

## **Attachment J-C22.2**

# **Sanitary Sewer Lift Station & IWS Basins Work Instructions**

<b><u>SOW Item No.</u></b>	<b><u>Title</u></b>	<b><u>Page</u></b>
C22-02	B20 ISCO Model 4230 Sanitary Flow Meter Calibration and Maintenance Quarterly PM	2

**SOW Item No. C22-02**  
**B20 ISCO Model 4230 Sanitary Flow Meter Calibration and**  
**Maintenance Quarterly PM**

- \_\_1. Inspect desiccant the two cartridges within unit. (See attached manual Section 5.2 and 5.2.1 for procedure)
- \_\_2. Inspect bubble line from the 4230 to make sure that it has not become kinked, frayed, cut, nicked or damaged. Inspect outlet of bubble line for signs of clogging. (See manual Section 5.3 and 5.3.1)
- \_\_3. Calibrate unit as per manual. Make sure level in weir corresponds to level set in 4230 unit. Inform EMCS operator that meter recalibration is complete. Verify operator receives information correctly.
- \_\_4. Check that the output corresponds to EMCS readings.
- \_\_5. Replace back-up battery (1) once per year if needed.

Contractor shall supply all materials necessary to complete PM and replace as necessary. Materials included: Desiccant Cartridge, Dri-Can Canister, Plotter Paper, Printer Ribbon, Spool End Cap, and Supply Spool.

# 4230 Flow Meter

---

## *Section 5 Maintenance and Service*

This section of the 4230 instruction manual provides routine maintenance and servicing instructions. Included are sections on cleaning the flow meter, reactivating the desiccators, maintaining the bubble line, servicing the internal printer, elementary troubleshooting, and servicing CMOS circuitry.

Teledyne Isco recommends that you become familiar with the maintenance procedures presented here. While the 4230 is ruggedly built to withstand severe field conditions, it will function best and remain most reliable if you follow these simple procedures.

### **5.1 Care of the Flow Meter Case**

If you close and latch the lid, and cap all the M/S connectors on the side of the case tightly, you can clean the case by spraying it with a hose or washing it with soapy water. Do not use a hose with a nozzle or a high pressure hose-and-wand such as used at car washes. Do not immerse the flow meter in a tank of water to wash it. The flow meter will withstand accidental submersion in water, if that should occur, but it is not intended for routine submersion.

#### **5.1.1 Care of the Case Seal**

From time to time you should inspect the case seal and clean it, if necessary. The ridge around the edge of the case and the groove on the cabinet door form a seal when the door is closed. Keep this seal free of dirt, sand, etc. If it is not, clean it carefully with a damp cloth. Also keep the rubber gasket in the lid clean. You can clean it with a small brush and a damp cloth. If you do any cleaning while the case is open, be careful not to let any dirt or debris fall inside the flow meter assembly. It is best to work on the flow meter with the case standing upright. If you do not maintain the seals properly, they may leak, causing damage and eventual failure of the components inside.

#### **5.1.2 Preventing Moisture Damage**

To prevent moisture damage to the internal components, keep the lid tightly latched at all times, except when it is necessary to change the program or change the chart. Do not operate the flow meter routinely with the case open. This will expose the internal components to dirt and moisture; it will also saturate the desiccant canister inside the case very quickly. Inspect this canister periodically and recharge it as necessary as described subsequently. It is also important to keep the external connectors clean by keeping the mating connectors or the protective caps tightly screwed down. Under severe operating conditions you can spray the threads of the connectors with a cleaner/lubricant, such as Jif (manufactured by GC Electronics), or WD-40 (manufactured by the WD-40 Company) to prevent corrosion. Be careful not to

spray any of the terminals (pins or jacks) inside the connectors; residue from the sprays could cause intermittent or failed connections.

