Flow meters, Flow switches and Flow transmitters

A Medium Vane-Style
For Corrosive Fluids

DESCRIPTION

These variable-area flow meters have a spring-loaded swinging vane. Mounting is in-line and in any position. Straight pipe runs, before or after the meter, are not required. The all-mechanical sensing system directly drives the pointer and remote signaling devices.

CALIBRATION

All flow meters are individually calibrated for fluids with the viscosity you specify (up to 3000 SSU (650 Centistokes)). We compensate for your fluid’s specific gravity. For NIST Traceability please consult factory.

READOUTS

The flowmeter has outputs both visual and electronic. Visual displays are either pointer (with inscribed scale) or numeric (digital LCD). Electronic outputs can be mechanical switch closure, 4-20 mA analog, HART or some combination of switches with electronic outputs (for signal redundancy). The switches can be general purpose or rated for hazardous locations (all classes, groups and divisions).

CONSTRUCTION MATERIALS

These flowmeters have plastic bodies, a wide variety of metal internals, and fittings. They are ideally suited to monitor flows of such fluids as corrosive liquids, seawater, deionized water, acids, caustics, and plating solutions. See selections in the “How to Order” section.

LINE CONNECTION

Threaded units have 2 ½ inch -12 SAE ports. Adapters are used to offer NPT female port connections in a variety of materials and sizes (see “How to Order” section). Van Stone flanges are offered in a variety of sizes in PVC.

Fluid enters at A, passes around the semi-circular vane B, exits at outlet C. The vane resists the flow because of the spring D. The further the vane is pushed the larger the passageway E becomes. This minimizes the increase in pressure drop. The vane shaft turns to operate the pointer F and remote signal devices such as the switch G.

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HOW TO ORDER  Select appropriate symbols and build a model code number, as in example shown:

**EXAMPLE:** MX - V I F 70 GM - 12I 32V1.0

| SERIES | Medium = MX |
|---------------------------------|
| HOUSING MATERIAL | |
| PVC = V | Polysulfone = P | Tefzel = T |
| INTERNAL MOVING PARTS | |
| 316 Stainless Steel = I | Titanium = T | Monel = L | Hastelloy C = C |
| SEAL MATERIAL | |
| Buna N = B | EPR = F | Viton = J | Kalrez = A | Kalrez (dynamic)/Buna N (static) = H | Kalrez (dynamic)/EPR (static) = | Kalrez (dynamic)/Viton (static) = K |

**MAX FLOW RATE LIQUIDS**

- GPM: 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160 = GM
- LPM: 40, 50, 60, 70, 80, 90, 100, 200, 250, 300, 400, 500, 600 = LM
- CMH: 2.25, 2.5, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30 = CMH

**PORT CONNECTION**

<table>
<thead>
<tr>
<th>INCHES</th>
<th>MM</th>
<th>MAX GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAN STONE PIPE FLANGE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(PVC only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>25.40</td>
<td>70</td>
</tr>
<tr>
<td>1 1/2</td>
<td>38.10</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>50.80</td>
<td>160</td>
</tr>
<tr>
<td>2 1/2</td>
<td>63.50</td>
<td>160</td>
</tr>
<tr>
<td>3</td>
<td>76.20</td>
<td>160</td>
</tr>
<tr>
<td>NPT (Female adapters)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>316 stainless steel</td>
<td></td>
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<tr>
<td>1</td>
<td>25.40</td>
<td>70</td>
</tr>
<tr>
<td>1 1/2</td>
<td>38.10</td>
<td>100</td>
</tr>
<tr>
<td>Titanium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>25.40</td>
<td>70</td>
</tr>
<tr>
<td>1 1/2</td>
<td>38.10</td>
<td>100</td>
</tr>
<tr>
<td>Monel</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>25.40</td>
<td>70</td>
</tr>
<tr>
<td>1 1/2</td>
<td>38.10</td>
<td>100</td>
</tr>
<tr>
<td>*PVC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>25.40</td>
<td>70</td>
</tr>
<tr>
<td>1 1/2</td>
<td>38.10</td>
<td>100</td>
</tr>
<tr>
<td>*Polysulfone</td>
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<td></td>
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<tr>
<td>1</td>
<td>25.40</td>
<td>70</td>
</tr>
<tr>
<td>1 1/2</td>
<td>38.10</td>
<td>100</td>
</tr>
<tr>
<td>Tefzel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>25.40</td>
<td>70</td>
</tr>
<tr>
<td>1 1/2</td>
<td>38.10</td>
<td>100</td>
</tr>
</tbody>
</table>

*Material will be same as housing; Adapter O-ring will be same as static seal material.

