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JOHN C. ERNST LLC

PROCESS OBSERVATION SOLUTIONS

FLOW METERS

INSTALLATION, OPERATION & MAINTENANCE MANUAL

FOR SERIES: M11

JOHNERNST.COM

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Table of Contents

PRODUCT QUICK SPECS.

Size				Tube Size	Available Flow Rates			
					Water		Air*	
					GPM	LPM	SCFM	SLPM
1/2"				Small	0.40 - 3	N/A	N/A	N/A
				Small	0.50 - 5	2 - 20	5 - 50	200 - 1400
				Small	1 - 10	6 - 38	15 - 90	250 - 2500
				Small	3 - 15	5 - 55	20 - 135	600 - 3900
	3/4"	1"	1-1/2"	Large	4 - 20	15 - 75	20 - 200	500 - 5500
				Large	5 - 30	10 - 110	30 - 300	1000 - 8000
				Large	5 - 40	15 - 150	40 - 400	1000 - 11000
				Large	5 - 50	20 - 200	50 - 500	2000 - 14000

Ratings		
Temp	Pressure	
	Fluid	Air*
PVC Tube		
70°F	200 PSIG	100 PSIG
100°F	100 PSIG	50 PSIG
125°F	75 PSIG	35 PSIG
130°F	50 PSIG	N/A
Polysulfone Tube		
230°F	200 PSIG	125 PSIG
***Calibrated for 90 PSIG @ 70°F**		

I. INTRODUCTION

NOTICE

John C. Ernst does not have any control over the manner in which its sight flow is handled, installed or used. John C. Ernst cannot and will not guarantee that a gauge is suitable or compatible for the user's specific application.

This manual has been prepared as a guide for personnel responsible for installation and maintenance of these items. All instructions must be read and understood thoroughly before attempting any installation, operation and maintenance.

Design and Function

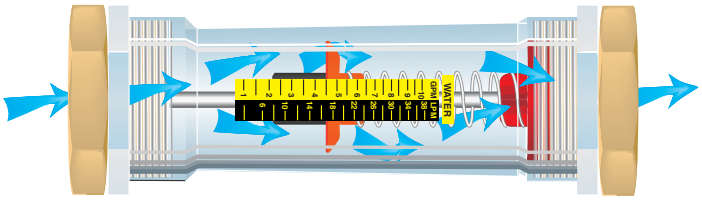
Fluid enters at the end marked "IN" and forces the piston to move with it, against spring pressure, enough to pass given flow around piston periphery. The knife edge of the piston is visible through the transparent housing; its position under the printed scale gives the flow rate of the fluid.

Switch Kit Option

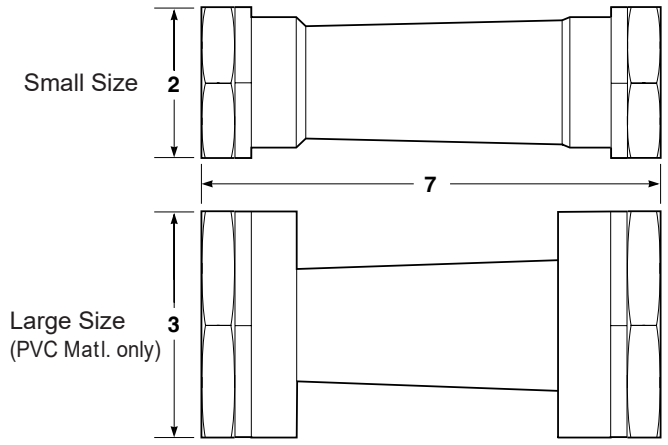
Flow meters can be equipped with one or two electric switches so that any flow rate within the range of the meter can be made to trigger a signal(s). Switch settings are easily adjusted. Switches are supplied in kit form for installation in the field.

Each kit consists of a ring shaped ceramic magnet, that fits the flow meter piston, and a proximity switch in a housing that clamps to the body of the flow meter. As the magnet moves with the piston its field trips the proximity switch. An adjustment screw changes the actuation point by moving the switch.

For 3 - 15 GPM, Order Part # P370 SWITCH SM
For 20 - 50 GPM, Order Part # P370 SWITCH LG



DIMENSIONS. Approximate in inches.



