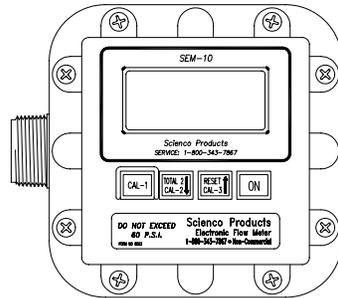


**SCIENCO® PRODUCTS**  
**A DIVISION OF FLOWSERVE PUMP CORP.**

**Model SEM-10 and SEM-10FT**  
**Electronic Flow Meter**  
**Operation Manual**



**Description**

Scienco Products Model SEM-10 and SEM-10FT flow meters are identical in operation and performance. The SEM-10 is intended for fixed mounting to a pump or other device that can provide support. The SEM-10FT is designed for mounting at hose end. The female threaded connection on the SEM-10 FT should be connected to the hose and a ball valve should be connected to the male threaded connection.

**Theory of operation**

The SEM-10/SEM-10FT flow meter is a positive displacement, nutating disk, fluid-metering unit. As fluid flows through the unit, it causes the nutating disk to also move which in turn causes the rotation of a hermetically sealed magnet disk. The meter electronic assembly counts the number of revolutions of the magnet and mathematically determines, based on the calibration number, the quantity of liquid that has passed through the meter. The self-contained electronic assembly features a large Liquid Crystal Display (LCD), and simple four-button operation.

**Features**

- Simple, one touch operation
- Large, 0.7-inch LCD Display Characters
- Choice of three calibration modes
- Large positive touch buttons

## **Technical Specifications**

Inlet Port, SEM-10 -----	1-inch Male NPT
Outlet Port, SEM-10 -----	1-inch Male NPT
Inlet Port, SEM-10FT -----	1-inch Female NPT
Outlet Port, SEM-10FT -----	1-inch Male NPT
Flow Range -----	2 to 30 GPM
Maximum Pressure -----	60 PSI (410 kPa)
Maximum Temperature -----	150° F (65° C)
Accuracy -----	+ - 0.5%
Maximum Total -----	999,999.9
Batteries -----	Three alkaline AA
Auto Shut off -----	40 Seconds
Auto Wake up -----	With flow

## **Material of Construction**

Fluid housing/form cover -----	Nylon
Meter Chamber -----	Polyphenylene Sulfide (PPS), Stainless Steel
O-rings -----	Fluorocarbon
Electronic housing -----	Nylon
Screws -----	Stainless Steel

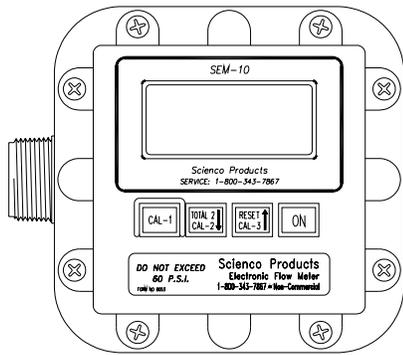
**Note:** Ensure chemical compatibility between liquid metered and the meter's wetted parts before using.

**Note:** Meter should NOT be used to meter flammable petroleum products. Do NOT use with fluids that have a flashpoint lower than 100°F.

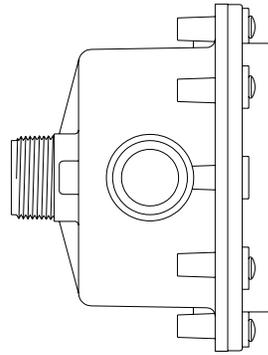
### **! WARNING**

1. MISUSE AND ABUSE OF THIS METER CAN CAUSE SERIOUS INJURIES.
2. READ ALL CAUTIONS AND INSTRUCTIONS BEFORE USING METER.
3. INSPECT BEFORE EACH USE AND REPLACE ANY DEFECTIVE COMPONENTS.
4. EXPOSURE TO CHEMICALS CAN CAUSE SERIOUS INJURY. ALWAYS WEAR PROPER PROTECTIVE CLOTHING AND DEVICES WHEN METERING CHEMICALS.
5. REFER TO CHEMICAL MANUFACTURERS HANDLING INSTRUCTION.

