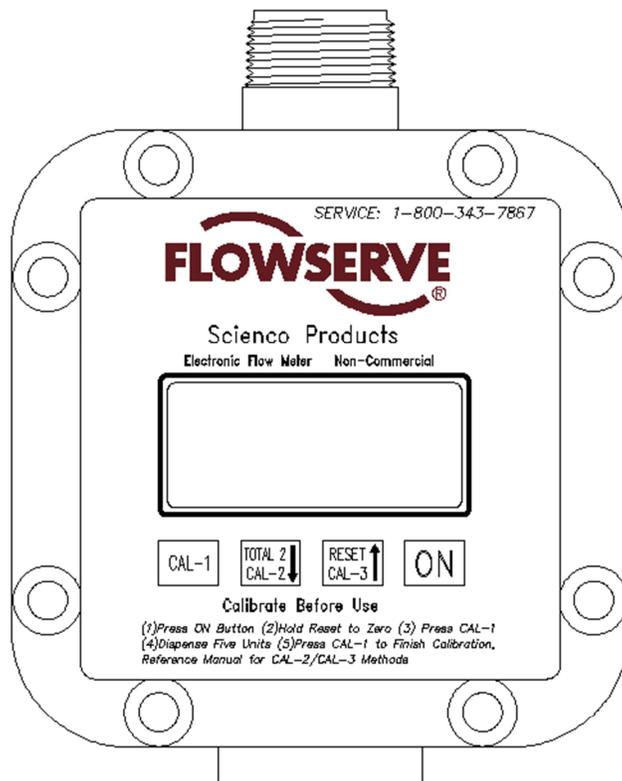




Operator Manual



SEM-10 and SEM-10FT Electronic Flow Meter

Safety Notices

- MISUSE AND ABUSE OF THIS METER CAN CAUSE SERIOUS INJURIES.
- READ ALL CAUTIONS AND INSTRUCTIONS BEFORE USING METER.
- INSPECT BEFORE USING AND REPLACE ANY DEFECTIVE COMPONENTS.
- EXPOSURE TO CHEMICALS CAN CAUSE SERIOUS INJURIES. ALWAYS WEAR PROPER PROTECTIVE CLOTHING AND DEVICES WHEN METERING CHEMICALS.
- REFER TO AND FOLLOW CHEMICAL MANUFACTURER'S HANDLING INSTRUCTIONS.

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-10FT 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 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)
Accuracy	-----	+/- 0.5%
Maximum Total	-----	999,999.9
Battery	-----	Lithium CR 2032 (3 Volt)
Auto Shut Off	-----	40 Seconds
Auto Wake Up	-----	With Flow

Material of Construction

Fluid Housing/Form Cover	-----	Nylon or Polypropylene
Meter Chamber	-----	Polypropylene Sulfide (PPS), Stainless Steel
O-rings	-----	Viton or EPDM
Electronic Housing	-----	Nylon
Screws	-----	Stainless Steel

Note: The Polypropylene SEM-10 and SEM-10FT is designed to pump chemicals with a low PH. Ensure chemical compatibility between liquid metered and the meter's wetted parts before using.