Consult factory for dimensions with switch mount

II. INSPECTION

Receiving Inspection

Upon receipt of the Flow Meter, check all components carefully to ensure that damage did not occur. If damage is evident or suspected, do not attempt installation.

End User's Rating Inspection

Prior to installation the user(s) must confirm that:

1. The user's purchase order, Product Quick Specs, and the John C. Ernst Technical Drawing, all agree with the actual operating conditions at the installation site.
2. The connections and inside of the unit are clean and free of any foreign material.
3. The materials of construction are chemically compatible with both the media(s) and unit's surrounding environment.

⚠ WARNINGS

Failure to follow instructions could result in a malfunction or breakage of the indicator, resulting in fluid escaping from the unit.

Always wear safety glasses when installing, servicing or operating Flow Meters.

Failure to follow precautions can result in personal injury and property damage.

⚠ WARNING

Exceeding the design ratings or application's data limits can cause the unit to break, leak, or sudden release of pressure. Failure to keep operations below design ratings may result in serious personal injury and property damage.

⚠ **WARNING:** Cancer and Reproductive Harm - *www.P65Warnings.ca.gov*

III. INSTALLATION

Precautions

Do not impose system piping loads on the Flow Meters. It is not designed to be a load bearing component. Piping must be supported and aligned with the Flow Meter end connections to reduce any bending or torsional stresses.

Installation

Inlet and outlet ends are marked on the flow meter body, and an arrow on the printed scale indicates flow direction. John C. Ernst flow meters can be mounted in any convenient orientation (vertical, horizontal or anything in-between) without affecting performance.

> ***NOTICE***
> The end fittings are connected to the plastic body with O-ring sealed straight threads and do not need to be exceedingly torqued to prevent leakage, or require any other kind of sealant such as Teflon tape or pipe dope.

These end fittings accept pipe with tapered threads (NPT). Teflon tape should be applied and standard torques applied to make pressure-tight connections.

> ***NOTICE***
> Use wrench only on the end fitting when piping the meter in-line. Do not apply wrenches on the plastic body when connecting to pipe, only end fittings.

Many users find that a disconnect fitting, installed upstream of the flow meter makes for easier removal of the flow meter, for cleaning internal components. Control valves should be installed downstream of the flow meter.

Switch Installation

> ***NOTICE***
> Switches have a 25% of full scale operating band. Within the band, the relay activates. Above and below the band, the relay deactivates. Thus one switch can be used as a deviation alarm.

The switch contact ratings(maximum) are 8 watts @ 120VAC/100VDC. Do not exceed 8 watts of power. The switch has three wires: Black for normally open, Blue for normally closed, and white for common. Switch contact ratings: 12VDC @ 0.66A; 28VDC @ 0.285A, 120VAC @ 0.066A (at 77°F).

1. *Installing the magnet:* You must disassemble the flow meter to do this. Follow the instructions found under the Maintenance section. Remove the piston from the shaft and place the magnet between the piston and spring. Be sure that the piston is installed as in the drawing under the Spare Parts Index, and the spring is seated on the magnet and piston. Insert into tube and replace outlet end fittings.
2. *Installing the foam gasket:* It has an adhesive on one side, covered with a protective paper. Peel off and press firmly on switch housing.
3. *Installing the switch housing(s) on the flow meter body:*

   Single switch: push the capscrews through the switch housing tabs, and thread them into the half-collars, as shown. Use the provided washers. The Nuts may be discarded.

   Dual switches: match up the tabs on the two switch housings and push the capscrews through both collar tabs. Put the nuts on the ends of the capscrews and tighten. Use washers provided. (The half-collars and extra magnet may be discarded.)

> ***NOTICE***
> There is no incorrect orientation of the switch housing. If installing two switch housings, they can both be oriented the same way or opposite of each other. Install to suit your wiring/adjustment needs.