**FLUID CHARACTERISTICS**

Viscosity number followed by a 'V' (for SSU), 'C' (for centipoise), or 'CS' (for centistokes) followed by the specific gravity. Example: 32V1.0 would indicate a fluid with a viscosity of 32 SSU with a specific gravity of 1.0 (water).
**Service**

- Oil and dust tight (Type 12) = N
- Weatherproof (Type 4) = W
- Weatherproof, corrosion proof (Type 4X) = X

**Flow Direction**

- Left to right = R
- Right to left = L
- Up = U
- Down = D

**Special Options**

- Stainless steel ID tag for customer supplied information = ST
- Safety Glass window ref. page 4 = TG
- Manual override ref. page 4 = OG
- Dual spring = DS
- Clearance vane for ≥ 16 GPM = 286

**Switch Setting**

No symbol = Lowest possible setting (usually 10% of maximum flow)

Desired set point is assumed to be in flow units already selected (GPM). Give flow rate followed by a “D” for flow going down (flow failure) or a “U” for flow going up.

Example, 5D indicates a setting of 5 GPM in declining flow.

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**Control Box & Readout**

**A”, “L” and “Z” Boxes**

“A”, “L” and “Z” boxes are small, simple and cost effective. Available with analog display, mechanical switches or transmitters (HART or 4-20mA).

**4-20 mA Transmitter (Intrinsically Safe with Approved Barriers)**

- AX0
- LX0
- ZX0

**HART with Programmable Switch Points**

- AH0
- LH0
- ZH0

**Display Only**

- A0
- LB0
- Z0

**One SPDT (3 Wire)**

- A1
- L1
- Z1

**One High Vibration SPDT (3 Wire)**

- A1B
- L1B
- Z1B

**Two SPDT (3 Wire)**

- A2
- L2
- Z2

**Two High Vibration SPDT (3 Wire)**

- A2B
- L2B
- Z2B

**One SPDT (4 Wire)**

- A3
- L3
- Z3

**Two SPDT (4 Wire)**

- A4
- L4
- Z4

**One SPDT (3 Wire) High Temperature**

- A61
- L61
- Z61

**Two SPDT (3 Wire) High Temperature**

- A62
- L62
- Z62

**One SPDT (3 Wire) Gold Contact**

- A71
- L71
- Z71

**Two SPDT (3 Wire) Gold Contact**

- A72
- L72
- Z72

**One SPDT (3 Wire) Hermetically Sealed**

- A53
- L53
- Z53

**Two SPDT (3 Wire) Hermetically Sealed**

- A54
- L54
- Z54

**Flow Rate Display Plus**: Display only

- R0

**Flow Rate Display, 4-20 mA Transmitter Plus Options as Follows**: For > 5 Amp Circuits

- One SPDT (3 Wire) = RX0
- One High Vibration SPDT (3 Wire) = RX1
- Two SPDT (3 Wire) = RX2
- Two High Vibration SPDT (3 Wire) = RX3
- One SPDT (4 Wire) = RX4
- Two SPDT (4 Wire) = RX5

**Flow Rate Display, 4-20 mA Transmitter Plus Options as Follows**: For < 1 Amp Circuits

- One SPDT (3 Wire) = RX6
- One High Vibration SPDT (3 Wire) = RX7
- Two SPDT (3 Wire) = RX8
- Two High Vibration SPDT (3 Wire) = RX9
- One SPDT (4 Wire) = RX10
- Two SPDT (4 Wire) = RX11

**Flow Rate Display, HART Output Plus Options as Follows**: For Intrinsically Safe Only

- One SPDT (3 Wire) = RH0
- One High Vibration SPDT (3 Wire) = RH1
- Two SPDT (3 Wire) = RH2
- Two High Vibration SPDT (3 Wire) = RH3
- One SPDT (4 Wire) = RH4
- Two SPDT (4 Wire) = RH5

**“T” Box**

“T” box always has a transmitter (4-20 mA or HART) and can be in combination with a mechanical switch for redundancy. It has two junction boxes to separate wiring for switches and transmitters. The display can be analog or digital LCD.