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

Figure 1: SEM-10

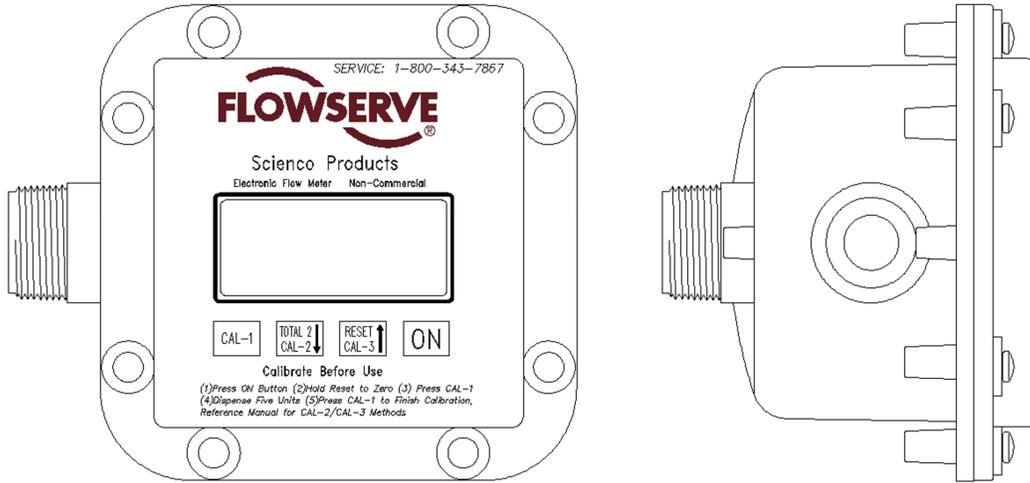
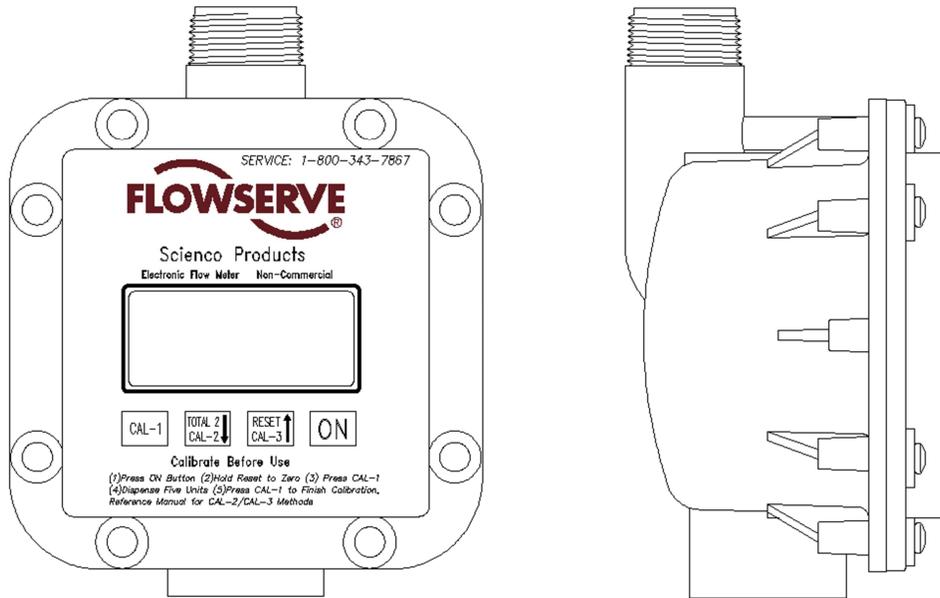
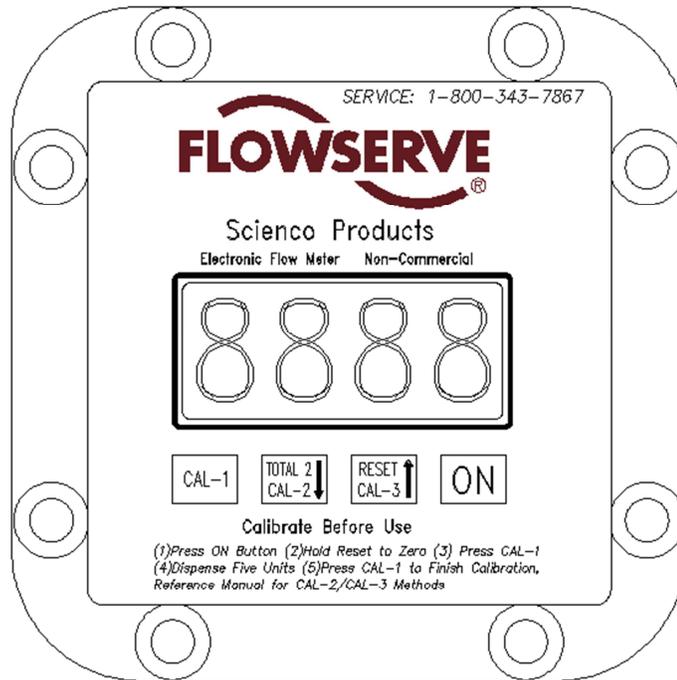


Figure 2: SEM-10FT



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.