**Figure 1: SEM-10**

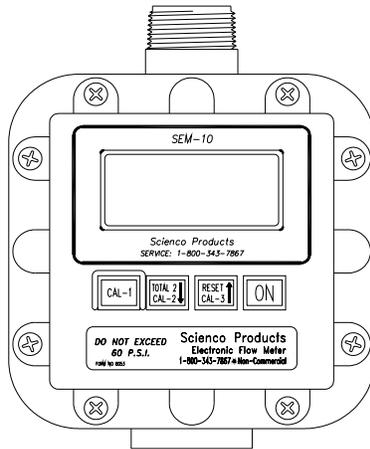


SEM-10 (FRONT VIEW)

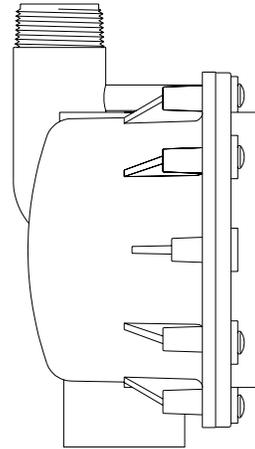


SEM-10 (SIDE VIEW)

**Figure 2: SEM-10FT**

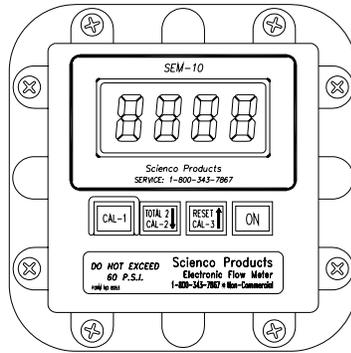


SEM-10FT (FRONT VIEW)



SEM-10FT (SIDE VIEW)

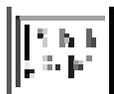
## Meter Operation



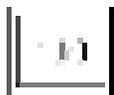
Wakes up display in Current Total mode. Unit will automatically shut off after 40 seconds with no input.



Resets Current Total to zero. Also used to enter CAL-3 mode, and to increase the CAL-3 number during the calibration sequence.



When depressed and held with Current Total displayed it shows Total 2. Also used to enter the CAL-2 mode, and to decrease the CAL-3 number.



Push to enter into the three calibration modes, starting with CAL-1.

## OPERATING PROCEDURES

**TO METER FLUID:** With pump properly installed onto a pumping system meter will wake-up automatically and begin to display Current Total as fluid is pumped.

**TO DISPLAY CURRENT TOTAL:** Press “ON” button.

**TO RESET CURRENT TOTAL TO ZERO:** Press the “RESET” button for 2 seconds while Current Total is displayed. Current Total is reset to “.00”.

**TO DISPLAY TOTAL-2:** With Current Amount showing, press and **HOLD** “TOTAL-2”. Total number will be displayed as long as “TOTAL-2” is pressed. Once released Current Amount is shown. **Note:** Total-2 can not be reset to zero.

## CALIBRATION PROCEDURES

Model SEM-10/SEM-10FT Flow Meter has three calibration options, CAL-1, CAL-2, and CAL-3. This flow meter can be calibrated in any unit desired (i.e. gallons, Liters, ounces, pints, etc.). CAL-1 requires pumping

5 units of fluid. CAL-2 requires the pumping of a known quantity of any units; this quantity is then entered into the electronics. CAL-3 allows calibration without pumping fluid by manually changing the calibration constant.

Before performing meter calibration, turn pump on and purge pump and hose of all air. For best results, calibrate at normal dispensing conditions, i.e. flowrate and pressure.

#### **CAL-1 Calibration:**

1. Press **“ON”** button to wake up meter.
2. Press and hold the Reset button to zero (“.00”) the Current Total screen.
3. Press **“CAL-1”** to enter calibration sequence.
4. Pump liquid into a calibrated container that holds five units (gallons, liters, etc). Note: the display will blink as fluid is being pumped.
5. Press **“CAL-1”** to complete the calibration process. Note: the display will return to the Current Total screen and should read “.00”.

**Note:** “ERR” will be displayed if too few or too many counts have been received during the calibration. You must record a volume between 0.5 to 20 units for a valid calibration. If “ERR” is displayed no calibration change has taken place.

