

Low Flow Indicator



The Flow-Mon low flow unit is a robust flow indicator specifically designed to manage low flow rates of liquids and gases.

Its basic design provides a simple and robust accurate measurement well suited to harsh industrial process applications. It is easy to install and can be mounted in any orientation offering threaded or flanged connections with very low pressure loss.

Design

A fixed tapered needle passing through an orifice in the face of a piston, the device completely seals the port to port connection when the piston is seated. As flow commences, the piston is displaced against a differential spring and moves over the tapered section of the needle to permit flow through the orifice. Accuracy is not affected by position so the unit can be mounted in any plane.

Maximum Flow Rates

1/4" - 2" 5 l/min

Maximum Pressure

Low Pressure up to 300psi (20 Bar)

Medium Pressure up to 725psi (50 Bar)

High Pressure up to 300psi (200 Bar)*

* Cast iron, steel & Stainless Steel only

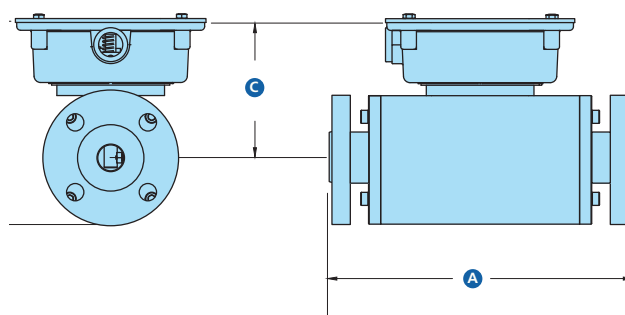
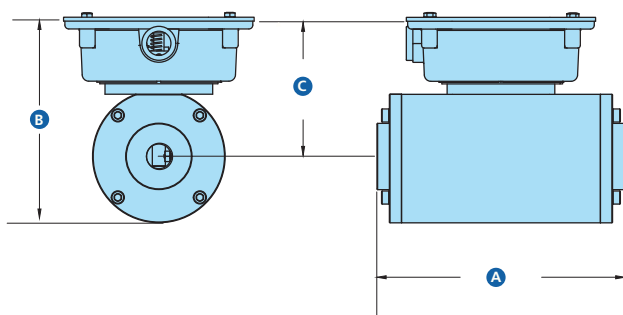
Applications

- Water
- Soluble Oils (Glycols)
- Synthetic Based Fluids
- Corrosive Fluids
- Solvents
- De-Ionised Water
- Petroleum Based Fluids
- Coolants
- Paints
- Air and Gases

Switches

The low flow meter can be connected to a field adjustable indicator or transmitter suitable for batching, trending, totalising or recording. All Flow-Mon units can be supplied with a 0-10v or 4-20mA output.

Dimensions



Min Full Scale LPM	Max Full Scale LPM	Pipe Size	Dimensions			Weight (kg)			
			a	b	c	AL	B	S/SS	PVC
0.2	5	1/4" - 2"	190	161	110	3	8	8	3



Features & Benefits

- +/- 3% accuracy across the full range
- Calibrated in any unit of measure
- Measures down to 50cc/minute
- Maximum capacity 5 litres/minute
- Installed in any position
- Low pressure drop
- Weatherproof enclosure box
- Available in a wide range of materials
- High pressure variant available
- Size range from 8mm (1/4") to 50mm (2")

PART CODE BUILDER

SERIES AND FLOW RATE

FMC*	= Low Flow
FML*	= Litres/Min
FMB*	= Imp. Gallons/Min
FMG*	= U.S. Gallons/Min
FMM*	= m ³ /Hour





* Add Full Flow Rate in Units

MATERIAL OF MANUFACTURE

AL	= Aluminium
B	= Bronze
CI	= Cast Iron
CIK	= Cast Iron Nickel Plated
S	= Carbon Steel
SS	= Stainless Steel
PTFE*	= PTFE
PVC*	= PVC

* Only available up to 4" port connections and 100 psi / 7 bar maximum pressure. Note: For materials and pressures not specified, please consult sales

FLOW DIRECTIONS

D1	= 	D2	= 
D3	= 	D4	= 

'O' RING SEAL MATERIAL

S1	= Buna	(-40°C	+110°C)
S2	= EPDM	(-40°C	+150°C)
S3	= Viton	(-20°C	+200°C)
S4	= PTFE	(-100°C	+250°C)
S5	= Perlast	(-15°C	+330°C)

PRESSURE RATING

LP	= 300psi / 20 bar maximum
MP	= 750 psi / 50 bar maximum
HP	= 3000 psi / 200 bar maximum*

