

674 Rain Gauge

Installation and Operation Guide



Part #60-3283-011
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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 Technical Service Department for assistance. 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

Customer Service

Phone: (800) 228-4373 (USA, Canada, Mexico)
(402) 464-0231 (Outside North America)
Fax: (402) 465-3022
Email: IscoCSR@teledyne.com

Technical Support

Phone: (800) 775-2965 (Analytical)
(866) 298-6174 (Samplers and Flow Meters)
Email: IscoService@teledyne.com

Return equipment to: 4700 Superior Street, Lincoln, NE 68504-1398

Other Correspondence

Mail to: P.O. Box 82531, Lincoln, NE 68501-2531
Email: IscoInfo@teledyne.com
Web site: www.isco.com

674 Rain Gauge

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674 Rain Gauge

Operation Instructions

1.1 Description and Operation

The Isco 674 Rain Gauge is a precision instrument for accurately measuring rainfall. The rain gauge is mounted inside a steel cylinder and has an eight-inch opening on top to collect rain. Rain falls through a screen into a funnel. From the funnel, rain collects in one side of a two-chambered plastic bucket mounted on jewelled pivots. When rain fills the chamber, the bucket tips, draining the water and exposing the other chamber to fill. When that chamber fills, the bucket tips back and the process begins again.

Each time the bucket tips from one side to the other, a magnet passes over a reed switch, momentarily closing the normally open contacts. This contact closure provides a short-duration output pulse from the rain gauge for each 0.01 inch of rain.

1.2 Applications

When connected to a flow meter, the rain gauge enables the flow meter to print rainfall data on its chart or store rainfall data in memory. It also lets the flow meter actuate an associated Isco Automatic Wastewater Sampler.

Typical applications include monitoring of storm water runoff, inflow and infiltration studies (I&I), and combined sewer overflow monitoring. You can also use the rain gauge for any other general purpose rainfall measurement as long as the associated equipment is electrically compatible.

1.3 Materials and Construction

The rain gauge is constructed of steel, stainless steel, aluminum, and plastic. All metal parts are coated, plated, or painted to ensure a durable, ruggedly tough instrument capable of resisting deterioration from exposure to the elements. Screens cover all openings, preventing clogging by leaves, insects, or other debris. The powder-coated steel sleeve protects the internal parts. The jewelled-pivot mounting for the tipping bucket provides long life. A built-in bubble level makes leveling the rain gauge after installation easy. A 50-foot cable terminated in an M/S connector attaches the rain gauge to the flow meter or to other equipment.

CAUTION

The rain gauge is factory-calibrated and adjusted. Do **not** attempt to make any adjustments to the jewelled-pivot screws. You may damage the jewel bearings.

1.4 Location of the Rain Gauge

Location affects the accuracy of the rainfall catch because the prevailing winds may tend to carry the rain away from the gauge. There are advantages and disadvantages to most sites. Sites may be either open or protected. Totally open sites affect the accuracy of the catch if the rain is carried on strong winds, but are satisfactory if rainstorms are generally calm. With no nearby vegetation the characteristics of the site will not tend to change over time, which is an advantage. Where strong winds are characteristic of storms, protected sites are generally preferable. This is because the effect of the wind on the rainfall catch is reduced. The presence of small groups of objects or objects of varying heights around the gauge can also affect accuracy by producing eddy currents in the wind which will interfere with the catch.

1.4.1 Suggested Siting

Groups of objects of uniform height (such as trees) in the vicinity of the gauge are beneficial for an accurate catch by acting as a windbreak while not interfering with the catch. Mounting the rain gauge in the clearing of an orchard or a grove of trees would be a recommendation for a good site.

The **height** of the surrounding objects should not exceed **twice their distance** from the rain gauge. If vegetation serves as a windbreak, understand that growth will greatly change the conditions of the site with the passage of time. What may originally have been a good site may not always remain one.

Vegetation grows dramatically over time. Any construction nearby that takes place after the installation may also make a site undesirable by altering the wind currents and rainfall patterns around the gauge. Under no circumstances should any nearby object be allowed to grow above or hang directly over the gauge.

The rain gauge is solidly built to withstand years of outside use; however, vandals could ruin it. Always try to install the rain gauge where it will be protected from vandalism.