#### **CAL-2 Calibration:**

1. Press **“ON”** button to wake up meter.
2. Press and hold the Reset button to zero (“.00”) the Current Total screen.
3. Press **“CAL-1”** to enter calibration mode.
4. Press **“CAL-2”** to enter calibration Cal-2 mode.
5. Dispense desired amount. **Note:** For greatest accuracy pump a minimum volume of 2.5 gallons or 9.5 Liters. The minimum amount required is 0.5 gallons or 1.9 Liters.
6. Press **“CAL-1”**. **Note:** The last volume entered will appear on the display. Example, if you have previously calibrated on 30 quarts then “30.00” would appear. First time default is “5.00”.
7. Press **“UP or DOWN ARROW KEYS”** to scroll in the amount actually pumped. Use the desired units. Example: if you pump 2 gallons but you want the meter to display in quarts, enter “8.00”.
8. Press **“CAL-1”** to enter amount and finish the calibration process. Note: the display will return to the Current Total screen and should read “.00”.

**Note:** “ERR” will be displayed if too few or too many counts have been received during the calibration. You must record a volume between 0.5 to 20 units for a valid calibration. If “ERR” is displayed no calibration change took place.

### **CAL-3 CALIBRATION:**

1. Press "**CAL-1**" to enter Calibration mode.
2. Press "**CAL-3**". The current CAL-3 number will show. A typical CAL-3 number for water is 600.
3. Press the "**UP or DOWN ARROW KEYS**" to scroll to the desired Cal-3 number.
4. Press "**CAL-1**" to enter the new number.

### **METER INSTALLATION PROCEDURES**

Flow can be metered in either direction through the SEM-10 and SEM-10FT meters. **SEM-10:** Thread the meter inlet into the female discharge port of the pump. Using an elbow or coupling, screw the discharge hose onto the other port of the meter. Use thread sealant tape, or pipe dope to seal threaded connections. **SEM-10FT:** Thread the meter inlet (female threads) on to the end of the hose. Install a 1-inch ball valve on the meter outlet (male threads). Use thread sealant tape, or pipe dope to seal threaded connections.

#### **! CAUTION**

DO NOT OVER TIGHTEN THREADED CONNECTIONS. BREAKAGE CAN OCCUR, RESULTING IN EXPOSURE TO FLUID.

#### **! CAUTION**

DO NOT MOUNT METER IN A LOAD BEARING MANNER. EXCESSIVE LOADS CAN CAUSE BREAKAGE, RESULTING IN FLUID EXPOSURE AND LEAKAGE.

### **BATTERY REMOVAL/REPLACEMENT**

If the LCD display becomes dim, the batteries should be replaced. Normal maintenance should call for the batteries to be replaced once a year. The meter electronics can be removed without exposure to the fluid inside the meter.

#### **! CAUTION**

OPEN VALVE TO RELIEVE SYSTEM PRESSURE AND DO NOT PRESSURIZE SYSTEM DURING THIS PROCEDURE.

**BATTERY REMOVAL:** To replace batteries, remove the eight (8) (PH-13) screws that hold the electronic assembly to the meter assembly. Remove the electronic housing; the three- (3) batteries will be found on the backside. Remove and discard used batteries.

#### **! CAUTION**

DO NOT USE NiCAD BATTERIES AS AN EXPLOSION MAY RESULT! USE ONLY ALKALINE BATTERIES.

**BATTERY INSTALLATION:** Re-install three- (3) new batteries into the battery holders. Note the polarity markings, (+) and (-), shown for each battery. Place the gasket and electronic assembly onto the meter assembly. Re-install the eight- (8) screws to secure the electronic assembly to the meter assembly.

### **METER CHAMBER REMOVAL**

#### **! CAUTION**

EXPOSURE TO CHEMICALS CAN CAUSE BODILY HARM. BEFORE DISASSEMBLING, THOROUGHLY FLUSH THE METER WITH WATER. ALWAYS WEAR GLOVES AND PROPER EYE PROTECTION WHILE WORKING WITH CHEMICALS.