Switch Point Setting

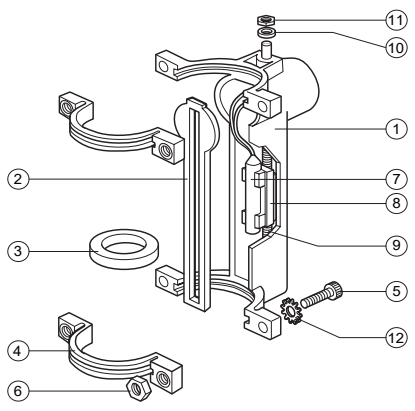
If adjusting while flow meter is installed, simply adjust the flow to the desired amount where the switch signal is desired, then turn the switch adjustment screw until the switch actuates. (Switch moves toward the adjustment screw head as you turn it clockwise. Use and Ohmmeter to determine actuation.) If you are using two switches, repeat the procedure for the second switch.

If adjusting while flow meter is not installed, simulate flow by pushing the eraser-end of a pencil (or a similar tool) through the inlet end of the of the tube, contacting the piston, and moving it against the spring pressure until the knife edge of the piston is at the desired reading on the scale. (If unit has a 1/2” pipe fitting, remove it to gain better access.) Then, turn the switch adjustment screw until the switch actuates. (Switch moves toward the adjustment screw head as you turn it clockwise. Use and Ohmmeter to determine actuation.) If you are using two switches, repeat the procedure for the second switch.

When connecting the switch wires, leave enough lead length (as a pigtail) to allow full travel of the switch.

Parts Description

1. Housing
2. Gasket
3. Magnet
4. Half-collar (2)
5. Capscrew (4)
6. Capscrew nuts (2)
7. Switch
8. Switch carrier
9. Adjustment screw
10. O-ring (2)
11. Retainer clip
12. Lockwasher (4)



IV. OPERATION

Before starting operation, check that all installation procedures have been completed. Use only qualified, experienced personnel who are familiar with Flow Meter equipment and thoroughly understand the implications of the tables and all the instructions. Check that all connections are pressure tight and the glass is clean and free of any damage.

The Air flow meter is calibrated (reading in SCFM/SLPM), at 90 PSI pressure and 70°F temperature.

If the flow meter is used at pressures and/or temperatures that differ from the above, correction factors can be applied to the 90 PSI air scale readings to get the correct SCFM values. See Tables 1 & 2.

Table 1 Pressure

PSIG	10	20	30	40	50	60	70	80	90	100	110	120	125
Factor	0.49	0.58	0.65	0.72	0.79	0.84	0.90	0.95	1.00	1.05	1.09	1.13	1.16

Table 2 Temperature

Temp	30°F	50°F	70°F	90°F	100°F	120°F	125°F
Factor	1.04	1.02	1.00	0.98	0.97	0.96	0.95

When operating at a pressure other than 90 PSIG, or a temperature other than 70°F, multiply the applicable factor(s) to the SCFM reading on the tube for the corrected SCFM reading.

V. MAINTENANCE

⚠ WARNING

A Flow Meter in service must be freed of all pressure or vacuum, allowed to reach ambient temperature and drained or purged of all fluids before maintaining. Failure to follow this procedure could result in serious personal injury and property damage.

The only servicing required is a periodic cleaning of the tube and the 3 internal parts. Use wrenches on the end fittings to remove the flow meter from the line.

