

# Flow meters, Flow switches and Flow transmitters

## A Small 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 mechanical switch closure, 4-20 mA analog, HART or some combi-

nation 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

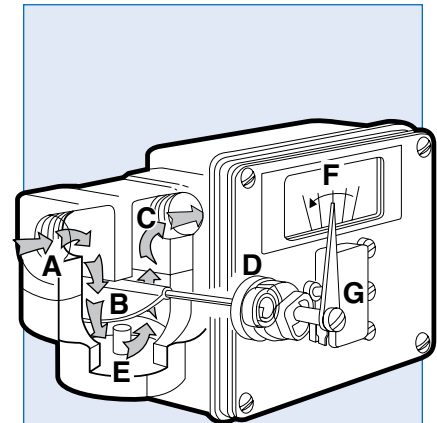
These flowmeters have plastic bodies, a wide variety of metal internals, and fittings. They are ideally suited to monitor flows of such fluids as corrosive liquids, seawater, deionized water, acids, caustics, and plating solutions. See selections in the "How to Order" section.

### 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.



*SX 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**.

**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

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	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		
Inches	Flanged Max Flow	Plastic (PVC only)
1/2	10	4R
1	20	8R

**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
High accuracy (+/-3%) ref. page 4	=	HA
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.

**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

A, L and Z small control box in the following configurations and materials:	Polysulfone	Aluminum	316 SS
4-20 mA transmitter (Intrinsically safe with approved barriers)	AXØ	LXØ	ZXØ
HART with programmable switch points	AHØ	LHØ	ZHØ
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	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	RØ
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

**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)	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 & 4-20mA output:**

Hart protocol is not intrinsically safe	
HART & 4-20mA output only	RHØ
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	TXØ
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	THØ
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	TXLØ
One SPDT (3 wire)	TXL1
One SPDT (4 wire)	TXL3
One SPDT (3 wire) high temperature	TXL61

## ENGINEERING DATA

### Maximum fluid temperature:

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

### Readout accuracy, full scale: ±5%

Switch repeatability is 1% of actual flow rate

## 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

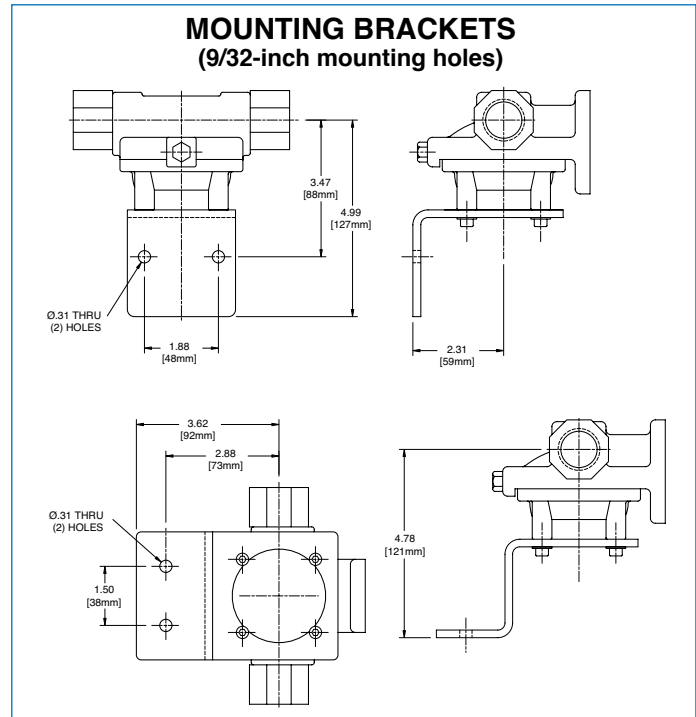
**High Accuracy:** (option **HA**) Modification of full scale to +/-3%. HA not available with transmitter or R7, R17 switch options. Water viscosities require a flow rate of 3 GPM or greater. On viscosities (200 SSU and greater) requires flow rates of 1 GPM or greater.

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

**Safety Glass window:**

## 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.



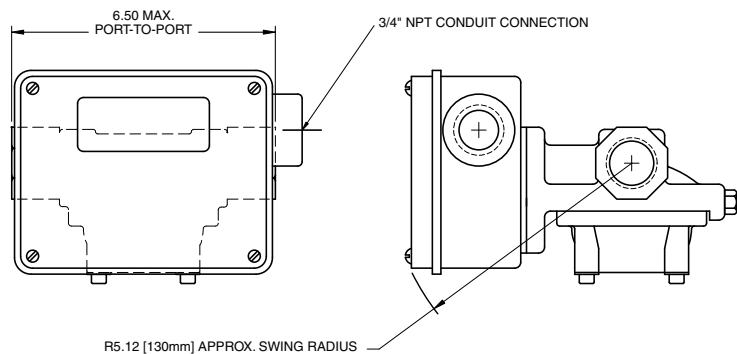
(option **TG**) replaces the standard window with "Laminated Safety Glass" ANSI Z97.1 and CPSC 1601 CFR 1201.