#### **! CAUTION**

ENSURE THAT THE METER IS NOT UNDER PRESSURE BEFORE CONTINUING.

Remove the eight (8) (PH-13) screws to remove electronic assembly (S10-01N-ASSY-R1). Remove the four (4) (PH-03) screws that secure the meter plate (S10-02N) to the fluid housing (S10-05N). Remove the meter plate and o-ring (S10-03). The meter chamber can now be removed for cleaning or replacement.

### **METER ASSEMBLY PROCEDURE**

Ensure that the bottom o-Ring (S10-04) is in place. Insert the meter chamber into the fluid housing (S10-05N). Place o-Ring (S10-03) around the bottom of meter plate (S10-02N) and place on top of the fluid housing. Secure with four (4), short screws (PH-03). Torque the screws to 25-28 inch-pounds. Install the gasket (S10-06) and the electronic assembly (S10-01N-ASSY-R1) using the eight- (8), long screws (PH-13). Torque to 25-28 inch-pounds.

### **TROUBLE SHOOTING GUIDE**

**Problem:** Meter reads high or low.

**Solution:**

1. Ensure lines are full and there is no trapped air in the system before calibrating.
2. Pump may be sucking air due to low fluid level or bad pump inlet connection.
3. Calibrating at one flow rate and operating at a different rate. Or calibrating on one less viscous fluid (water) while pumping another more viscous fluid (30wt oil).

**Problem:** Meter flashes “ERR” at end of calibration procedures.

**Solution:**

1. Meter Electronics is not sensing the rotation of the magnet. To verify no rotation look at the CAL-1 or CAL-2 while fluid is being pumped through meter, if it does not "BLINK" then the electronics is not sensing rotation. Disassemble meter and clean out or replace the meter chamber (SEM-10KIT).
2. Volume dispensed to calibrate is too small or too large. Must dispense a volume of at least 0.5 gallons, and no larger than 70 gallons.

**Problem:** No liquid will pass through the meter or the meter will not register the flow.

**Solution:** Foreign material is in the metering cartridge and is obstructing flow or preventing the nutating disk from moving freely. Remove the meter cartridge and clean.

**Problem:** The meter will not power up or the display appears dim.

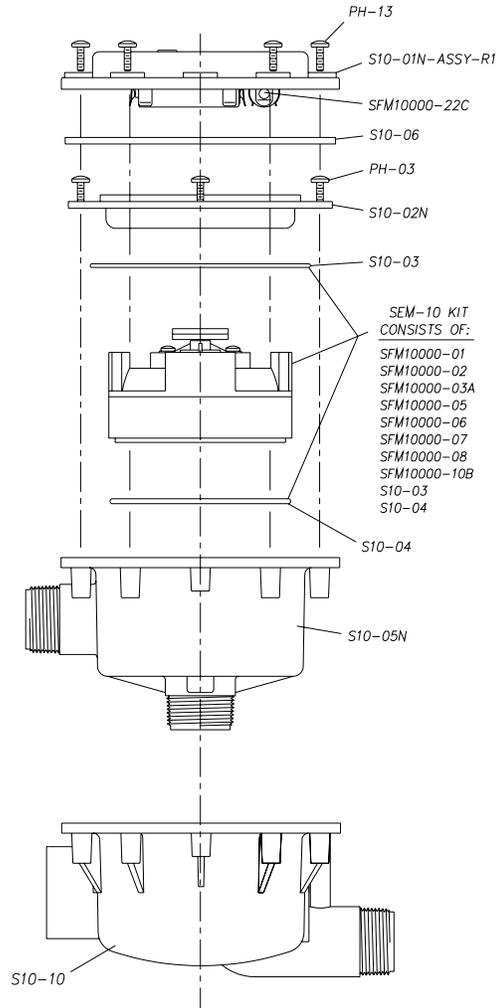
**Solution:** Replace the three AA batteries.

