

Flow meters, Flow switches and Flow transmitters

A Medium Vane-Style For Corrosive Fluids



**NIST Traceable Calibration
Certificate Available**

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 mechan-

ical 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

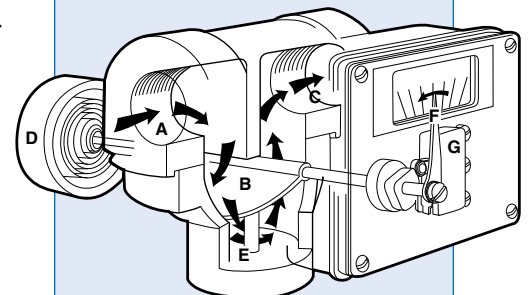
These flowmeters have plastic bodies, a wide variety of metal internals, and fittings. They are ideally suited to monitor flows of such fluids as corrosive liquids, seawater, deionized water, acids, caustics, and plating solutions. See selections in the "How to Order" section.

LINE CONNECTION

Threaded units have 2 1/2 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.



*MX shown with "A"
style control box.*



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

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	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, 150, 200, 250, 300, 350, 400, 500, 600 = LM
CMH	2.25, 2.5, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30 = CMH

PORT CONNECTION			
	Inches	MM	Max GPM
VAN STONE PIPE FLANGE			
(PVC only)	1	25.40	70 = 8R
	1 1/2	38.10	100 = 12R
	2	50.80	160 = 16R
	2 1/2	63.50	160 = 20R
	3	76.20	160 = 24R
NPT (Female adapters)			
316 stainless steel	1	25.40	70 = 8I
	1 1/2	38.10	100 = 12I
Titanium	1	25.40	70 = 8T
	1 1/2	38.10	100 = 12T
Monel	1	25.40	70 = 8L
	1 1/2	38.10	100 = 12L
*PVC	1	25.40	70 = 8V
	1 1/2	38.10	100 = 12V
*Polysulfone	1	25.40	70 = 8P
	1 1/2	38.10	100 = 12P
*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	=	E
Dual spring	=	DS
Clearance vane for ≥ 16 GPM	=	Z86

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.		

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).

A Box	L Box	Z Box
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A, L and Z small control box in the following configurations and materials: Polysulfone Aluminum 316 SS

Configuration	Polysulfone	Aluminum	316 SS
4-20 mA transmitter (Intrinsically safe with approved barriers)	AX0	LX0	ZX0
HART with programmable switch points	AH0	LH0	ZH0
Display only	A0	L0	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



"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.

R Box

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:

One SPDT hazardous location	R7
One DPDT hazardous location	R17
Two SPDT hazardous location	R18
Two DPDT hazardous location	R19

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

Display and transmitter only (Intrinsically safe with no switch options with approved barriers)	RX0
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 & 4-20mA output:

Hart protocol is not intrinsically safe	
HART & 4-20mA output only	RH0
One SPDT (3 wire)	RH1
Two SPDT (3 wire)	RH2
One SPDT (4 wire)	RH3
Two SPDT (4 wire)	RH4

T Box

"T" Box

"T" box always has a transmitter (4-20 mA) 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.

NOTE: The 4-20mA transmitter with or without the LCD and with NO switches is Intrinsically safe with approved barriers.



Pointer, scale and 4-20 mA:

No switches	TX0
One SPDT (3 wire)	TX1
Two SPDT (3 wire)	TX2
One SPDT (4 wire)	TX3
Two SPDT (4 wire)	TX4
One SPDT (3 wire) high temperature	TX61

Flow rate display, HART & 4-20mA output:

HART protocol is not intrinsically safe	
HART & 4-20mA output only	TH0
One SPDT (3 wire)	TH1
Two SPDT (3 wire)	TH2
One SPDT (4 wire)	TH3
Two SPDT (4 wire)	TH4



LCD readout, 4-20mA with 2 open collectors:

No switches	TXL0
One SPDT (3 wire)	TXL1
One SPDT (4 wire)	TXL3
One SPDT (3 wire) high temperature	TXL61

ENGINEERING DATA

Maximum operating temperature:

PVC housing: 100°F (38°C)
 Polysulfone 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)

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.

