



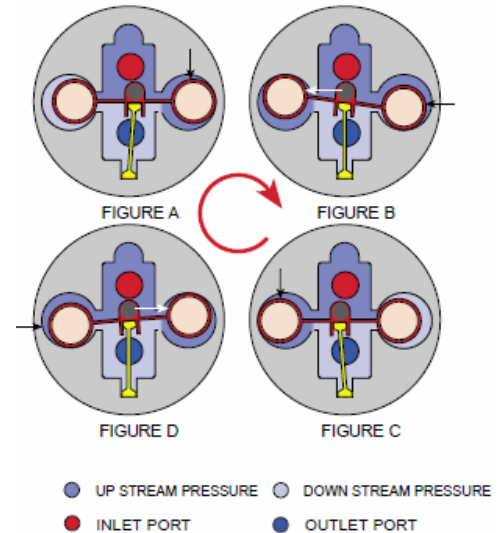
# ALMPD

## Nutating Disc Micro Flow PD Flowmeter ALMPD Series

### GENERAL

SMC's ALMPD micro-flowmeter is a nutating disk positive displacement meter designed for precise measurement of ultra-low flow rates. The low-cost ALMPD offers superior value by providing a package that is capable of measuring very low flow rates with less susceptibility to wear versus other positive displacement flowmeters and the ability to work with a wider variety of hostile liquids. The ALMPD may easily be disassembled, cleaned and reassembled with reasonable care in the field.

Measurement occurs as the result of the dual orbiting motion of the nutating mechanism as it rolls on the beam. Refer to figures A, B, C and D in sequence. This motion is induced by the fluid as it passes through the meter. This motion is consistent because the differential pressure forces are always great enough to ensure that the nutating mechanism travels the complete volume in each chamber. The process repeats itself 12 to 250 cycles per second, in proportion to the fluid flow through the meter. A flow signal is produced by interrupting the light from a photoemitting/detecting device. The interruptions are created by a magnet wire which tracks the magnet encapsulated in the orbiting nutating mechanism. The interruptions are then converted to an electronic square wave output, which is used to quantify the flow.



### FEATURES

- ❑ The relative simplicity of the ALMPD makes it far less costly than other PD flowmeters designed for low-flow rate measurement.
- ❑ Reduced susceptibility to wear versus other PD technologies as a result of the following design features:
  - Micro-machined components with reduced size resulting in lower relative velocities amongst the moving parts
  - Any forces acting on one side of the nutator are offset by opposing forces acting on the opposite side.
  - The ends of the beam are rounded, resulting in a rolling motion rather than sliding during operation.
- ❑ Since the moving parts are not rigidly attached to each other or the motion detection mechanism, the ALMPD is capable of service in fluids less filtered than other devices which may be capable of measuring similar low flow rates.
- ❑ Should the MICRO FLOWMETER become clogged with debris, it can be easily disassembled, cleaned and reassembled with reasonable care in the field.