**Tbox Readout, 4-20mA Plus Option**: No switches (intrinsically safe with approved barriers)

- TX0
- TX1
- TX2
- TX3
- TX4
- TX5
- TX6

**HART Pointer, Scale and 4-20mA Plus Option**: Two programable HART switch

- TH0
- TH1
- TH2
- TH3
- TH4
- TH5

**“R” Box**

“R” box is selected for greater visual resolution. It holds switches (general purpose and hazardous location all classes, groups and divisions) and transmitters (HART or 4-20 mA). Switch (standard service) and transmitter are offered in this control box together when signal redundancy is desired.

**Example 5D**: Indicates a setting of 5 GPM in declining flow.
ENGINEERING DATA

Maximum operating temperature:
PVC housing: 100°F (38°C)
Polysulfone housing: 200°F (95°C)
Tefzel housing: 200°F (95°C)

Maximum ambient temperature:
130°F (UL listed to 105°F (40°C; for hazardous locations -13 to +104°F)

Maximum operating pressures:(3:1 safety factor)
PVC housing: 100 PSI (6.90 BAR)
Polysulfone housing: 200 PSI (13.79 BAR)
Tefzel housing: 150 PSI (10.3 BAR)

Readout accuracy, full scale: ±2%
Switch repeatability is 1% of actual flow rate.

FLOW & PRESSURE DROP

Units with max flows to 80 GPM (300 LPM) impose a pressure drop that increases with flow, from 1.9 to 3.8 PSI. Higher flow-rated models are made possible by having a partial bypass (which raises minimum indicated flow), or dual springs (which raises the pressure drop). The table shows minimum flow rates and pressure drops (PSI) (at max flow rates) for models rated from 100 to 160 GPM.

<table>
<thead>
<tr>
<th>MAX FLOW RATE</th>
<th>BYPASS ONLY</th>
<th>DUAL SPRING*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum Flow GPM/LPM</td>
<td>Max Pressure Drop PSI</td>
</tr>
<tr>
<td>90/340</td>
<td>20/75</td>
<td>4.5</td>
</tr>
<tr>
<td>100/380</td>
<td>30/100</td>
<td>4.5</td>
</tr>
<tr>
<td>110/400</td>
<td>30/100</td>
<td>5.0</td>
</tr>
<tr>
<td>120/450</td>
<td>40/150</td>
<td>5.8</td>
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<tr>
<td>130/500</td>
<td>40/150</td>
<td>5.8</td>
</tr>
<tr>
<td>140/550</td>
<td>50/190</td>
<td>6.5</td>
</tr>
<tr>
<td>150/570</td>
<td>50/190</td>
<td>6.5</td>
</tr>
<tr>
<td>160/600</td>
<td>50/190</td>
<td>6.5</td>
</tr>
</tbody>
</table>

*When dual-spring is ordered you must specify special option DS. Some dual-spring units also have partial bypass to achieve high flow ranges.

SPECIAL OPTIONS

Identification tag: (option ST) customer-supplied information is stamped on a stainless steel tag that is attached to the nameplate.

Safety Glass window: (option TG) replaces the standard window with "Laminated Safety Glass" ANSI Z97.1 and CPSC 1601 CFR 1201.

Manual override: (option E) provides an extended shaft you can manipulate to clear debris, simulate flow, adjust switch settings, etc. Same material as internals specified.

Clearance vane: (option Z86) the swing vane is modified to provide extra clearance for liquids that contain particulate. Available for maximum flow range of 16 GPM or greater, this reduces the turndown to a minimum of 4 GPM.
CONTROL BOX SELECTION GUIDE

“A”, “L” and “Z” Boxes

Maximum installation dimensions

“R” Box

Maximum installation dimensions
CONTROL BOX SELECTION GUIDE

“T” Box

Maximum installation dimensions

Vanstone Flanges
(PVC units only)

"Flow up" or "Flow down" dimensions are the same.
Scale numbers are turned 90° to be right reading.