MAX FLOW RATE GPM/LPM	BYPASS ONLY		DUAL SPRING*	
	Minimum Flow GPM/LPM	Max Pressure Drop PSI	Minimum Flow GPM/LPM	Max Pressure Drop PSI
90/340	20/75	4.5	10/40	6.0
100/380	30/100	4.5	10/50	8.0
110/400	30/100	5.0	20/90	6.8
120/450	40/150	5.8	20/90	6.8
130/500	40/150	5.8	20/90	6.8
140/550	50/190	6.5	20/90	6.8
150/570	50/190	6.5	30/100	6.8
160/600	50/190	6.5	30/100	7.5

*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.

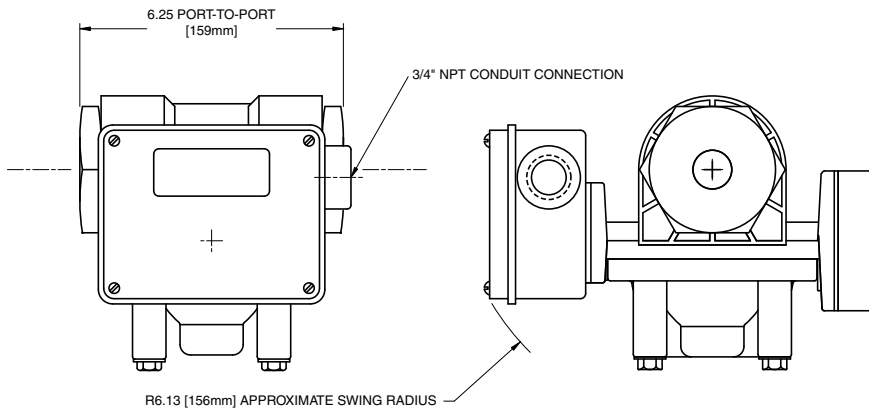
Safety Glass window: (option **TG**) replaces the standard window with "Laminated Safety Glass" ANSI Z97.1 and CPSC 1601 CFR 1201.

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.