NOTICE

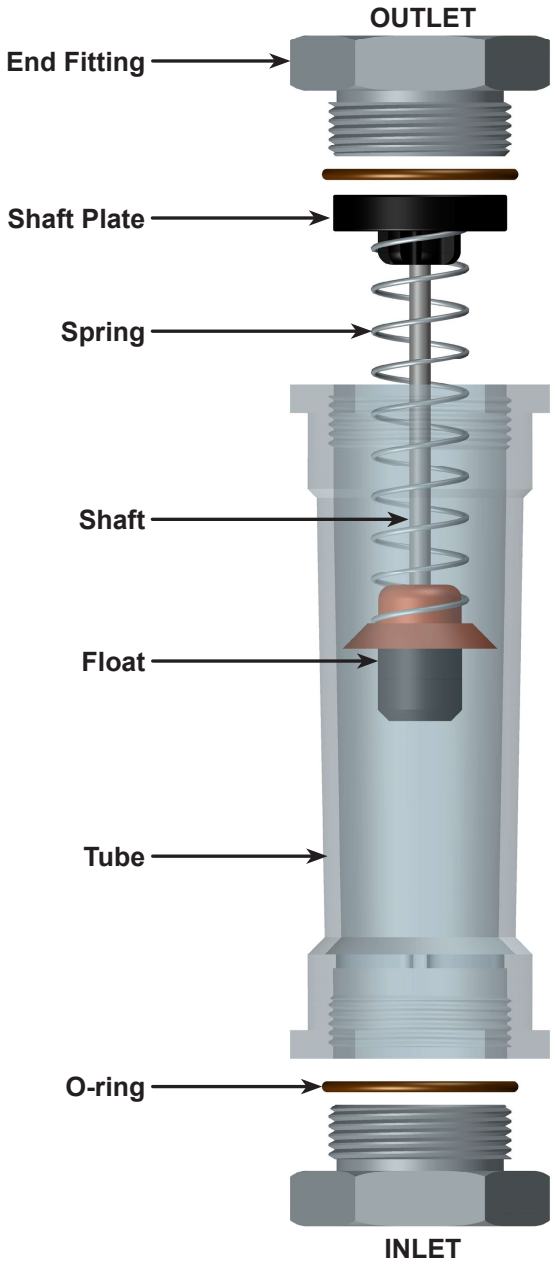
Use a wrench only on the end fitting when piping the meter in-line. Do not apply wrenches on the plastic body when connecting to pipe, only end fittings.

Disassembly

With the flow meter out of the line, completely remove the end fitting from the outlet end of the flow meter. May need to use a bent wire or other hook to grab the shaft by the plate, piston and spring from the inside of the tube. Inspect all parts for damage. The interior of the tube can be swabbed out, and all the parts wiped off, with a soft dry cloth. If dirt or residue cannot be removed with a soft dry cloth, use water and a mild non-abrasive soap. **DO NOT USE SOLVENT OF ANY KIND.** Replace any worn or damaged parts.

Reassembly

With the shaft plate in hand, slide the spring onto the shaft. Then with the spring resting against the plate, slide the piston with the black bottom facing away from the shaft, onto the shaft and into the spring. Do not put in upside down. Install the assembly into the tube. Inspect the O-ring for damage and replace if necessary. Wetting the O-rings with water prior to assembly can improve sealing.



LIMITED WARRANTY

Period of Coverage
The John C. Ernst LLC. expressly warrants products to the original purchaser to be free from defects in the material and workmanship for 12 months from date of shipment. John C. Ernst LLC. will, at its option, replace or repair any products which fail during the warranty period due to defective material or workmanship. Evaluations, repairs, and replacements will most often occur in Sparta NJ 07871 USA, or another facility determined by the John C. Ernst LLC.. The warranty does not cover costs required to transport warrantied units to or from the John C. Ernst facility.

Limitations
The responsibility of the John C. Ernst LLC. is hereunder limited to repairing or replacing the product at its expense. This warranty shall not apply if the product has been disassembled, tampered with, repaired, subjected to misuse, neglect, accident, or otherwise altered in any way. The warranty does not guarantee products against normal wear, glass breakage, clouding, or corrosion. The John C. Ernst LLC. shall not be liable for loss, shipping costs, damage, or expenses related directly or indirectly to the installation or use of its products. It is expressly understood that the John C. Ernst LLC. is not responsible for damage or injury caused to other products, buildings, personnel, citizens, or property by reason of the installation or use of its products.
Advertised ratings apply only to units serviced with parts supplied by the John. C. Ernst LLC. Service must be done in accordance with the instructions of the product that is being serviced.
THIS IS JOHN C. ERNST, CO's. SOLE WARRANTY AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED WHICH ARE HEREBY EXCLUDED, INCLUDING IN PARTICULAR ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. WE WILL NOT BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY NATURE.

How to get Warranty Service
Prior to submitting any claim for warranty service, the owner must submit proof of purchase, and obtain written authorization to return the product. All returns must be sent back with an MSDS for the application that the product was used in, and with a maintenance log of all service including inspections. Thereafter, the product shall be returned to the John C. Ernst LLC. with freight paid and packaged to prevent damage in transit. Should damage in transit occur the John C. Ernst LLC. will not be held liable.