Avoid installation in low places where runoff from heavy storms could flood the gauge or wash it away. The rain gauge would not be hurt by submersion, but it would be unable to measure.

Do not drop the rain gauge or expose it to shock; that could damage the jeweled bearings.

1.5 Installation

To install the rain gauge, follow the procedure below. Step 7 is optional, depending on the requirements of your particular installation.

1. Unpack the rain gauge from the shipping box. Save the box and packing to return the rain gauge to Isco if that becomes necessary. Remove the outer tube (white cover with funnel) from the rain gauge by loosening the two thumb screws on either side.
2. Locate the bottom (mounting) plate of the rain gauge. This is circular and made of black metal. Mount this plate securely to a stable horizontal surface that is relatively

level. Isco suggests using corrosion-resistant hardware for mounting. The mounting holes will accommodate hardware as large as ¼ inch in diameter.

3. This is **very important**: Level the rain gauge by adjusting the three thumb screws on the base until the bubble in the bubble level is exactly centered.
4. Carefully remove the rubber band used to secure the tipping bucket assembly. Do not apply pressure to the bucket or the pivot arm. Do not attempt any adjustments.
5. Reinstall the protective outer tube on the rain gauge.
6. Route the cable from the rain gauge to the flow meter. Coil any extra wire by the flow meter.
7. If necessary, you can increase the distance between the flow meter and the rain gauge to **1,000 feet** (maximum) by splicing a **two-wire #18 AWG** cable (user-supplied) between the Isco-provided cable and the rain gauge, as described below.

Disconnect the Isco cable from the terminal block inside the rain gauge and splice the user-supplied cable to that end of the Isco cable. If the wiring and the splice will be exposed to the weather, use wire appropriate for outdoor use and insulate the splice properly. A weatherproof box may be necessary. Do **not** cut the M/S connector from the Isco cable unless you are connecting the rain gauge to equipment that does not have a compatible connector. You will not be able to reconnect it easily.

1.6 Maintenance

The Isco Rain Gauge is built of quality materials to withstand years of exposure to the elements. Normally, no maintenance is required.

Once a year (or more often if conditions warrant) you may want to remove the cover and check the gauge to see that it has not been affected by the buildup of dust, debris, or insect infestation.

The rain gauge is factory-calibrated and needs no further adjustment. If your installation is temporary and you intend to move the rain gauge from site to site, use care in transporting the unit. Again, you could damage the jewelled pivots for the tipping bucket if you expose the rain gauge to a severe shock - for example, by dropping it. If you move the rain gauge frequently, always secure the tipping bucket with a rubber band and use the original packing box to protect the unit during transport.

Repack the rain gauge as it was originally shipped to you if you need to return it to Isco.

1.7 Electrical Considerations

The electrical output from the Isco Rain Gauge is the rapid contact closure of a normally open reed switch. The rain gauge is **not** itself a powered device. It contains neither batteries nor transformer and does not connect to the AC line. Electrically, it is a “dry contact” switch, with power supplied from whatever device it controls.

When you connect the rain gauge to an Isco Flow Meter, the current through the switch contacts is very low and there is no problem with line losses or damage to the switch contacts. However, if you plan to use the rain gauge for general-purpose rain measurement with other types of equipment not specified by Isco, please note the following:

 CAUTION
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The reed switch is rated for pilot duty only! The sealed contacts are limited to 10 watts (or 10 VA), 200 VDC maximum. Exceeding these limits may cause welding or rupturing of the reed switch, ruining it. For safety considerations, Isco recommends connection only to equipment supplying 30 volts or less, AC or DC.

Be particularly careful using the rain gauge with equipment supplying DC voltages at higher current loads or equipment presenting an inductive load to the reed switch. **Never** connect the rain gauge directly to any equipment where enough current passes to strike an arc when the contacts switch. You should always buffer such equipment with a solid-state switch (transistor, IC, SCR, etc.) or a sensitive relay.

1.8 Technical Specifications

The technical specifications for the 674 rain gauge are presented in Table 1-1.

