving at a high velocity. The force of the stream striking the ring could jerk the pole from your hands, causing you to lose balance and fall into the hole. Make sure you hold the strap in your hand below your thumb. Be prepared to let the strap slide off your hand if the force of the stream against the ring is too great. Do not slide the strap any higher than your thumb; do not wrap it around your hand. Do not secure it to your body in any way that prevents you from letting go quickly. If there is an accident, you could be caught in the strap.

1. Prevent the entire sensor cable or bubble line from falling into the hole, yet ensure that a sufficient length will freely move into the hole as the system is inserted.

⚠ WARNING

Do not create obstructions or tripping hazards. Keep the instrument and cable out of the immediate work area.

2. Hold the free end of the strap in one hand and lower the pole and ring assembly into the manhole. See Figure 4-4.
3. Set the ring down at the bottom beside the upstream pipe invert.
4. Put your hand inside the loop of the polypropylene strap. **Do not slide the strap beyond your thumb nor wrap it around your hand or arm.** Pull up on the strap to tighten the ring to its smallest diameter.
5. With the strap still across your hand, grasp the pole with both hands while still pulling up on the strap. This lets you keep both hands on the pole and minimizes the effort necessary to keep the ring collapsed during the installation process.
6. Lift the ring from beside the invert and carefully guide it into the upstream pipe. See Figure 4-6. **Be prepared for the force of the water against the ring and pole, especially with larger pipes, higher flows, or faster velocities. If necessary, let go of the pole and strap.** Slide the ring into the invert with the stainless steel rod positioned at the top center of the pipe. Insert the ring fully into the invert so that only the rod is visible.
7. Release the pull on the strap. (Do not drop the strap into the manhole.) This will let the ring expand to the wall of the pipe.

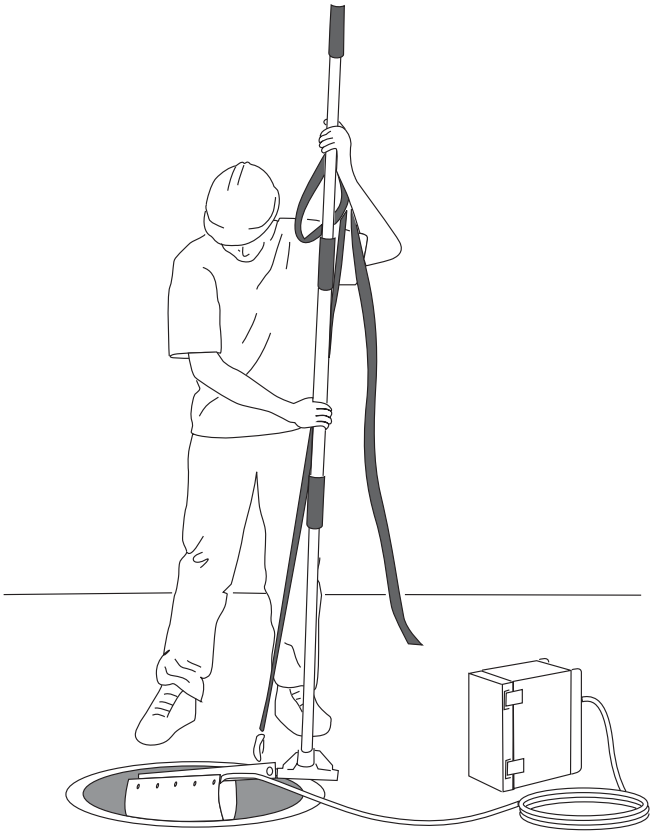


Figure 4-4 Correct Position for Installation

Note the correct position of the installer in the figure above. He is standing up straight beside the manhole opening. Because he is standing off to one side of the manhole, he is in little danger of falling in if he should slip.

Figure 4-5 Incorrect Position for Installation

In Figure 4-5, the installer is holding onto the pole too far down. This forces him to lean over the manhole, putting him in a dangerous position if he should slip. Also note the poor placement of the flow logger and cable. He could easily fall inside the manhole.