### SPECIFICATIONS

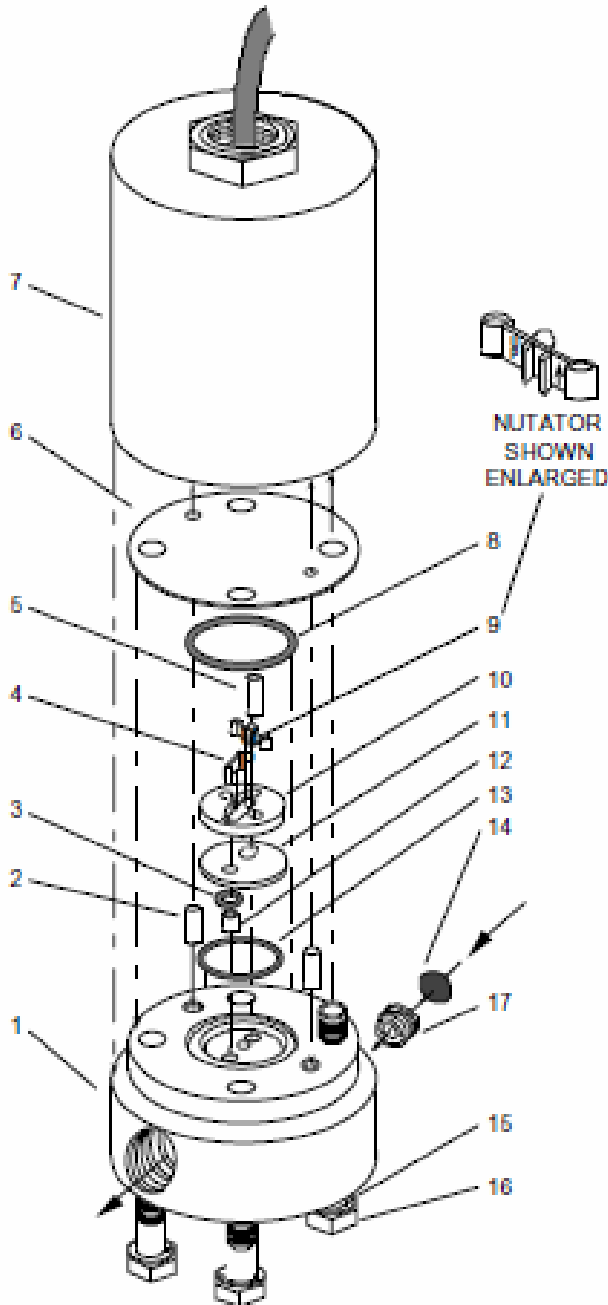
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|---|--|
| <ul style="list-style-type: none"> <li>● Measuring principle: Nutating Disk Positive Displacement</li> <li>● Materials: All wetted parts are SS#316 / PTFE</li> <li>● Accuracy: ±1.0% of range</li> <li>● Repeatability: ±0.1% of range</li> <li>● Ranges:           <ul style="list-style-type: none"> <li>FMTD4: &lt;0.015~4.00 GPH (1-250 CC/min)</li> <li>FMTD20: &lt;0.075~20.00 GPH (5-1250 CC/min)</li> </ul> </li> <li>● Operating Pressure: 3,000 psig (21 MPa) Standard<br/>21,000 psig (147 MPa) Optional</li> <li>● Max Δ Pressure:           <ul style="list-style-type: none"> <li>FMTD4: 5 psid (34 kPa)</li> <li>FMTD20: 15 psid (102 kPa)</li> </ul> </li> <li>● Max Viscosity: 100 SSU (25 cP) Recommended</li> </ul> | <ul style="list-style-type: none"> <li>● Displacement:           <ul style="list-style-type: none"> <li>FMTD4: ≈ 50 pulses/cc</li> <li>FMTD20: ≈ 10 pulses/cc</li> </ul> </li> <li>● Temperature: -40~180 °F (-40~80 °C)</li> <li>● Power Supply: 8~30 V<sub>DC</sub></li> <li>● Power Consumption: 50 mA maximum</li> <li>● Output Signal: 0-5 V<sub>DC</sub> square wave pulse</li> <li>● Cable Length: 3 feet (1 M) standard</li> <li>● Process Connections: 1/4" NPTF</li> <li>● Conduit Connection: 1/2" NPT</li> <li>● Approvals: CSA explosion proof, Class I, Div I grp. C &amp; D</li> <li>● Dimensions: 2.5" Dia x 4.63 L (6.4 cm x 11.8 cm)           <ul style="list-style-type: none"> <li>● Weight: 2.9 lbs (1.32 kg)</li> </ul> </li> </ul> |
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### SmartMeasurement

10437 Innovation Drive, Suite 315, Milwaukee, WI 53226  
TEL : +1-414-299-3896 FAX : +1-414-433-1606



### ➤ Construction



FMTD4 PARTS LIST				
ITEM NO.	PART NUMBER	DESCRIPTION	MATERIAL	QTY.
1	570618	PORT HOUSING	316 SS	1
2	570003-10	DOWEL PIN	18-8 SS	2
3	570001-1006	"O" RING	TFE	1
4	570418	BEAM	316 SS	1
5	570310	DOWEL PIN	316 SS	1
6	570943	DIAPHRAGM	316 SS	1
7*	570809	ELECTRONICS ASS'Y		1
8	570001-1118	"O" RING	TFE	1
9	570122	NUTATOR	316 SS	1
10	570621	BODY	316 SS	1
11	570945	BALANCE PLATE	316 SS	1
12	570930	OUTLET BUSHING	316 SS	1
13	570001-1017	"O" RING	TFE	1
14	570307	SCREEN	316 SS	1
15	570003-20	LOCK WASHER	18-8 SS	4
16	570002-10	CAP SCREW	18-8 SS	4

FMTD20 PARTS LIST				
ITEM NO.	PART NUMBER	DESCRIPTION	MATERIAL	QTY.
9	570123	NUTATOR	316 SS	1
10	570622	BODY	316 SS	1
ALL OTHER ITEMS SAME AS FMTD4				

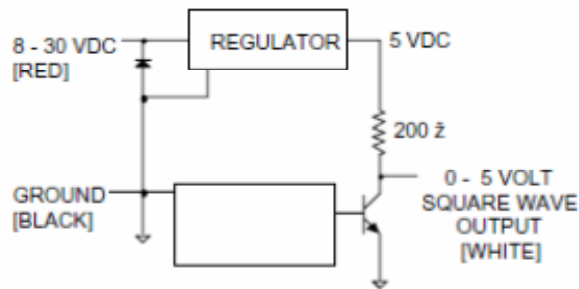
INJECTION PUMP MODIFICATIONS [-O]				
ITEM NO.	PART NUMBER	DESCRIPTION	MATERIAL	QTY.
17	570941-08	FMTD4 ORIFICE	316 SS	1
17	570941-18	FMTD20 ORIFICE	316 SS	1
ALL OTHER ITEMS SAME AS ABOVE				

\* THIS ASSEMBLY IS NOT FIELD SERVICEABLE. CONSULT FACTORY FOR SERVICE.