## 5.2 Desiccators

The 4230 has a reusable desiccant canister held by a steel clamp on the inside of the case lid. There is also a tubular desiccant cartridge on the top of the case next to the connectors. The canister contains silica gel that adsorbs moisture trapped inside the flow meter's case when it is closed. This keeps the inside of the case completely dry during shipment, storage and use. If you leave the case open, the desiccant will quickly absorb moisture from the surrounding air and will soon be saturated. It will no longer be able to protect the flow meter. Both desiccators use a color indicator that changes from blue to pink or yellow when saturated. The external desiccant cartridge vents the reference port of the pressure transducer and the air intake port for the bubbler system air pump.

### 5.2.1 Regenerating the Internal Case Desiccant

Look at the desiccant canister each time you open the case. The canister has a window on its side that appears blue or yellow when the desiccant is dry. As the desiccant absorbs moisture, the window will turn pink or green. When the window is pink or green, you need to regenerate the desiccant, or replace it with the spare canister provided in the flow meter accessory package. Remove the canister from the flow meter by pulling outward on the spring clamp, releasing its hold on the canister.

Remove the canister and heat it in a **vented** oven in a well-ventilated room at 300°F (150°C) for about three hours, or until the blue or yellow color returns. **Do not use a microwave oven;** the metal case of the canister could cause arcing. After cooling, reinstall the canister in the flow meter. Make sure the window on the side of the canister remains visible.

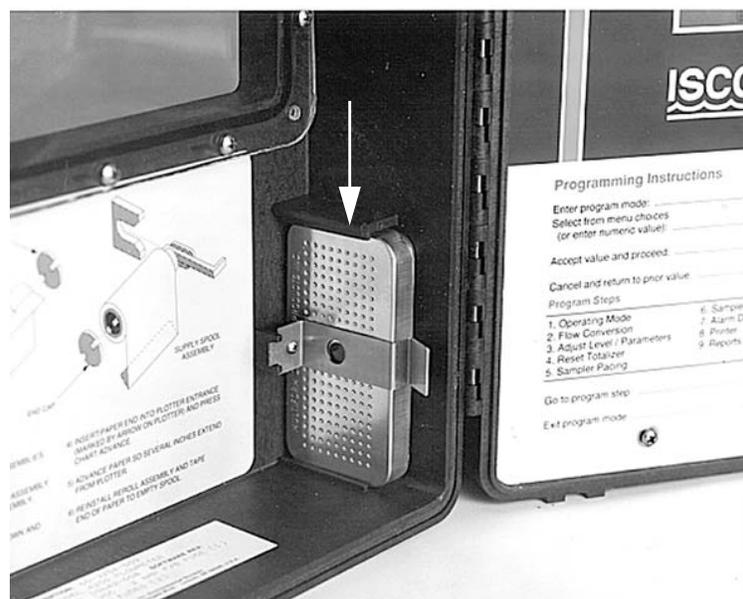


Figure 5-1 Location of the Case Desiccating Canister

### 5.2.2 Regenerating the External Desiccant Cartridge

Teledyne Isco uses two types of silica gel:

- One chemical looks like small beads or pellets that are blue-black when dry, pale pink to transparent when saturated.
- The other chemical looks like coarse sand, yellow when dry, dark green when saturated.

Regenerate desiccant by heating at 212° - 350° F (100° - 175°C).

MSDS (Material Safety Data Sheets) for silica gel chemicals are provided at the back of this manual.

#### To regenerate the desiccant cartridge:

1. Snap it out of its bracket.
2. Pull the silicone tubing from the end of the cartridge.
3. Remove one of the end caps from the cartridge by twisting and pour the saturated desiccant into a metal, ceramic, or other heat-resistant container.
4. Identify the desiccant and heat it at the proper temperature two to three hours, or until the blue or yellow color returns.
5. Do not try to regenerate the desiccant inside the cartridge; the cartridge is plastic and will melt.
6. Refill the cartridge with the regenerated desiccant (or with the extra desiccant provided in the accessory package).
7. Replace the end caps. If you have difficulty removing or replacing the end caps, you can coat the O-rings with a small amount of silicone oil. (Do not use any other type of oil; it may attack the plastic.)