GENERAL PRESERVATION

Recommended Practice for Long Term Storage of John C. Ernst Products

1. All units should be inspected upon receipt to ensure that no damage has been incurred during transit. If there has been damage, a claim should be filed with the carrier immediately. Units should be stored in an area protected from the elements and corrosive fumes, in a secure manner where they can neither fall nor be struck by other objects. Care should be taken to protect the glass and the end connections from damage. Avoid placing any objects directly on the glass(es) at any time.
2. Units should be checked to ensure that they contain no foreign matter and that the end connections are clean, undamaged, and in line with adjoining piping. Examine each glass carefully using a flashlight for any indications of chips, scratches, blemishes or cloudiness. Inspect for scratches, shining a bright concentrated light (powerful flashlight will suffice) at about a 45º angle. Any scratch that glistens and catches a fingernail, or star or crescent-shaped mark that glistens, is cause for replacement. Process surface that appears cloudy or roughened, after cleaning, is evidence of chemical attack and is cause for replacement. If any type of flaw is apparent, the unit should not be installed until the glass and gaskets have been replaced. Follow the torquing recommendations given by the gasket and piping manufacturers to achieve proper sealing pressures.
3. Some products are shipped unassembled, as they are to be welded into position and then assembled. Individual pieces should be carefully stored in a manner to avoid damage until installation. The glass requires special attention. It should not be stored or mixed with objects that may cause damage and should remain wrapped or boxed until assembly.
4. Gaskets frequently assume a compression-set over a period of time. Some materials, however, may compress/relieve or creep. Visually inspect the gaskets for gaps or looseness before start-up. If the gaskets are not compressed, adjust the unit gasket compression. Do not tighten any fasteners or clamps while the unit is in operation.
5. Periodic visual inspection should be made to ensure that no leaks are evident and that there is no clouding, scratching, or blemishing of the glass. Keep glasses clean using commercial glass cleaners. Cleaning should be done without removing glass. This may require recirculation of cleaning material if process side of glass is not accessible. Never use harsh abrasives, wire brushes, metal scrapers, or anything that may scratch the glass. Do not attempt to clean glasses while equipment is in operation.
6. Should leaking around the glass occur, first check the glass for damage. If the glass appears to be in good condition, the gasket seal should be checked, but only after the system pressure has been brought down to zero. If the gasket appears to be loose, or hardly compressed, the spacers must be adjusted. If the leak persists after repressurizing, disassemble and replace the gaskets.
7. Glass, shields and gaskets that have been removed, MUST BE REPLACED. Used parts may contain hidden damage. Induced stress in glass and de-tempering are NOT visible to the naked eye. Be sure that the replacement glass is proper for the service.
8. Inspect protective coating (if applied) for chipping.
9. Store within the temperature extremes of the nameplate or specification documents – do not expose to direct sunlight or other UV sources.
10. Products should be stored off of the floor on suitable skids, pallets, or racks and protected from dirt, debris, and exposure to direct sunlight, particularly to soft sealing surfaces.
11. Store in a cool dry place, room temperatures between 40°F - 80°F with a relative humidity level between 40 – 75%.
12. Store in dry areas, avoiding any contamination with any liquids. Products should be kept in a clean, heated, weather-tight (dry), well ventilated facility.
13. If a flanged product is to be stored for any extended period of time, the flange or end protector should be examined to ensure they are fastened securely, and any other open areas should be sealed to prevent any moisture damage.
14. Product assemblies with electrical components, pneumatic tubing, positioners, actuators, and other accessories should be protected from impact.
15. Useful Life When Stored:
    a. Unit: Indefinite, based on ideal storage conditions.
    b. Spare Gaskets: Indefinite, based on ideal storage conditions.
    c. After 9 months, the torque of the bolting should be checked as the gasket relaxes. This should be done for units not in service as well as those installed in process.
    d. The useful life of the material, when the storage conditions differ from the recommended factors is not known. It has been established, however, that room temperature has a significant influence on the shelf life of material.
    e. Spare Gaskets should be stored flat.
16. Periodical checks at least every 6 months have to be carried out in the storage area to verify that the above mentioned conditions are maintained.

If there are any questions or concerns, please contact the John C. Ernst LLC. Sales Office at 888-943-5000.

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