Table 1-1 Technical Specifications for the 674 Rain Gauge	
Type:	Tipping bucket
Orifice:	8 inches (20 cm) diameter
Sensitivity:	<i>English:</i> 0.01 inches <i>Metric:</i> 0.1 mm
Accuracy:	<i>English:</i> ± 1% at 2 inches/hr; +3, -4% up to 5 inches/hr <i>Metric:</i> ± 1½% at 5 cm/hr; +3.5, -9% up to 13 cm/hr
Maximum Capacity:	<i>English:</i> 22 inches/hr <i>Metric:</i> 38 cm/hr
Connector Pinout:	Pin A - Red, +12V DC from Flow Meter; Pin D - Black, Output from Rain Gauge
Output Signal:	Contact closure, 50 milliseconds minimum duration
Switch Type:	Hermetically sealed magnetic reed switch. Normally open. 200V DC, 0.5 A maximum
Height and Diameter:	13 inches (33 cm); 9½ inches (24 cm) at base
Weight:	10 pounds (4.5 kg)
Operating Temperature:	32° to 140° F (0° to 60° C)
Storage Temperature:	-40° to 140° F (-40° to 60° C)

1.9 Replacement Parts List

The following pages contain a list of replacement parts for the Isco 674 rain gauge. The illustration shows the location of the numbered parts, which are described in the accompanying table.