Notice the filters in the end caps; they keep small pieces of the desiccant material from falling out of the cartridge. Clean these filters from time to time using ordinary dish soap and water, and allow to dry.

### CAUTION

There have been reports of irritating fumes coming from the desiccant during regeneration. While our attempts to duplicate the problem have been unsuccessful, we still urge you to use caution.

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

**Regeneration of the desiccators is extremely important.** While it is true that the equipment may run for some time with saturated desiccators, the operating environment of many installations places the units at risk. Please consider the following:

**Note**

Saturated desiccators let the flow meter draw moisture inside, exposing both mechanical and electronic components. The air in many installations contains fumes that will form acids in the presence of moisture. These acids may corrode electrical components, particularly connectors and circuit boards. Operation of the air pump in low temperature, high humidity environments causes ice to form inside the pump. The ice formed could jam the pump, ruining it. **Unseen damage caused by moisture will eventually ruin the flow meter.** For maximum equipment life and reliability, inspect the desiccators regularly and regenerate them when necessary.

**5.3 Bubble Line Maintenance**

Periodically inspect the bubble line from the 4230 to make sure that it has not become kinked, frayed, cut, nicked, or damaged in any other 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.) Look for a pump duty cycle value in the STATUS menu higher than 20%. 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 and diameter as the old.

**Note**

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. You should also recheck the bubble rate to make sure it has not changed.

**5.3.1 Inspection of the Bubble Line Outlet**

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 clogging proves to be a recurring problem, you may want to use a bubble line with a larger inside diameter. However, you will usually find it preferable to increase the frequency of **Purge** to increasing the size of the bubble line.

If you decide to change the bubble line size, consult the factory for specific recommendations regarding the size of the line, connectors required, etc.

If algae growth is a problem, consider using a copper bubble line extension. The copper salts formed on the line by the flow stream are algicidal. Again, recheck the bubble rate and re-enter the actual level measurement.

**5.3.2 Automatic Air Purge**

The 4230 has an automatic purge feature to clear deposits from the bubble line with a sharp burst of air from the pump. Purge is intended to help keep the outlet of the bubble line open. The program substep PURGE INTERVAL (in Setup) allows you to set the time between purge cycles, from five minutes to one hour.

The **Purge** key on the keypad lets you manually purge the bubble line anytime just by pressing the key. You don't have to wait until the next programmed purge cycle occurs to purge the line.

When you press **Purge**, the pump will start running inside the flow meter. The pump will continue to run as long as you press the button, and for a short while after you release it.

**5.4 Maintenance of the Printer**

The internal printer needs little maintenance beyond changing the chart roll and the ink ribbon.

Refer to the pictures provided for each section. Also refer to the label inside the cabinet.

