Flow meters, Flow switches and Flow transmitters
A Small 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 a 7/8-14 inch SAE ports. Adapters are used to offer NPT port connections both male and female and in plastic or 316 SS (see “How to order” section). One inch diameter Van Stone flanges are offered 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: SX - P I F 6 GM-8R 4FS - 32V1.0 -

SERIES
Small vane style corrosion resistant = SX

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 = E
Viton® = F
Kalrez™ = J
Kalrez (dynamic)/Buna N (static) = A
Kalrez (dynamic)/EPR (static) = H
Kalrez (dynamic)/Viton (static) = K

MAX FLOW RATE LIQUIDS
GPM: 3, 4, 5, 6, 7, 8, 9, 10, 15 & 20
LPM: 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 75
CMH: .75, 1, 1.25, 1.5, 2, 2.5, 3, 3.5, 4, 4.5

SCALE CALIBRATIONS
Calibrated in gallons per minute = GM
Calibrated in liters per minute = LM
Calibrated in cubic meters per hour = CMH
Dual gallons & liters per minute = GLM

Note: For specific calibrated increments and other scales consult factory

PORTING
PORT ADAPTER
NPT  Max Flow  Plastic*  Plastic*  316 S.S.
Inches  MM  (gpm)  Male  Female  Male  Female
1/4  6.350  8  2MP  2FP
1/2 12.70  10  4MP  4FP  4FS
3/4 19.05  10  6MP  6FP  6FS
1 25.40  20  8MP

*Material will be same as housing

VAN STONE PIPE FLANGE

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).
### 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).

<table>
<thead>
<tr>
<th>A Box</th>
<th>L Box</th>
<th>Z Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polysulfone</td>
<td>Aluminum</td>
<td>316 SS</td>
</tr>
</tbody>
</table>

**4-20mA transmitter (Intrinsically safe with approved barriers)**

- HART with programmable switch points: AXØ, LXØ, ZKØ
- Display only: AØ, LØ, ZØ
- 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, L51, 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

**“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 4-20mA). Switch (standard service) and transmitter are offered in this control box together when signal redundancy is desired.

**Flow rate display plus:**

- Display only: R0
- One SPDT (3 wire): R1
- One high vibration SPDT (3 wire): R1B
- Two SPDT (3 wire): R2
- Two high vibration SPDT (3 wire): R2B
- One SPDT (4 wire): R3
- Two SPDT (4 wire): R4
- One SPDT (3 wire) high temperature: R61
- Two SPDT (3 wire) high temperature: R62
- One SPDT (3 wire) gold contact: R71
- Two SPDT (3 wire) gold contact: R72

**Flow rate display, Hazardous location switches as follows:**

**For > 5 amp circuits**

- One SPDT hazardous location: R7
- One DPDT hazardous location: R17

**For < 1 amp circuits**

- One SPDT hazardous location: R20
- One DPDT hazardous location: R21
- One SPST hazardous location proximity: R30
- Two SPST hazardous location proximity: R31

**Flow rate display, 4-20mA transmitter plus options as follows:**

- Display and transmitter only: RXØ
- One SPDT (3 wire): RX1
- Two SPDT (3 wire): RX2
- One SPDT (4 wire): RX3
- Two SPDT (4 wire): RX4
- One SPDT (3 wire) high temperature: RX61

**Flow rate display, HART output plus options as follows:**

- HART output only: RHØ
- One SPDT (3 wire): RH1
- Two SPDT (3 wire): RH2
- One SPDT (4 wire): RH3
- Two SPDT (4 wire): RH4

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**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
- High accuracy (+/-3%) ref. page 4 = HA
- CSA enclosure / PVC window = C
- Safety Glass window ref. page 4 = TG
- Clearance vane for ≥ 5 GPM = Z86
- Wall mounting bracket ref. page 4 = W
- Foot mounting bracket ref. page 4 = F

**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, 2D indicates a setting of 2 GPM in declining flow.

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**“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.

**Pointer, scale and 4-20mA plus option:**

No switches (Intrinsically safe with approved barriers): TXØ, TX1, TX2, TX3, TX4, TX61

- One SPDT (3 wire): TXL0, TXL1, TXL2, TXL3, TXL4, TXL61

**HART, pointer, scale plus option:**

- Two programmable HART switches: THØ, TH1, TH2, TH3, TH4, TH61

**LCD readout, 4-20mA plus option:**

- No switches (Intrinsically safe with approved barriers): TXL0, TXL1, TXL2, TXL3, TXL4, TXL61
- One SPDT (3 wire): TXL0, TXL1, TXL2, TXL3, TXL4, TXL61
- One SPDT (4 wire): TXL0, TXL1, TXL2, TXL3, TXL4, TXL61
- One SPDT (3 wire) high temperature: TXL0, TXL1, TXL2, TXL3, TXL4, TXL61