**For assistance, please contact our Technical Service Department at (800) 343-7867.**

### **PARTS LIST AND PARTS DIAGRAM**

**Note:** all parts are common to SEM-10 and SEM-10FT except the fluid housing

<b>SEM-10/SEM-10FT Parts List</b>		
<b>QTY</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>
8	PH-13	SS. Screw, long
1	S10-01N-ASSY-R1	Electronics assembly
3	SFM10000-22C	AA Battery
1	S10-06	Meter Gasket
4	PH-03	SS. Screw, short
1	S10-02N	Meter Plate
1	S10-03	Viton O-Ring
1	SEM-10KIT	Metering chamber kit:
		S10-03 S10-04 SFM10000-01 SFM10000-02 SFM10000-03A SFM10000-05 SFM10000-06 SFM10000-07 SFM10000-08 SFM10000-10B
1	S10-04	Viton O-Ring
1	S10-05N	SEM-10 fluid housing
1	S10-10	SEM-10FT fluid housing



**Figure 3: SEM-10 and SEM-10FT parts diagram**

**To purchase parts, please contact our Sales Department at  
(800) 343-7867.**

# SCIENCO® PRODUCTS TERMS AND CONDITIONS OF SALE

The sale of all products shall be governed by the following terms and conditions of sale only.

## 1. General

The Terms and Conditions of Sale outlined herein shall apply to the sale by Ingersoll-Dresser Pump Company ("Company") of products, equipment and parts ("Equipment"). Unless prior written agreement is reached, it shall be understood that the Company's proceeding with any work shall be in accordance with the terms and conditions outlined herein. The Company shall not be bound by any contract or any modification therein until approved in writing by an officer of the Company.

The rights and remedies of the parties shall be governed by the laws of the State of Delaware. Compliance with any local governmental laws or regulations relating to the location, use or operation of the Equipment, or its use in conjunction with other equipment, shall be the responsibility of the Purchaser.

## 2. Title and Risk of Loss

Title and risk of loss or damage to the Equipment shall pass to the Purchaser upon tender of delivery F.O.B. manufacturing facility unless otherwise agreed upon by the parties.

## 3. Assignment

Neither party shall assign or transfer this contract without the prior written consent of the other party. The Company however shall be permitted to assign or transfer, without the prior written consent of the Purchaser, the Company's right to receive all or any portion of the payment due from the Purchaser under this contract.

## 4. Delivery and Delays

Delivery dates shall be interpreted as estimated and the Company shall not be liable for any loss or delay due to causes beyond the reasonable control of the company.

## 5. Taxes

The price does not include any present or future federal, state, or local taxes or assessments which may be applicable to or result from this transaction or any services performed in connection therewith.

## 6. Warranty

The Company warrants that the Equipment will be free of defects in material and workmanship for a period of twelve months from the date of placing the Equipment in operation or eighteen months from the date of shipment, whichever shall first occur. Parts shall be warranted for a period of six (6) months from date of shipment. The Purchaser shall promptly report any failure to conform to this warranty, in writing to the Company within said period, whereupon, the Company shall, at its option, repair the Equipment or furnish a replacement part F.O.B. point of shipment, provided the Purchaser has stored, installed, maintained and operated the Equipment in accordance with good industry practices. The Company shall not be liable for any repairs, replacements, or adjustments to Equipment or any cost of labor performed by the Purchaser or others.

The effects of corrosion, erosion and normal wear and tear are specifically excluded.

**The Company makes no other warranty or representation whatsoever, expressed or implied, except that of title, and all implied warranties of merchantability and fitness for a particular purpose, are hereby disclaimed.**

## 7. Limitations of Liability

**The remedies of the Purchaser set for herein are exclusive and the total liability of the Company with respect to this contract or the Equipment and services furnished hereunder, whether based on contract warranty, negligence indemnity, strict liability or otherwise, shall not exceed the purchase price of the unit of equipment upon which such liability is based.**

**The Company and its suppliers shall in no event be liable to the Purchaser, any successors in interest or any beneficiary or assignee of this contract for any consequential, incidental, indirect, special or punitive damages arising out of this contract or any breach thereof, whether or not such loss or damage is based on contract, warranty, negligence, indemnity, strict liability or otherwise.**

FORM: SCIENCO L102 6/97

**MODEL SEM-10/SEM-10FT**  
ELECTRONIC FLOW METER  
OPERATION MANUAL

**SCIENCO® PRODUCTS**  
**A division of Flowserve Pump Corp.**  
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Form No. 8057  
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