8. Turn the insertion tool counterclockwise to free it from the stainless steel rod.
9. Slide the insertion tool off the stainless steel rod and lift it out of the manhole, being careful to avoid any overhead wires. If there are any overhead wires, lift the pole and remove each section, one at a time, as they come into your grasp.
10. Secure the strap by hooking it to a rung inside the manhole. The strap has a buckle in the loop beyond the camlock that you can release and reconnect to secure the loop to the rung. You may want to secure the strap to the rung before removing the insertion tool. This frees both hands for removing the tool. See Figure 4-7.
11. Secure the sensor cable or bubble line so that it will not hang in the stream.

4.3.1 Sensor Calibration

You can add additional steps to the installation procedure if you do not wish to measure the depth of the flow stream from outside the manhole.

Instead of setting the ring momentarily beside the invert when you begin the installation (step 2), set the ring down into the flow stream to allow the sensor (submerged probe or area-velocity sensors only) to reach the same temperature as the water in the flow stream. This will take from ten to thirty minutes.

Then lift the ring out of the flow stream and set it beside the invert. Zero the level on the flow meter or flow logger.

Then install the ring as described previously. Note that this method of level measurement is not as accurate as measuring the level after installation. Three factors contribute to the reduced accuracy:

- First, the installation of the expansion ring and sensor will affect the depth of the stream, particularly at lower levels.
- Second, depth measuring transducers are located *near*, but not *at* the bottom of the ring.
- Third, slope, roughness, and other pipe characteristics may have an effect on level.

4.3.2 Removal

There are two ways to remove the expansion ring. The preferred method is simply to pull on the strap, collapsing the ring. You can then pull the ring out of the invert by alternating pulling on the strap from side to side, “walking” the ring out of the invert. Once the ring is free of the invert, you can lift it out of the manhole with the strap.

The second method is to slide the insertion tool extended with pole sections over the stainless steel rod coming from the ring. Turn the pole clockwise until it tightens onto the stainless steel rod. Then untie the polypropylene strap and pull on it to collapse the ring. With the ring collapsed, use the pole to slide it out of the invert. This is essentially the same as the installation procedure in reverse.

Figure 4-6 Inserting the Ring in the Upstream Channel

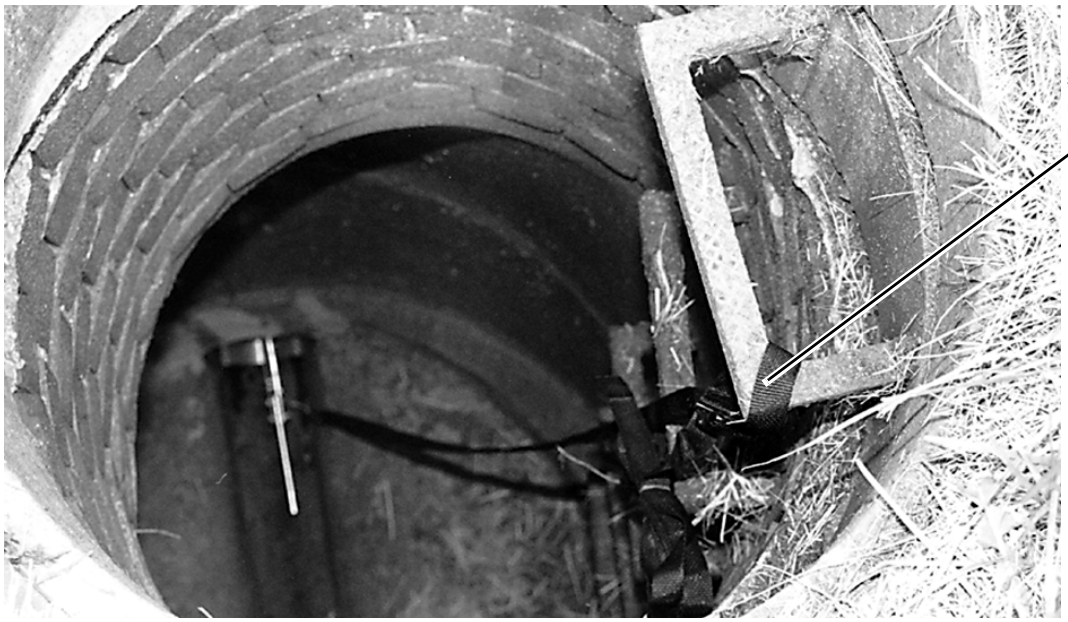


Figure 4-7 The Completed Installation

Teledyne Isco Mounting Rings

Section 5 Miscellaneous Hardware

5.1 Sensor Mounting Plate

Teledyne Isco recommends using the Sensor Mounting Plate to install sensors in rectangular, trapezoidal, and earthen channels. The stainless steel plate has tabs to mount up to three sensors. However, if you are measuring level, velocity, or flow rate, use only one set. Adjacent sensors could disturb the flow and cause inaccurate readings.