* CI, CIK, S & SS only

FMC2

SS

LP

3EE

1cS

4

S1

D2

Example Part Code

INDICATOR READ OUT

ME	= Mechanical Pointer only
3EE	= SPDT 3 Wire Switch
3EEG	= SPDT 3 Wire Switch with Gold Contacts
4EE	= single-pole, double throw, double-break
6EE	= DPDT 6 Wire Switch
3EE(ATEX2)	= SPDT Explosion Proof Micro Switch to ATEX zone 2
3EE(ATEX1)	= SPDT Explosion Proof Switch to ATEX zone 1
6EE(ATEX1)	= DPDT Explosion Proof Switch to ATEX zone 1
AIR	= Pneumatic Switch
POT	= Potentiometer (specify rating)
OUT	= 4-20 mAmp Output
OUTX	= 4-20 mAmp (ATEX)
TOT	= Digital Rate Totaliser
TOTX	= Digital Rate Totaliser (ATEX)

Note 1: All electrical boxes (apart from TOT & TOTX) also carry a mechanical pointer
 Note 2: For 4 & 6 wire switches replace 3EE by 4EE or 6EE
 Note 3: Manufactured to IP65 (NEMA 4) as standard (up to 2 1/2")

Electrical Options

Code: 3EE

Basic single pole, double throw, double-break.
 10 Amp - 125, 250 or 480V.AC
 0.5 Amp - 125V.DC / 0.25 Amp - 250V.DC

Code: 4EE

Contact arrangements are single-pole, double throw and double-break
 10 Amp - 125 or 250V.AC
 0.3 Amp - 125V.DC / 0.15 Amp - 250V.DC

Code: 6EE

Double-pole, double throw switches simultaneously make and break two independent circuits.
 10 Amp - 125 or 250V.AC
 0.3 Amp - 125V.DC / 0.15 Amp - 250V.DC

Code: AIR

This system offers an alternative safety arrangement for operation in explosive atmospheres. Compressed air can be used to transmit an on / off signal from the danger area, or to operate a klaxon inside the danger area.

Code: POT

Remote read-out option (0-10V). Rating to customer's specification, e.g. 1K, 2K etc.

Code: OUT

A non-contact position encoder gives a continuous 4-20 mAmp readout. Data loggers or recorders can be added to the system.
 The 3 and 6 wire switches described above are available in ATEX approved explosion proof versions, with the appropriate enclosure box. When two or more switches are assembled in one unit, they remain independently adjustable. Re-adjustments may be carried out in the field.

PORT CONNECTIONS

2	= 1/4"	Sizes 1/4" - 2" are screwed or flanged. For flanged bodies, add relevant code letters (shown below)
3	= 3/8"	
4	= 1/2"	
6	= 3/4"	
8	= 1"	
10	= 1 1/4"	Sizes 1 1/2" - 8", Standard units have flanged bodies - add relevant code letters (shown below) cast Iron and steel mating flanges are available: For screwed add - S For socket weld, add - SW
12	= 1 1/2"	
16	= 2"	
20	= 2 1/2"	
24	= 3"	
32	= 4"	
48	= 6"	
64	= 8"	

Standard Threads are BSP, not NPT add - N.
 For Wafer connections add W then flange type (e.g. WF10). For flanged connections add one of the following codes:

F10	Alternative pressure ratings in BS EN1092 / DIN2632-5
F16	
F25	
F40	Alternative pressure ratings in BS1560/ANSI B16.5.
F150	
F300	
F600	Alternative pressure ratings in BS10
FAD	
FE	
FF	

For special flange connections, please enquire at sales

VISCOSITY AT OPERATING TEMPERATURE

State units and scale eg. Water is 1 centistoke (cS)
 Maximum rating should not exceed 600cS

AIR & GAS APPLICATIONS

Flow-Mon flow switches can be used to measure gas flows in exactly the same way as liquid flows. When enquiring for such an application the following information will be required:

- Specify gravity of the gas
- Maximum flow volume
- Operating temperature
- Operating pressure

Technical Instructions

Installation Instructions

The flow indicators are in-line devices. Mounting can be in any position, and no straight length of pipe is required before or after the unit. The unit is sandwiched between two flanges.

Under the Pressure Equipment Directive (PED) these products are Pressure Accessories, and are not approved for use as safety Accessories, as defined by the PED. If used for safety purposes, it is the responsibility of the user/installer to assess the suitability of the product in the pressure equipment or system in which it is used.