### ➤ Wiring Connections

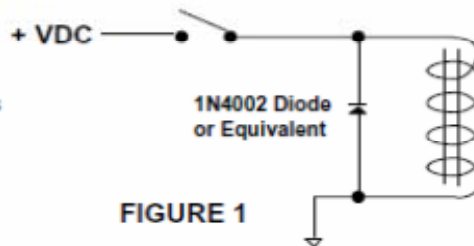
1. A twisted, shielded, 18 gauge, 3 or more conductor cable is recommended to minimize interference. If the Micro flowmeter signal at the electronics is less than required, use a larger gauge wire. If this does not effect the desired result, a repeater may be required. The two ground terminals should be jumpered at the electronics. Power and signal wires should be shielded. Only one end of the shield should be connected to ground. [Never use the shield as a signal or power conductor.]



**ELECTRONIC FUNCTIONAL DIAGRAM**

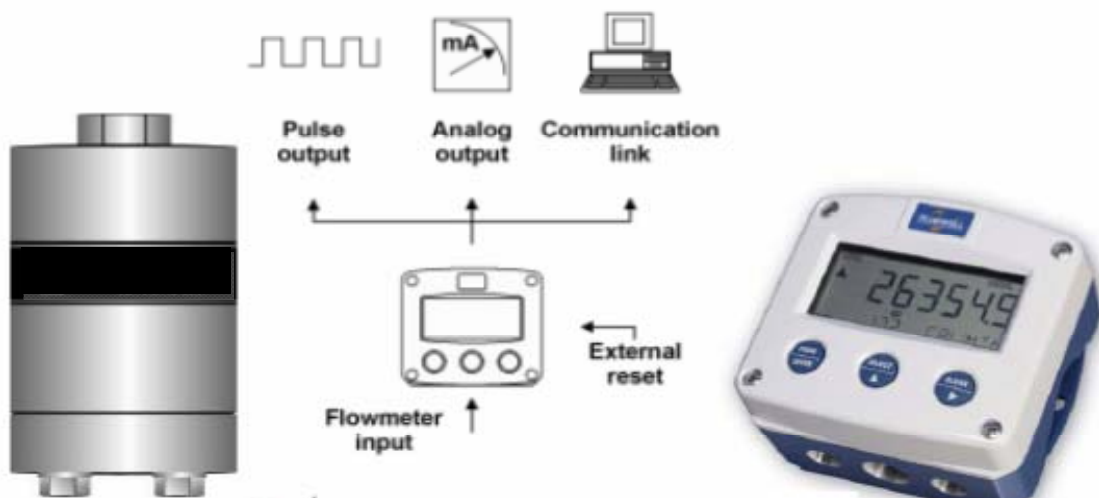
2. When using inductive devices such as relays, motors, or solenoids, care must be taken to avoid voltage transients which result when these devices are switched on and off. These transients can often be strong enough to interfere with [and even damage] system electronics. If the inductive devices are DC, a suppression diode should be placed across the coil as shown in Figure 1 .

On AC systems, a type of transient suppression device called a Varistor [MOV] should be used. The power should be controlled by a solid state relay which switches at zero voltage. The power supply driving the inductive devices should not be used to drive the system electronics. The supply for the electronics should have an AC line filter either integral with the supply or as a separate module. It is strongly recommended that wires which control the inductive devices not be bundled over long distances with sensor signal wires, even if these wires are shielded.



**FIGURE 1**

A full range of Rate/Totalizers, monitors and batch controllers are available, suitable for safe area or hazardous area applications. For wiring diagrams, recommended barriers etc, consult your supplier.





Please contact your SMC application engineer

You also need to provide the following information:

Type of fluid
Line Size
Process Temperature
Process Pressure
Electronic Options

Please provide the name of your fluid, including operating density and viscosity

Please specify the pipe diameter in unit of inches or mm

Please indicate the normal and maximum operating temperature

Please indicate the normal and maximum operating pressure

Please note the desired output signal and available power

### ➤ Model Selection Guide

ALMPD							
Example 1: Alsonic-AVM-100MC-XOD-C10							
ALMPD-	**	**	**	**			Description
<0.015~4.00 GPH (1-250 CC/min)	FMTD4						Flow range
<0.075~20.00 GPH (5-1250 CC/min)	FMTD20						
3,000 psig (21 MPa)		S					Operating Pressure
21,000 psig (147 MPa)		H					
Cable length (standard is 1 m)				C <sub>xx</sub>			Extra Cable