**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.

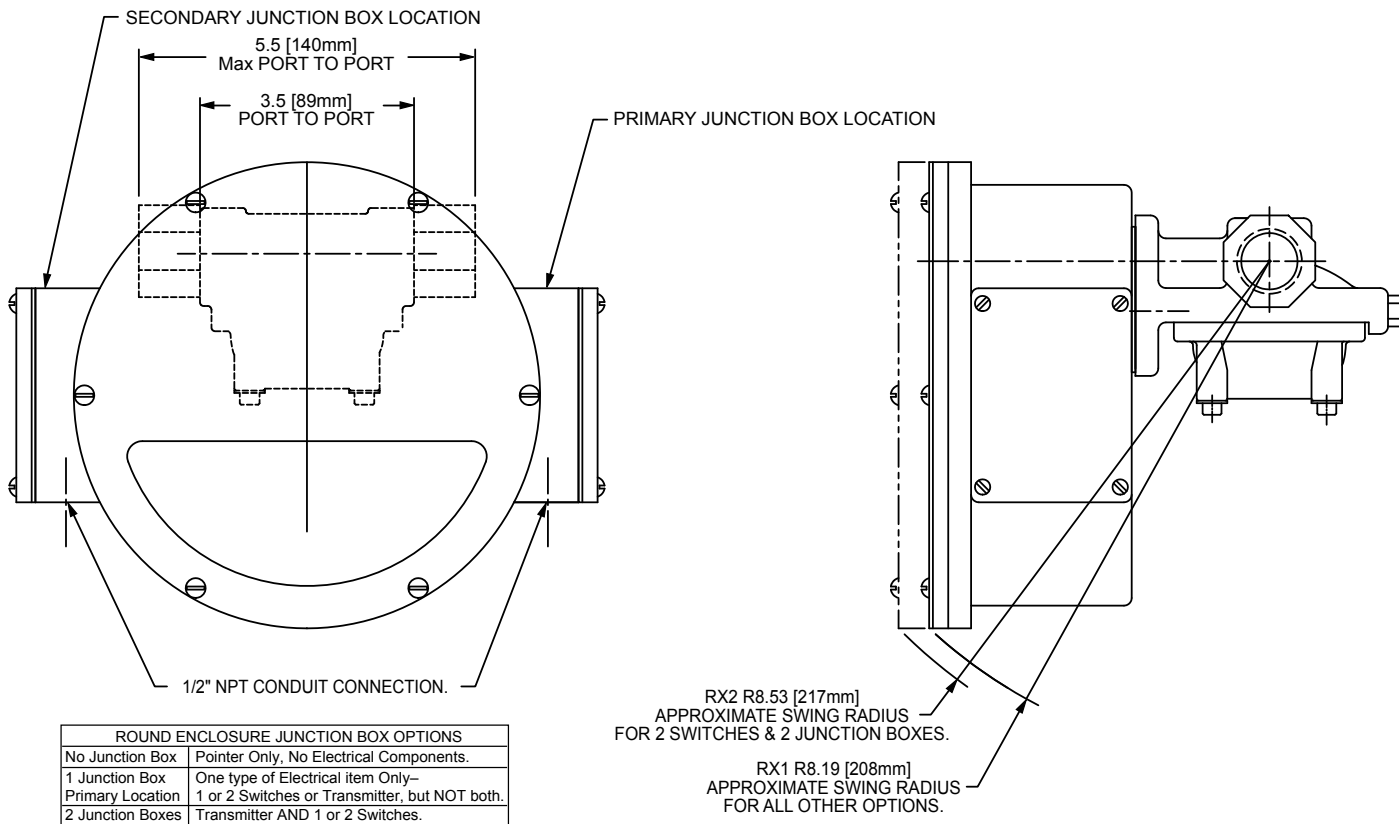
# CONTROL BOX SELECTION GUIDE

## “A”, “L” and “Z” Boxes



Maximum installation dimensions

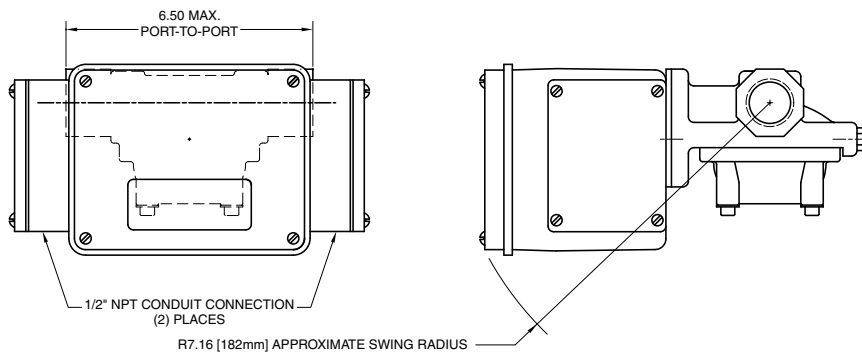
## “R” Box



Maximum installation dimensions

# 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.

FITTING SIZE NPTF	A (INCHES)
1/4, MALE	6.00
1/2, MALE	6.25
3/4 OR 1, MALE	6.50
ALL FEMALE PLASTIC	5.50
ALL FEMALE S.S.	5.88