It is the responsibility of the user/installer of this equipment to ensure:-

1. The product is installed and used by suitably trained personnel in accordance with all relevant Local and National regulations and codes.
2. Safe working practices for the media & processes concerned are followed during installation & maintenance.
3. The materials of construction are suitable for the application.
4. The product is protected from fire.
5. The product is protected from impact/vibration.
6. The instrument is only cleaned by washing with detergent, do not use abrasive cleaners or solvents.
7. For outdoor use in exposed positions the instrument must be additionally protected/shielded from heavy rainfall.
8. Regular inspection for corrosion/erosion and wear are carried out.

Essential Safety Requirements

1. The instrument must be installed in accordance with the instructions provided.
2. Prior to installation ensure pipelines are flushed/drain to ensure they are free from any solid particles or pressure.
3. Care must be taken to avoid introducing torsional stress on the instrument when installing into the pipeline. Tighten sufficiently to avoid leaks & check at regular intervals during maintenance.
4. Ensure pipelines are fully primed before commencing normal use.
5. Valves must be opened or closed gradually to avoid shock/vibration.
6. Do not exceed maximum working pressure as stated on the label.
7. Only use with the fluid/gas stated on the label.
8. Do not exceed minimum/maximum working temperature as stated.

9. Do Not Use instrument if any part of the cable appears to be damaged.
10. Isolate instrument before removing cover.

General Maintenance

1. Remove instrument from pipeline.
2. Remove flanges/bowls by undoing 4 securing bolts, leaving centre housing only. (keep enclosure box and spring housing intact)
3. Check for and remove any swarf/foreign body in bowls clean if necessary.
4. Remove faceplate and window
5. Check pointer is still firmly secured
6. Push open the valve plate, (depending on flow rate tension may be high), the valve plate will spring back to 0 when released. Repeat a few times at different points along the scale.
7. Listen/watch the switch to make sure it is activated at desired min/max flow as the valve plate is pushed open. (Adjust cam if necessary)
8. **DO NOT** remove or adjust springs as this will affect the calibration of the instrument.
9. Re-assemble instrument, ensure "O" rings are properly located in grooves and have been undamaged.

Switch Setting

The cam which operates the microswitch is situated on the spindle behind the pointer and can be adjusted to give an alarm anywhere between zero and max, flow. To alter the setting, lift the cam and rotate the cam in the direction required until switch point is located, then gently lower cam in that position.

Enclosure box rotation instructions-change of flow direction

Tools required: Screw driver, Allen wrench set, 5/16 nut driver

1. Remove 4 screws from nameplate. -5/16 Nut Driver
2. Remove Name Plate and Window
3. Remove Calibrated Scale.
4. Remove Electrical Switch -Screw Driver (if monitor does not have switch(es) go to #5.)
5. Remove all 4 Allen Screws (5/32 or 4mm Allen Wrench) at base of enclosure and rotate enclosure box to the desired position
6. Place 4 Allen Screws back into required tapped and tighten control box to meter body.
7. Loosen Indicator Pointer

NOTE: if monitor does not have switch(es) skip to #11)

8. "Slightly" Loosen Cam Set Screw just enough to move cam on dial. (DO NOT LOOSEN DIAL SET SCREW LOCATED BELOW THE CAM). This will make easier to tighten once switch contact point is set.) -1/8 (3.175mm) Allen Wrench