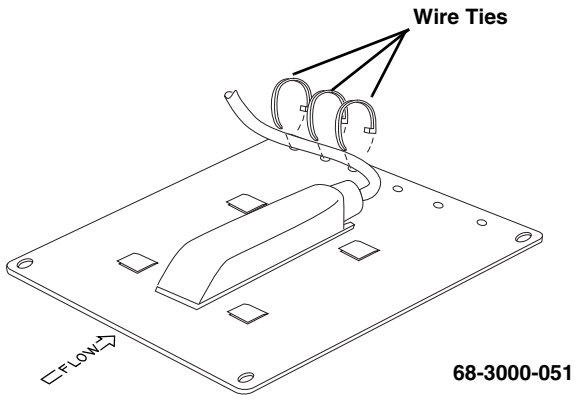


Figure 5-1 Assembling the Sensor Mounting Plate

Attach the carrier, Standard A-V sensor, or Low Profile A-V sensor with carrier to the plate by sliding it onto a set of tabs. **Make sure both tabs properly and completely engage the slots of the carrier**. Complete the assembly by attaching the cable (or bubble line) with wire ties to the holes along the back edge of the plate.

Secure the mounting plate 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 simply driving in stakes. After installing the plate, route the cable so that it offers as little resistance to the flow as possible. Avoid loops or slack sections in the cable.

5.2 Probe Extension

If the depth of flow, or the confined quarters of a small pipe or invert prevents you from locating the probe above the outfall, use the Probe Extension. The 4-foot (1.2-meter) extension attaches to Teledyne Isco's standard spring rings, standard scissors rings, or the mounting plate and positions the probe approximately 42 inches (107 centimeters) upstream from leading edge. You can insert the extension up into the pipe by installing the ring at a more accessible location.

All of the carriers, the Standard A-V Sensor with its integral mounting plate, and the Low Profile A-V Sensor mounted on a carrier will attach to the extension. However, Teledyne Isco recommends that you only attach the parameter probes (pH, D.O., or temperature). If you attach a level or velocity sensor, channel irregularities and silting may affect your readings. Consult the factory before installing a submerged probe, bubble line, or area velocity sensor.

Refer to Figure 5-2 to assemble the extension.

1. Attach the probe extension to the ring or mounting plate with the hardware supplied.
2. Attach the sensor carrier onto the probe extension's mounting tabs.
3. Secure the cable to the extension with self-locking plastic ties.

Once installed in the pipe, be sure the extension is on the bottom of the channel. You can force the extension against the bottom by pulling the bottom of the ring slightly away from the pipe.