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 and hold the “**RESET**” button for 3 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.

TO DISPLAY FLOW RATE: With the meter on, press and hold the “**ON**” button for two seconds. The display will read “FX.X”, with the numbers indicating flow rate in units of volume per minute. To return to total volume dispensed, press and hold the “**ON**” button for two seconds again.

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, pounds, acres, 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. flow rate 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 previous total.

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 previous total.

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-3 Calibration

1. Press “**CAL-1**” to enter calibration mode.
2. Press “**CAL-3**”. The current CAL-3 number will show.
3. Press the “**UP or DOWN**” **ARROW KEYS**”.
4. Press “**CAL-1**” to enter the new number.

Use of the “CAL-3” function will now automatically override any previous units of volume entered if “CAL-2” mode had been used. The change prevents a conflict between the “CAL-2” units and the “CAL-3” number, and will be transparent to users who do not use “CAL-2” for calibration.

A typical “CAL-3” number for water is 600. Recording “CAL-3” numbers for various products dispensed after calibration, and resetting the meter to those numbers when the liquid is pumped again is a convenient method to accurately and quickly measure various liquids dispensed.

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) onto 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 OVERTIGHTEN 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 battery should be replaced. 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 battery, remove the eight (8) (PH-13) screws that hold the electronic assembly to the meter assembly. Remove the electronic housing, one battery will be found on the back side. Remove and dispose of used battery.

Battery Replacement: Install the new battery into the batter holder. Note the polarity marking, (+) and (-), shown for the 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 DIS-ASSEMBLING, 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 (S10-11 COMPLETE). 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.

Troubleshooting Guide

- **Problem:** Meter reads high or low.
- **Solution:** Check for the following:
 - Ensure lines are full and there is no trapped air in the system before calibrating.
 - Pump may be sucking air due to low fluid level or bad pump inlet connection.
 - 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:** Check for the following:
 - 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-10 KIT).
 - Volume dispensed to calibrate is too small or too large. Must dispense a volume of at least 2.5 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 battery.

**For additional Trouble Shooting Questions please call
Flowserve-Scienco Technical Service & Support: 1-800-343-PUMP (7867)**