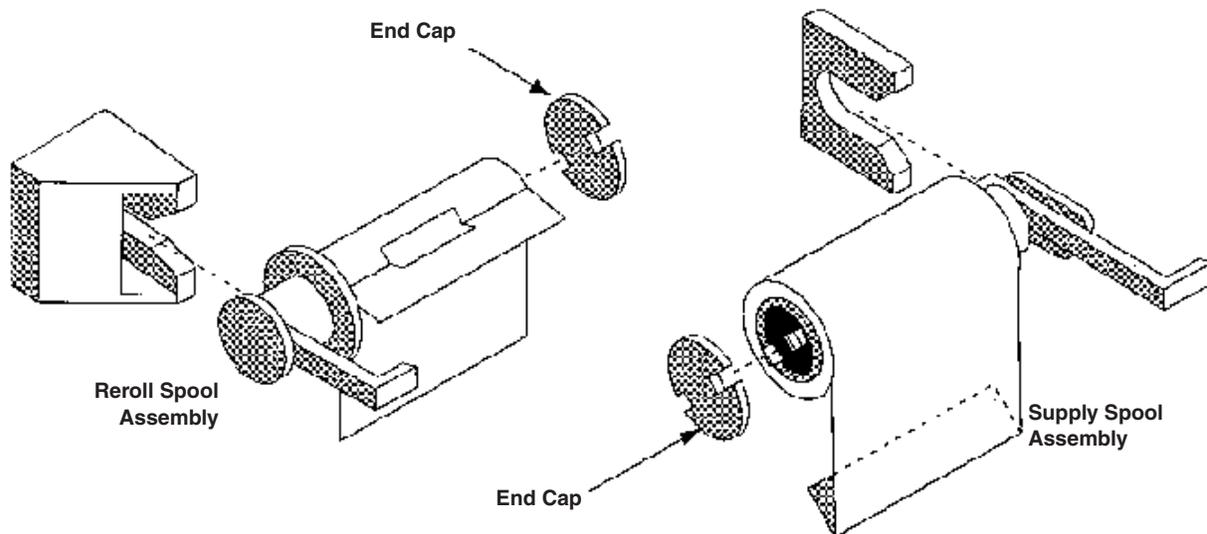


Figure 5-2 Changing the Chart Paper

**5.4.1 Changing the Paper Roll**

To change the chart paper you will need:

- new roll of paper
- a knife or a pair of scissors
- a small piece of tape

The printer will shut down when the paper runs out. The roll is nearly empty when a 1-inch wide pink band appears on the left side of the chart.

**To change the roll:**

1. Locate the handle on the left side of the take-up roll.
2. Pull straight out on this handle until the take-up roll slips off the printer.

*4230 Flow Meter*  
*Section 5 Maintenance and Service*

---

3. Remove the paper roll from the take-up spool by holding the handle in one hand with your thumb pressed against one of the slots in the white end cap.
4. Snap the white end cap free from the two black catches on the end of the spool.
5. Pull the paper roll off the spool with your other hand.
6. Remove the feed spool by pulling on the handle extending from the right side of the printer.
7. Snap off the other white end cap as described previously. Save the white end caps; you will reuse them.
8. Remove the empty roll from the spool by holding the handle in one hand and pulling the roll from the spool with the other.

### **Installing the New Roll of Paper**

After you remove the empty roll:

1. Slide the new roll onto the feed spool so it unrolls from the back side - facing away from you.
2. Line up the slots in the cardboard tube with the raised guides on the spool.
3. Reattach the white end cap by wedging the two catches on the end of the spool into the two slots on the white end cap.
4. Peel the paper back gently so it will unroll freely. Using the knife or scissors, cut off the end of the roll if it is torn.
5. Fold the paper over on itself so the end is straight and stiffer than a single layer of paper would be.
6. Unroll a few inches of the paper and set the roll on top of the cabinet.
7. Use your fingers to feed the paper down the back of the internal printer to where it touches the roller. Make sure the paper gets past the lever for the paper sensing switch.
8. Press the Chart Advance key and hold it until the paper comes through the printer mechanism.

### **Re threading the Paper**

1. When the paper comes through, reinstall the feed spool with the new roll on it by snapping it into the printer assembly.
2. Run a few inches through the printer, using the Chart Advance key; then unfold the end.
3. Put the cardboard tube from the empty roll on the take-up spindle and reattach the white end cap by wedging the catches on the end of the spool into the two slots on the white end cap.
4. Use the piece of tape to attach the end of the new paper to the cardboard tube from the old roll.
5. Roll some of the paper onto the spool so that it will wind clockwise, facing away from you. Then reinstall the take-up roll into the top of the printer.

6. Be careful to push it all the way back in, so that the take-up gear on the end of the spool assembly will reengage.
7. When the take-up spool is back in place, again push the Paper Reroll key; this will remove any slackness in the paper.

#### 5.4.2 Ink Ribbon Replacement

Ribbon life will vary greatly from one installation to another depending on how often the printer has to print. When the characters on the chart become difficult to read, you should replace the ribbon. If possible, try to replace the ribbon at the same time you change the paper roll, as it is easier to replace the ribbon when the roll of paper is out of the way.