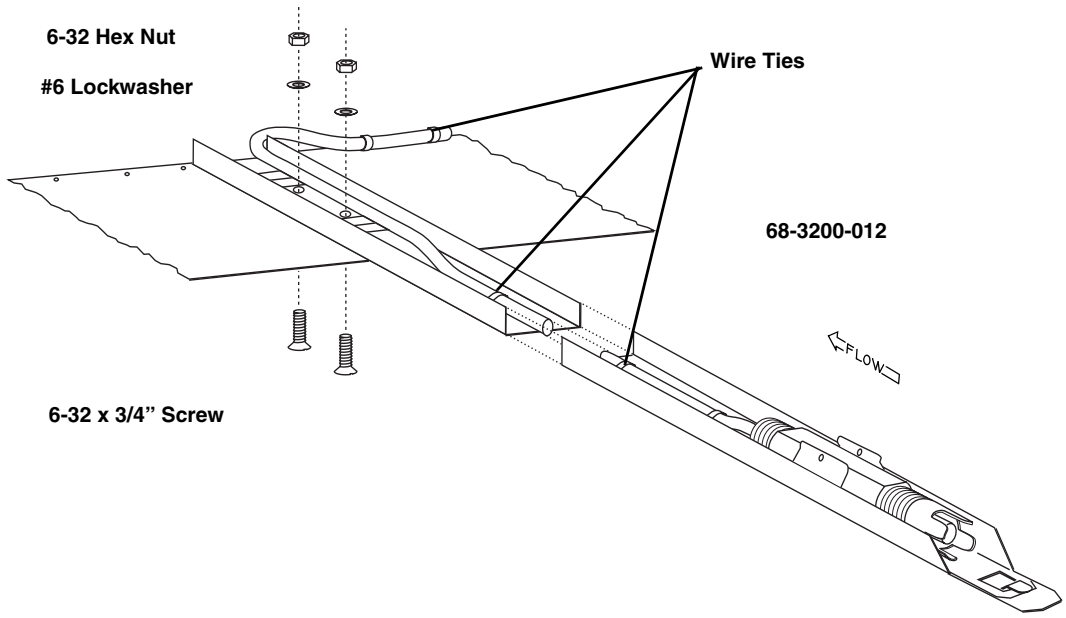


Figure 5-2 Attaching a Probe to the Probe Extension

Teledyne Isco Mounting Rings

Appendix A Replacement Parts List

A.1 Replacement Parts List

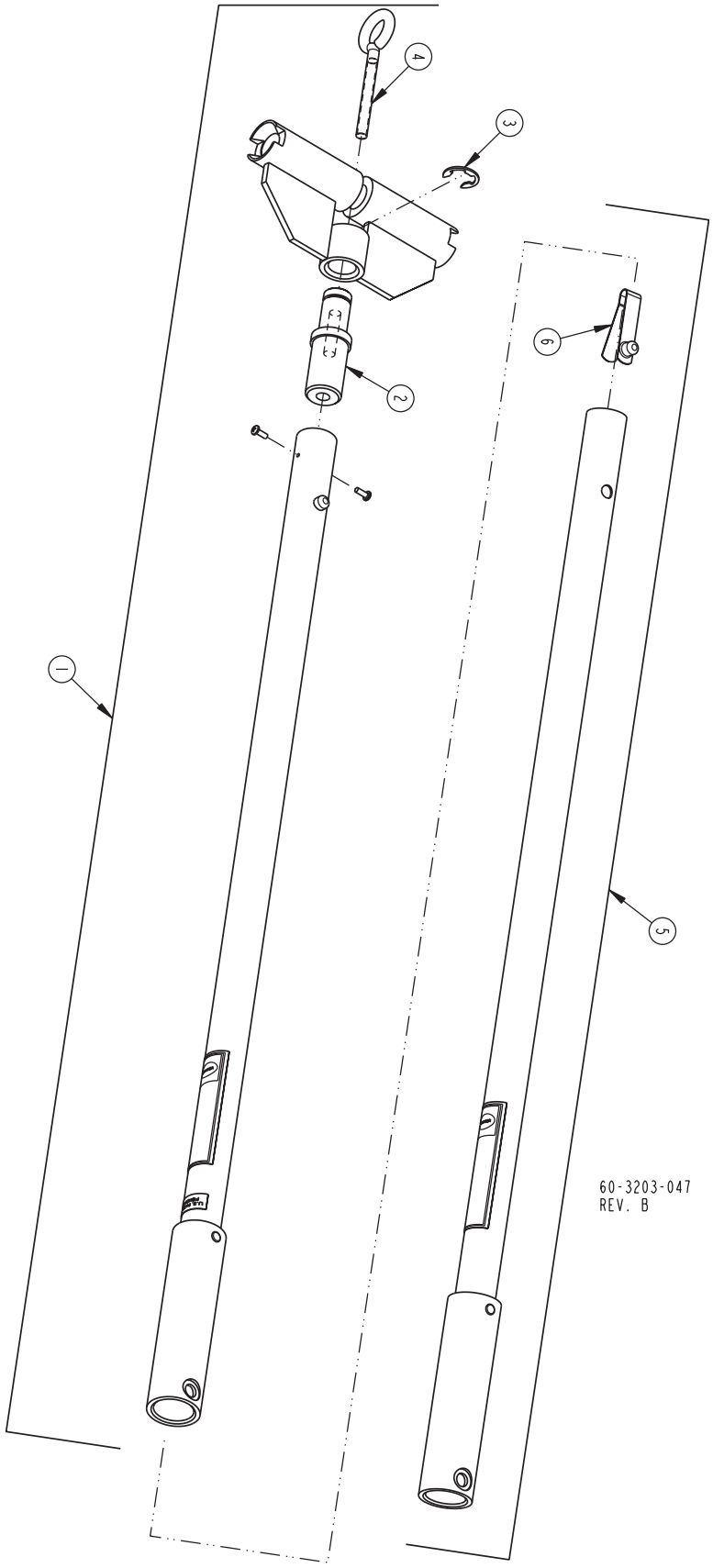
The following pages contain a list of replacement parts for the Teledyne Isco Street Level Installation System. The illustrations show the location of the numbered parts, which are described in the accompanying table.