9. Place Switch back into enclosure box and tighten until snug -DO NOT OVER TIGHTEN

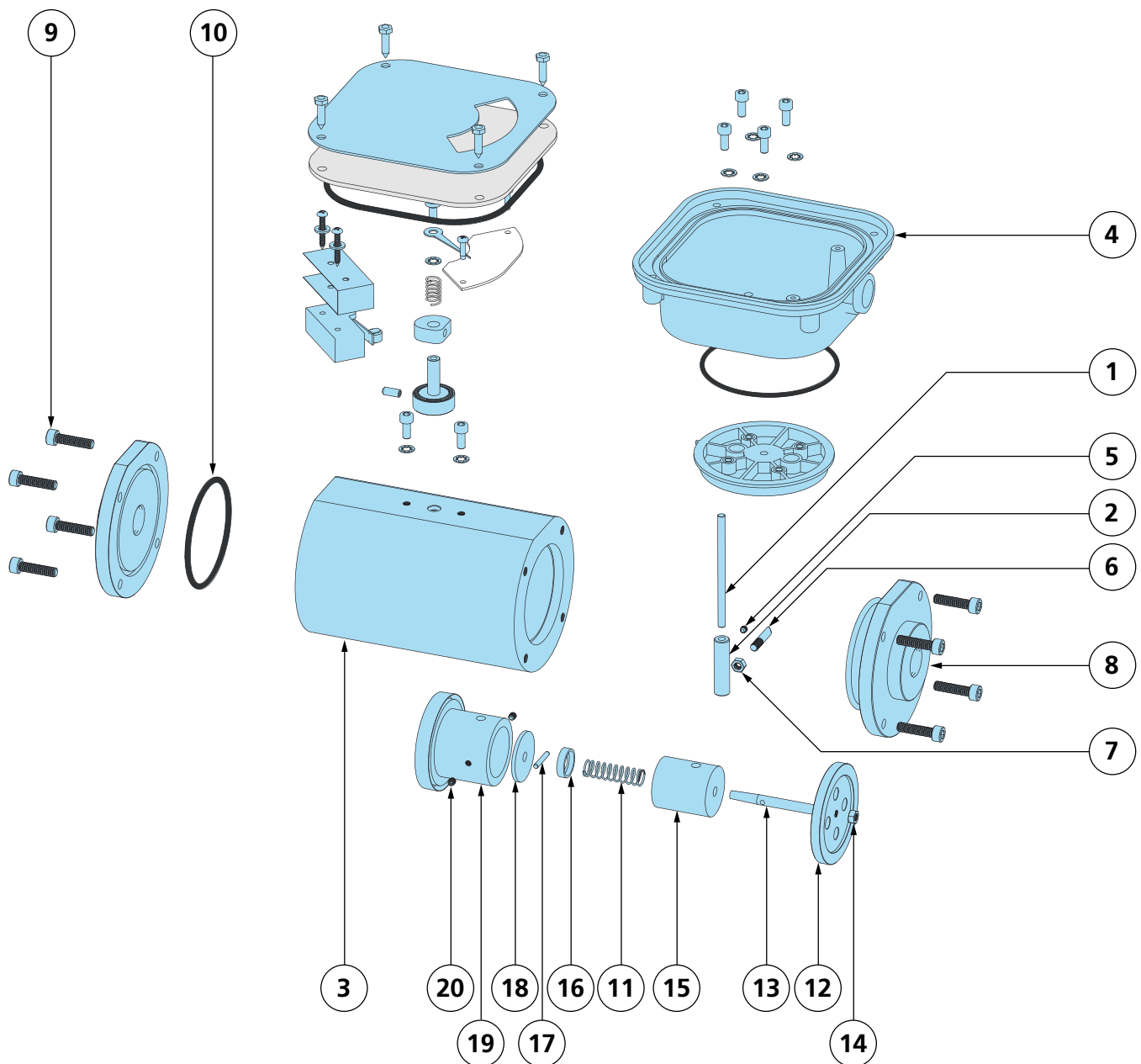
NOTE: Switch should be wired prior to re-installation

10. Rotate Cam to desired Set Point and tighten Allen Screw until snug. Cam will press against switch roller arm to actuate switch.
11. Place Calibrate Scale and tighten back in position. - DO NOT OVER TIGHTEN
12. Move Pointer to zero position on calibrated scale and tighten
13. Place Window then nameplate back on enclosure box and tighten Allen Screws.

Estimated time to rotate control box: 10 to 15 minutes.

Troubleshooting

1. In the event of a pointer appearing to stick in one position, remove centre housing and clean away pipe scale to ensure that valve plate is free to return to its seating position. (A spacer can be provided so that the flow can pass through whilst maintenance is being carried out)
2. If the pointer 'trembles' allow flow to continue. 'Trembling' is usually air entrapment, and this will be eliminated when the system becomes full.
3. At regular intervals the control valve to the circuit should be closed for one second and then opened to ensure that no large foreign body is holding the vane in one position. The indicator should drop to zero when closing the valve, and then when the valve is opened again return to the running flow point. When carrying out the procedure in 3. the indicator will immediately return to a position a little less than the running flow position and slowly return to the correct reading. This is due to the hysteresis of the 'O' rings and spring.



Parts List

Item	Qty	Part No.	Description	Material
1	1		Low Flow Spindle	Stainless Steel
2	1		Low Flow Lever Arm	Stainless Steel
3	1	5050	Shaft O Ring	Rubber, Black
4	1		Enclosure Box Assembly	
5	1			Steel
6	1		Lever	Steel
7	1		M5 Nut	Steel
8	2		Low Flow Lid	Aluminium
9	8		M6 x 25	Steel
10	2		Lid O Ring	Rubber, Black

Item	Qty	Part No.	Description	Material
11	1			Steel
12	1		Locating Plate	Steel
13	1		Tapered Shaft	Steel
14	1			Steel
15	1		Spring Retainer	Polytetrafluoroethylene
16	1		Spring Cap	Polytetrafluoroethylene
17	1			Steel
18	1		Limit Ring	Polytetrafluoroethylene
19	1		Low Flow Piston	Polytetrafluoroethylene
20	2			Steel



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