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- One SPDT hazardous location: R20
- One DPDT hazardous location: R21
- One SPST hazardous location proximity: R30
- Two SPST hazardous location proximity: R31

**Flow rate display, 4-20mA transmitter plus options as follows:**

- Display and transmitter only: RXØ
- One SPDT (3 wire): RX1
- Two SPDT (3 wire): RX2
- One SPDT (4 wire): RX3
- Two SPDT (4 wire): RX4
- One SPDT (3 wire) high temperature: RX61

**Flow rate display, HART output plus options as follows:**

- HART output only: RHØ
- One SPDT (3 wire): RH1
- Two SPDT (3 wire): RH2
- One SPDT (4 wire): RH3
- Two SPDT (4 wire): RH4
ENGINEERING DATA

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

Maximum ambient temperature:
130°F (55°C) (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: ±5%
Switch repeatability is 1% of actual flow rate

INSTALLATION

Flow monitors mount in-line and are typically supported by rigid pipe. For additional support when using tubing or flexible hose, order special options W (wall) or F (foot) mounting brackets.

FLOW & PRESSURE DROP

Maximum flow ranges to 8 GPM/32 LPM = pressure drop from 1.9 to 2.5 PSID (2.2 PSID average).
Maximum flow ranges to 9 to 12 GPM/45 LPM = pressure drop from 1.9 to 4 PSID (2.95 PSID average).
Maximum flow ranges to 15 GPM/56 LPM = pressure drop from 1.9 to 5 PSID (3.5 PSID average).
Maximum flow ranges to 16 GPM/60 LPM = pressure drop from 1.9 to 5.5 PSID (3.7 PSID average).
Maximum flow ranges to 20 GPM/75 LPM = pressure drop from 1.9 to 6 PSID (4.0 PSID average).

SPECIAL OPTIONS

High Accuracy: (option HA) Modification of full scale to +/-3%. HA not available with transmitter or R7, R17, R18, R19 switch options. Water viscosities require a flow rate of 3 GPM or greater. On viscosities (200 SSU and greater) requires flow rates of 1 GPM or greater.

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.

Clearance vane: (option Z86) the swing vane is modified to provide extra clearance for liquids that contain particulate. Available for maximum flow range of 5 TO 9 GPM. This reduces the turndown. The minimum flow is 1.5 GPM. Z86 is standard for maximum flows 10 to 20 GPM.
CONTROL BOX SELECTION GUIDE

“A”, “L” and “Z” Boxes

Maximum installation dimensions

“R” Box

Maximum installation dimensions

<table>
<thead>
<tr>
<th>ROUND ENCLOSURE JUNCTION BOX OPTIONS</th>
<th>RX2 R8.53 [217mm] APPROXIMATE SWING RADIUS FOR 2 SWITCHES &amp; 2 JUNCTION BOXES.</th>
<th>RX1 R8.19 [208mm] APPROXIMATE SWING RADIUS FOR ALL OTHER OPTIONS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Junction Box</td>
<td>Primary Location 1 or 2 Switches or Transmitter, but NOT both.</td>
<td>Primary Location 1 or 2 Switches or Transmitter, but NOT both.</td>
</tr>
<tr>
<td>1 Junction Box</td>
<td>One type of Electrical Item Only – 1 or 2 Switches or Transmitter, but NOT both.</td>
<td>One type of Electrical Item Only – 1 or 2 Switches or Transmitter, but NOT both.</td>
</tr>
<tr>
<td>2 Junction Boxes</td>
<td>1/2” NPT CONDUIT CONNECTION.</td>
<td>1/2” NPT CONDUIT CONNECTION.</td>
</tr>
</tbody>
</table>

6.50 MAX.
PORT-TO-PORT

3/4” NPT CONDUIT CONNECTION

5.12 [130mm] APPROX. SWING RADIUS

1/2” NPT CONDUIT CONNECTION.
CONTROL BOX SELECTION GUIDE

"T" Box

Maximum installation dimensions

OVERALL PORT-TO-PORT DIMENSIONS FOR ALL SX METERS WITH ADAPTER FITTINGS. ALL DRAWINGS ARE SHOWN WITH FEMALE PLASTIC FITTINGS.

<table>
<thead>
<tr>
<th>FITTING SIZE NPTF</th>
<th>A (INCHES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4, MALE</td>
<td>6.00</td>
</tr>
<tr>
<td>1/2, MALE</td>
<td>6.25</td>
</tr>
<tr>
<td>3/4 OR 1, MALE</td>
<td>6.50</td>
</tr>
<tr>
<td>ALL FEMALE PLASTIC</td>
<td>5.50</td>
</tr>
<tr>
<td>ALL FEMALE S.S.</td>
<td>5.88</td>
</tr>
</tbody>
</table>