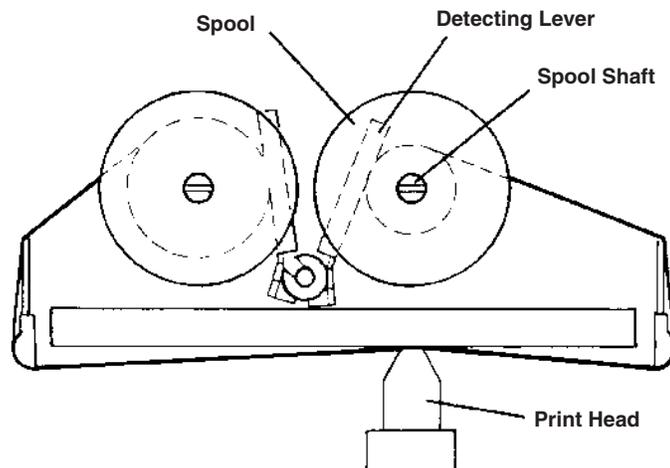


Figure 5-3 Ink Ribbon Replacement

#### To replace the ribbon:

1. Turn the unit off.  
If there is paper in the unit, remove the take-up spool and unroll enough paper to get it out of the way, so you can clearly see the two ribbon spools. Each spool has a ribbon-detecting lever pressing against the ribbon. Note the direction the ribbon leaves the left spool and how it winds onto the right spool.
2. Grasp one of the spools and rotate it slightly, loosening the ribbon.
3. Lift gently until the spool comes free from its shaft. Do the same with the other spool.
4. Lift the chart and take-up spool out of the way and remove the ink ribbon from the printer mechanism, noting how it threads through the unit.
5. Thread the new ink ribbon through the printer mechanism.

*4230 Flow Meter*  
*Section 5 Maintenance and Service*

---

6. Locate the three small pins on each spool of the ink ribbon and turn the spools so the pins face the gears on the two ribbon shafts.
7. Replace the two spools on their respective shafts, pushing the detector levers out of the way so the spools will easily re-engage their gears.
8. Gently rotate each spool to tighten the ink ribbon. Reinstall the paper take-up roll if necessary.

#### **5.4.3 Do Not Lubricate or Disassemble**

You do not need to oil the printer mechanism. As long as you keep the lid closed, keep the inside of the cabinet clean, and do not abuse the printer in any way, it should function normally. Teledyne Isco recommends you make no attempt to oil or disassemble the mechanism if it malfunctions.

Oil attracts dirt; some oils can become gummy over time and may cause parts to bind or stick. Do not attempt to disassemble the printer mechanism, as you may bend or distort the frame or component parts. This will certainly cause malfunction.

Do not force any part of the mechanism with tools or probes. If you disassemble the flow meter, do not lift the chassis from the case by holding on to any part of the printer. The internal printer contains no user-serviceable parts other than the paper and the ribbon. If the printer needs service, Teledyne Isco recommends you return the flow meter to the factory.

## **5.5 Servicing And Troubleshooting**

The remainder of this section provides servicing information and a general troubleshooting guide. This information will help you decide whether to attempt to repair the flow meter yourself or return it to the factory.

Included are sections on removing the flow meter chassis, fuse replacement, and an explanation of the components of the bubbler system. There are also general comments on servicing electronic equipment with special consideration of CMOS circuitry.

### **5.5.1 Disassembling the Flow Meter**

You can remove the flow meter chassis from the cabinet for inspection and servicing. Unscrew the four screws, two at the top, and two at the bottom, that hold the flow meter chassis in the cabinet. You can then lift the chassis out by inserting the thumb or index finger from each hand into the upper right and lower left corners of the opening for the internal printer.

Do not try to lift the flow meter out of its case by holding on to any part of the printer mechanism. This could bend or distort part of the printer, possibly damaging it. Once the chassis has cleared the case, you can hold onto the edges with both hands and lift it free of the case.