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

Teledyne 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@teledyne isco.com


1
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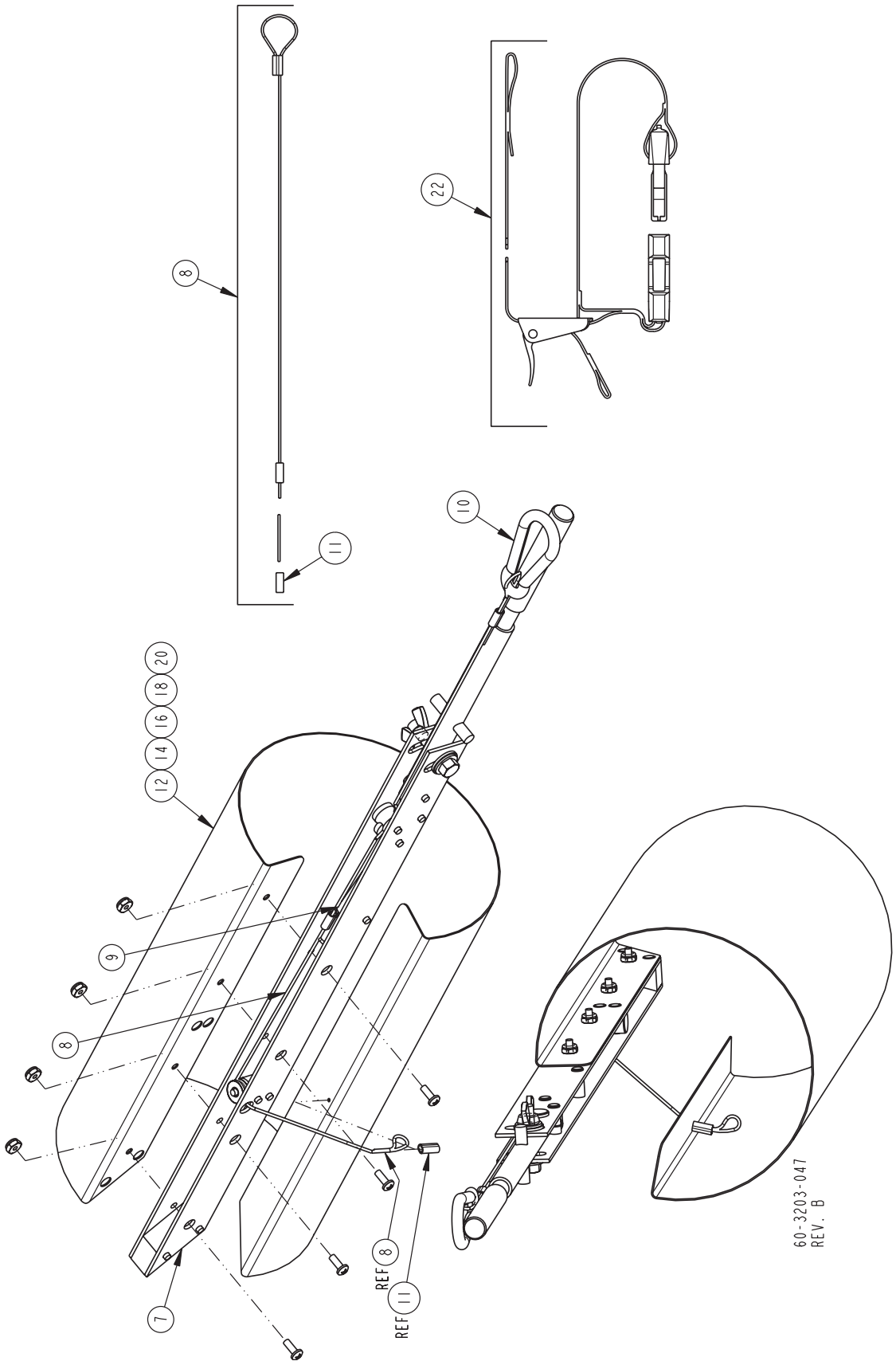
REV. B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REF 11
60-3203-047
REV. B