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

Isco, Inc.
Customer Service Department
P.O. Box 82531
Lincoln, NE 68501 USA

Phone: (800) 228-4373
(402) 464-0231
FAX: (402) 465-3022

E-mail: info@isco.com

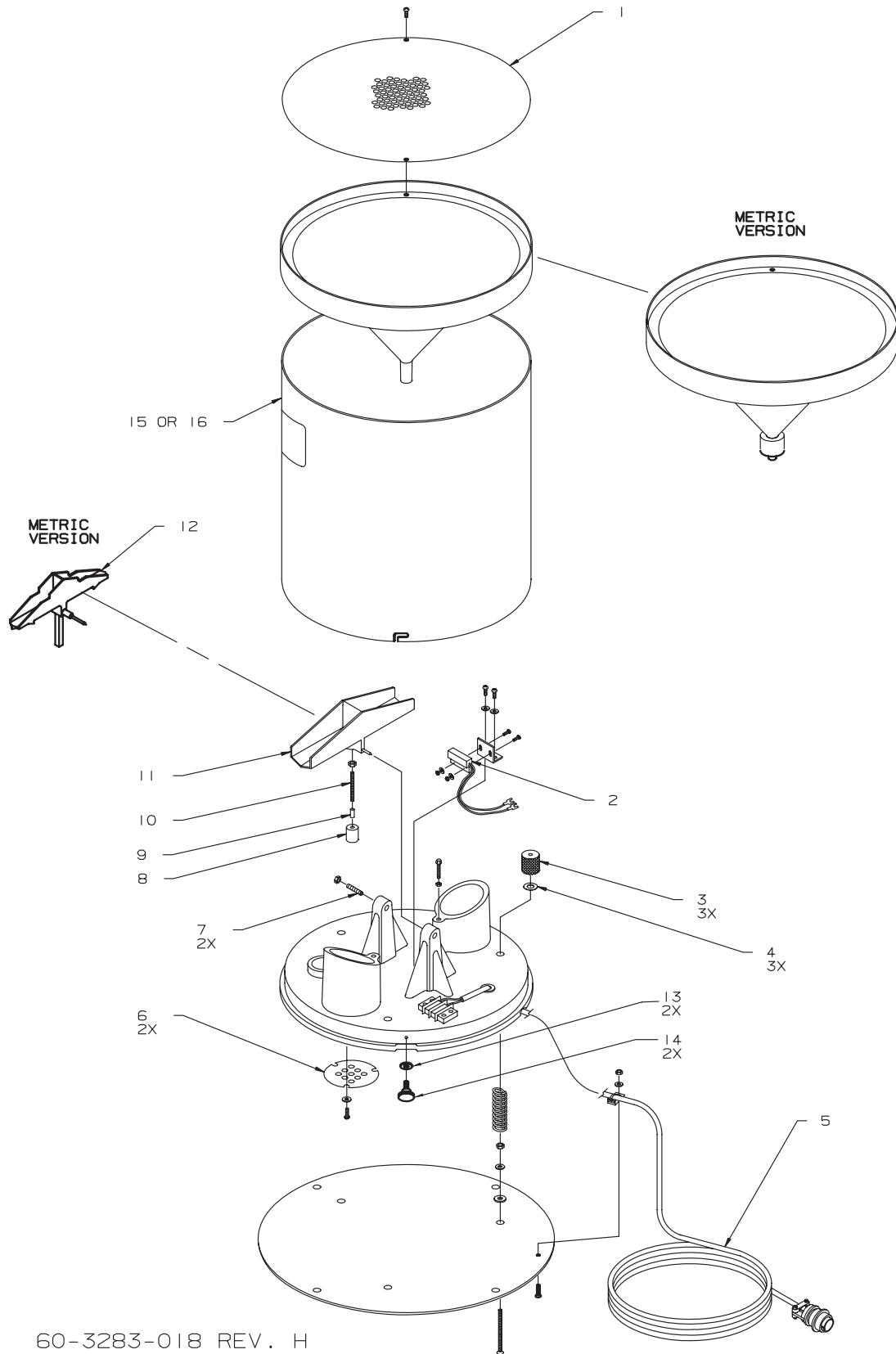


Figure 1-1 Replacement Parts List Illustration

ITEM	INVENTORY NO.	DESCRIPTION
1	603283023	INLET SCREEN MESH
2	410991001	SENSOR MAG PRXTY .175/.800 SPST
3	603283004	LEVEL ADJUSTING KNOB
4	233042800	NYLON WASHER .253 X .506 X .01
5	603004149	CBL ASSY RAIN GAUGE 50'
6	603283006	DRAIN SCREEN
7	201900000	SPRING LOADED VEE JEWEL BEARING
8	603283012	MAGNET MOUNT
9	209020400	MAGNET .12 DIA X 3/8 LONG
10	603283016	MOUNTING ROD
11	603284004	TIPPING BUCKET ASSY
12	603284010	TIPPING BUCKET ASSY METRIC
13	603283044	WSHR FL .172ID
14	603283045	SCR THM 8-32 SST
15	603284021	BODY TUBE REPL ASSY (INCLUDES FUNNEL, SCREEN)
16	603284022	BODY TUBE REPL ASSY METRIC (INCLUDES FUNNEL, SCREEN)

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Figure 1-2 Replacement Parts List

Teledyne Isco One Year Limited Warranty*

Factory Service for Teledyne Isco Flow Meters, Waste Water Samplers, and Syringe Pumps

This warranty exclusively covers Teledyne Isco instruments, providing a one-year limited warranty covering parts and labor.

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

Teledyne Isco will pay surface transportation charges both ways within the 48 contiguous United States if the instrument proves to be defective within 30 days of shipment. Throughout the remainder of the warranty period, the customer will pay to return the instrument to Teledyne Isco, and Teledyne Isco will pay surface transportation to return the repaired instrument to the customer. Teledyne Isco will not pay air freight or customer's packing and crating charges. This warranty does not cover loss, damage, or defects resulting from transportation between the customer's facility and the repair facility.

*** This warranty applies to the USA and countries where Teledyne Isco Inc. does not have an authorized dealer. Customers in countries outside the USA, where Teledyne Isco has an authorized dealer, should contact their Teledyne Isco dealer for warranty service.**

The warranty for any instrument is the one in effect on date of shipment. The warranty period begins on the shipping date, unless Teledyne Isco agrees in writing to a different date.

Excluded from this warranty are normal wear; expendable items such as charts, ribbon, lamps, tubing, and glassware; fittings and wetted parts of valves; and damage due to corrosion, misuse, accident, or lack of proper maintenance. This warranty does not cover products not sold under the Teledyne Isco trademark or for which any other warranty is specifically stated.

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

This warranty is expressly in lieu of all other warranties and obligations and Teledyne Isco specifically disclaims any warranty of merchantability or fitness for a particular purpose.

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

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

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

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)
(866) 298-6174 (samplers & flow meters)
Sales & General Information: (800) 228-4373 (USA & Canada)

Fax: (402) 465-3001

Email: IscoService@teledyne.com



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