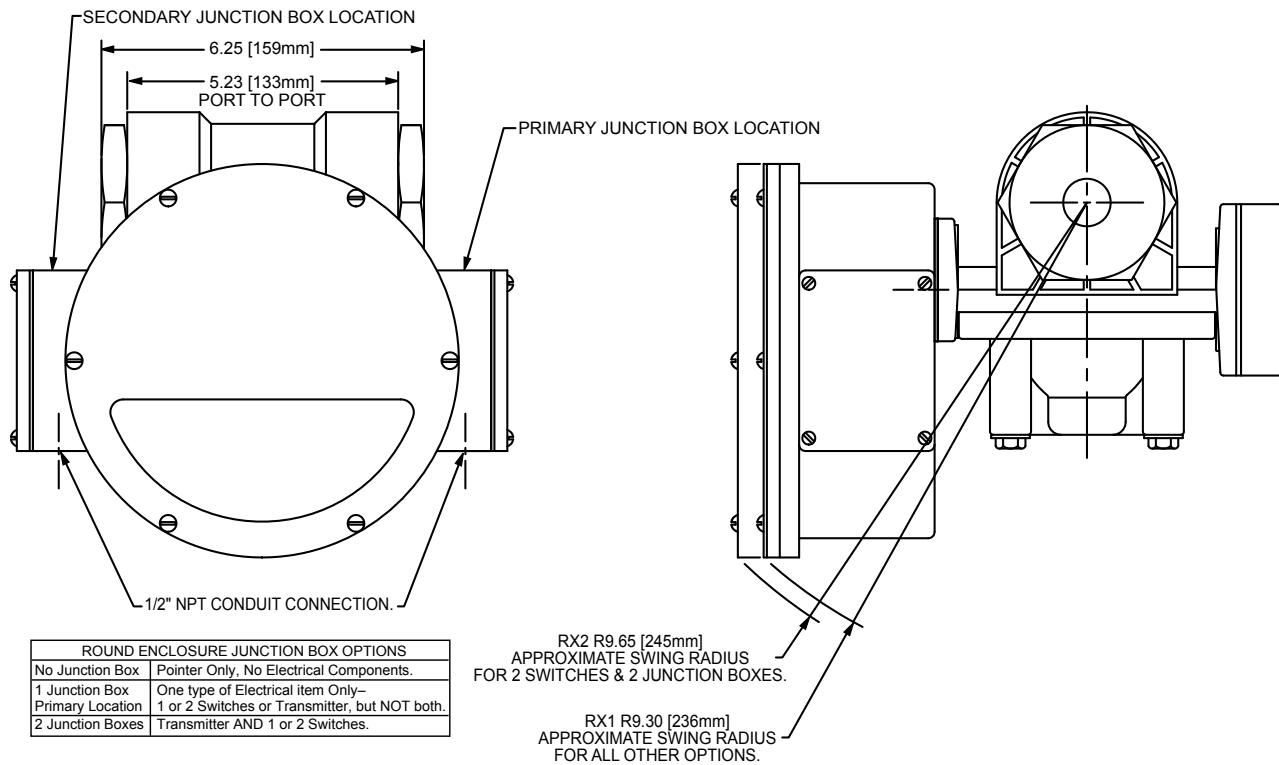
CONTROL BOX SELECTION GUIDE

“A”, “L” and “Z” Boxes



Maximum installation dimensions

“R” Box



ROUND ENCLOSURE JUNCTION BOX OPTIONS	
No Junction Box	Pointer Only, No Electrical Components.
1 Junction Box Primary Location	One type of Electrical item Only— 1 or 2 Switches or Transmitter, but NOT both.
2 Junction Boxes	Transmitter AND 1 or 2 Switches.

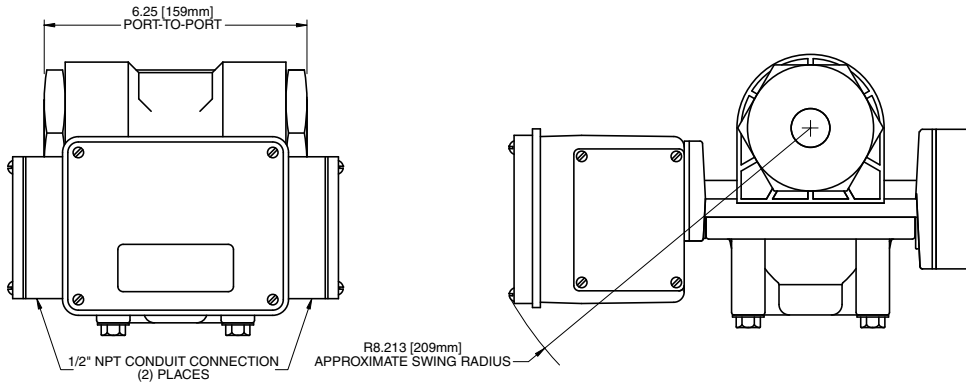
RX2 R9.65 [245mm]
APPROXIMATE SWING RADIUS
FOR 2 SWITCHES & 2 JUNCTION BOXES.

RX1 R9.30 [236mm]
APPROXIMATE SWING RADIUS
FOR ALL OTHER OPTIONS.

Maximum installation dimensions

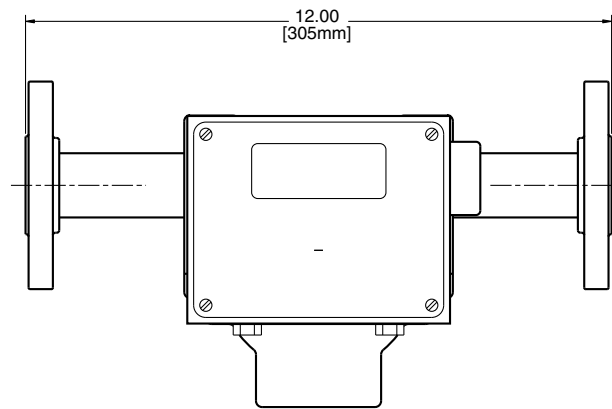
CONTROL BOX SELECTION GUIDE

“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.



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