603203047

REPLACEMENT PARTS LIST

SHEET: 3 OF 3

Isco, Inc.

REV: B | DATE: 03346

ITEM NO.	PART NUMBER	DESCRIPTION
1	603204020	MOUNTING RING INSERTION TOOL ASSEMBLY INCLUDES ITEMS 2, 3, 4
2	603203038	CLAMP BODY NUT
3	209001075	RETAINING RING, EXTERNAL, .75 SHAFT
4	603203040	EYE BOLT MODIFICATION
5	602814046	POLE SECTION ASSEMBLY INCLUDES ITEM 6
6	603004114	SNAP BUTTON ASSEMBLY
7	603204013	STREET LEVEL SIDE PLATE ASSEMBLY INCLUDES ITEM 11, CABLE, AND INSTRUCTIONS
8	603204022	CABLE KIT INCLUDES ITEM 11, CABLE, AND INSTRUCTIONS
9	203210068	EXTENSION SPRING, .020 DIAMETER WIRE, .312 OD X 2.125 LONG
10	209900300	SPRING HOOK, 1/4", STAINLESS STEEL
11	209900502	SLEEVE, STAINLESS STEEL, OVAL, 1/16"
12	603203031	STREET LEVEL MOUNTING RING, 6"
14	603203032	STREET LEVEL MOUNTING RING, 8"
16	603203033	STREET LEVEL MOUNTING RING, 10"
18	603203034	STREET LEVEL MOUNTING RING, 12"
20	603203035	STREET LEVEL MOUNTING RING, 15"
22	603204011	MOUNTING RING INSERTION STRAP ASSEMBLY

NOTE: 1. For current prices and quotations on parts, contact Isco Service Department.
2. This list is subject to change without notice.

*Teledyne Isco One Year Limited Factory Service Warranty **

Teledyne Isco warrants covered products against failure due to faulty parts or workmanship for a period of one year (365 days) from their shipping date, or from the date of installation by an authorized Teledyne Isco Service Engineer, as may be appropriate.

During the warranty period, repairs, replacements, and labor shall be provided at no charge. Teledyne Isco's liability is strictly limited to repair and/or replacement, at Teledyne Isco's sole discretion.

Failure of expendable items (e.g., charts, ribbon, tubing, glassware, seals and filters), or from normal wear, accident, misuse, corrosion, or lack of proper maintenance, is not covered. Teledyne Isco assumes no liability for any consequential damages.

Teledyne Isco specifically disclaims any warranty of merchantability or fitness for a particular purpose.

This warranty applies only to products sold under the Teledyne Isco trademark and is made in lieu of any other warranty, written or expressed.

No items may be returned for warranty service without a return authorization number issued from Teledyne Isco.

This warranty does not apply to the following products: Process Analyzers, SFX 3560 SFE Extractor, 6100 VOC Sampler.

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

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

In the event of instrument problems, always contact the Teledyne Isco Service Department, as problems can often be diagnosed and corrected without requiring an on-site visit. In the U.S.A., contact Teledyne Isco Service at the numbers listed below. International customers should contact their local Teledyne Isco agent or Teledyne Isco International Customer Service.

Return Authorization

A return authorization number must be issued prior to shipping. Following authorization, Teledyne Isco will pay for surface transportation (excluding packing/crating) both ways for 30 days from the beginning of the warranty period. After 30 days, expense for warranty shipments will be the responsibility of the customer.

Shipping Address: Teledyne Isco, Inc. - Attention Repair Service
4700 Superior Street
Lincoln NE 68504 USA

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

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

Fax: (402) 465-3001

Email: service@isco.com

June 2004 P/N 60-1002-040 Rev A

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A Teledyne Technologies Company