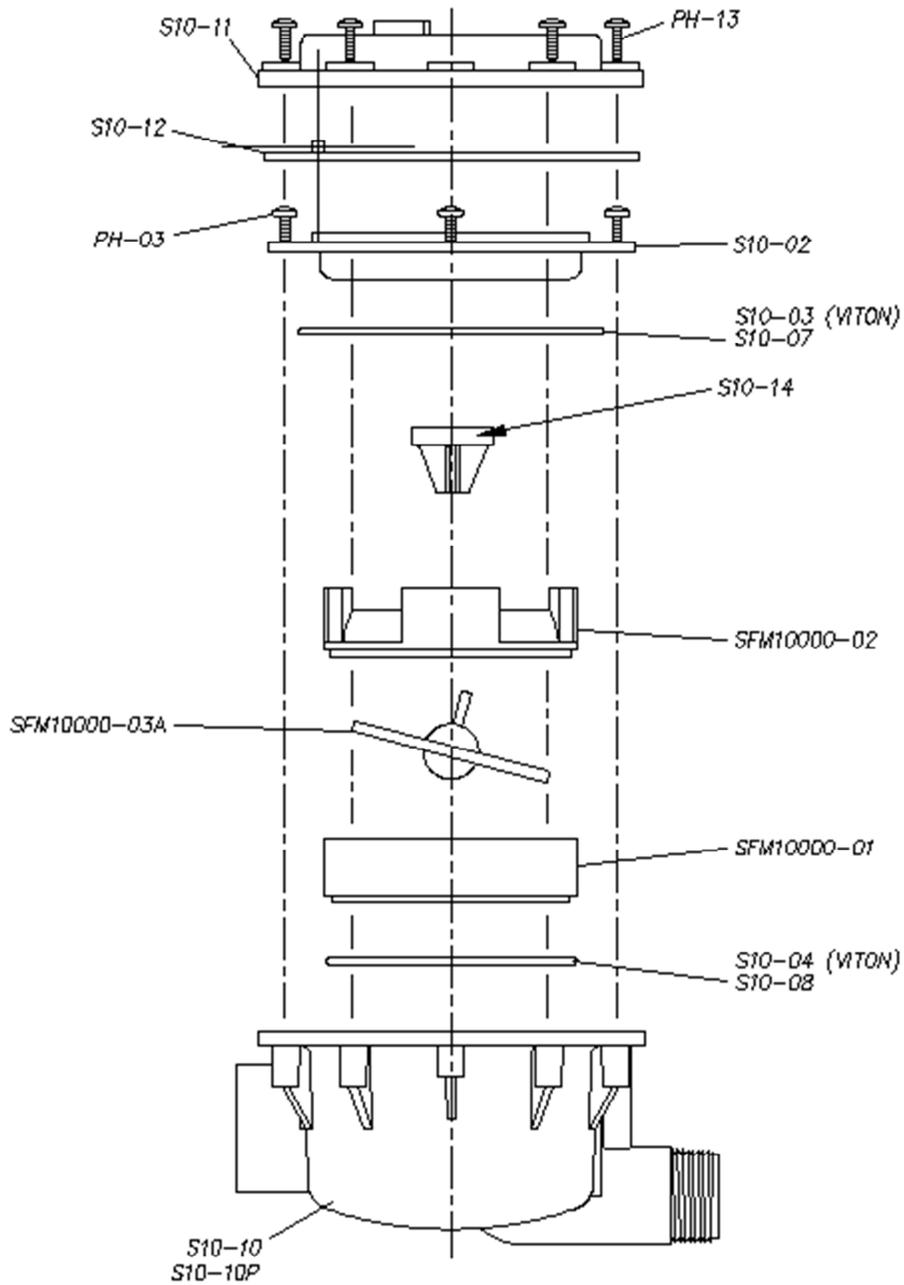
Parts List and Parts Diagram

Note: All parts are common to the polypropylene SEM-10 and SEM-10FT except the fluid housing.

Polypropylene/Nylon SEM-10/SEM-10FT Parts List		
Qty.	Part No.	Description
8	PH-13	SS. Screw, Long
1	S10-11 COMPLETE	Electronics Assembly
1	S10-12	Meter Gasket
4	PH-03	SS. Screw, Short
1	S10-02	Meter Plate
1	SEM-10 KIT-2	Metering Chamber Kit:
		S10-03 or S10-07 S10-04 or S10-08 SFM10000-01 SFM10000-02 SFM10000-03-0A S10-14
1	S10-05/05N	SEM-10 Fluid Housing
1	S10-10/10P	SEM-10FT Fluid Housing

For additional assistance please call
Flowserve-Scienco Sales Department: 1-800-343-PUMP (7867)

Figure 3: SEM-10 and SEM-10FT Parts Diagram



Note:

- S10-05N is 90° Nylon Housing
- S10-10 is Nylon flow through Housing
- S10-10P is Polypropylene flow through Housing



Product Warranty

Flowserve Corporation (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.

Technical Service & Support

3732 Cook Blvd. Suite 101
Chesapeake, VA 23323-1628 USA
Telephone: 800-343-7867 (343-PUMP)
Fax: 757-673-3528
Website: www.flowserve.com
Email: csb@flowserve.com

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