MAX FLOW SIZES FROM
0.5 TO 20 GPM (2 TO 75 LPM)

MAX LIQUID PRESSURE 300 PSI (20.69 BAR) **SN SERIES**
MAX LIQUID PRESSURE 500 PSI (34.48 BAR) **SM SERIES**
MAX LIQUID PRESSURE 2000 PSI (137.93 BAR) **SH SERIES**

Flow meters, Flow switches and Flow transmitters

A Small Vane Style For Liquids

HART COMMUNICATION PROTOCOL

NIST Traceable Calibration Certificate Available

SN Series shown with "A" style control box

DESCRIPTION

These are variable area meters with a spring biased semi-circular vane that opens wider with more flow. They are installed in-line in any position. Straight pipe runs before or after the meter are not required. The simple mechanical connection directly drives pointers, switches and transmitters.

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).

CALIBRATION

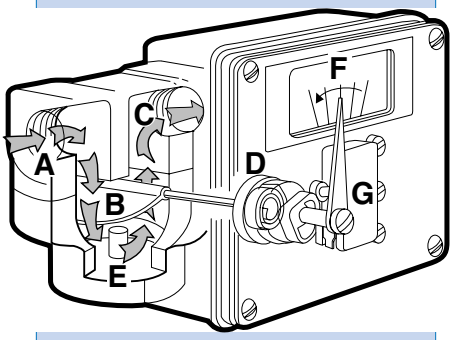
All flow meters are individually calibrated for fluids with the viscosity you specify (up to 3000 SSU/650 Centistokes). We also compensate for your fluid's specific gravity. For NIST Traceability please consult factory.

CONSTRUCTION MATERIALS

The meter body, internal moving parts, and seals are offered in a variety of materials to suit a wide range of applications: water, synthetic and petroleum based oils, paint, corrosives and solvents. See selections in the "How to Order" section.

LINE CONNECTION

Ports can be threaded or flanged. See selections in the "How to Order" section.



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 pressure drop. The vane shaft turns to operate the pointer F and remote signal devices such as the switch G.

Viton® and Kalrez™ are registered trademarks for DuPont Performance Elastomers.

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

EXAMPLE: SN - B S B 7GM V - 4 - 32ØV.9 -

SERIES BY PRESSURE RATING		
Normal pressure (300 PSI)	=	**SN**
Medium pressure (500 PSI)	=	**SM**
High pressure (2000 PSI) *Note: Max pressure for 316 SS body reduced to 1500psi. Exterior bolts are not 316 SS.	=	**SH**

HOUSING MATERIAL	WHERE USED			
Aluminum with nylon flow chamber	Lube oil	=	**A**	SN only
Brass with nylon flow chamber	Water	=	**B**	
Naval bronze with nylon flow chamber	Specialty	=	**W**	
Aluminum	Lube oil	=	**D**	SN or SM
Aluminum (hard coated)	Lube oil with exterior corrosion protection	=	**E**	
Brass	Water	=	**F**	
Naval bronze	Sea water	=	**U**	
Stainless steel (316)	Chemicals, corrosives	=	**I**	SH, SM or SN
Cast iron	Oil	=	**C**	
Cast iron, nickel plated	Water, oil with exterior corrosion protection	=	**N**	
Carbon steel	Oil	=	**M**	
Carbon steel, nickel plated	Water, oil with exterior corrosion protection	=	**J**	

NOTE: SH-I units only good to 1500 PSI. External screws not 316 SS.

INTERNAL MOVING PARTS			
Stainless steel (300 series)	Standard for oil	=	**S**
Stainless steel (316 series)	Water, chemicals and corrosives	=	**I**
Titanium	Sea water	=	**T**
Monel	Corrosives	=	**L**

SEAL MATERIAL			
Buna N	Water, oil	=	**B**
EPR	Hot water, caustics	=	**E**
Viton	Acids, some caustics	=	**F**
Kalrez	Corrosives, solvents	=	**J**
Kalrez (dynamic) & Buna N (static)	Specialty	=	**A**
Kalrez (dynamic) and EPR (static)	Specialty	=	**H**
Kalrez (dynamic) and Viton (static)	Specialty	=	**K**
Kalrez (dynamic) and Teflon (static)	Corrosives, solvents		
	Not available with A, B or W "Housing Materials"	=	**T**

MAX FLOW RATE LIQUIDS

Viscosity minimum (SSU/Centistokes)

	500/110	250/55	100/20	None		
GPH:	3Ø	6Ø	9Ø, 12Ø	18Ø, 24Ø, 3ØØ, 2ØØ, 3ØØ, 4ØØ, 5ØØ, 6ØØ, 7ØØ, 8ØØ, 9ØØ, 1ØØØ, 12ØØ	=	**GH**
GPM:	.5	1	1.5, 2	3, 4, 5, 6, 7, 8, 9, 1Ø, 15 & 2Ø	=	**GM**
LPM:	2	4	6, 8	1Ø, 15, 2Ø, 25, 3Ø, 35, 4Ø, 45, 5Ø, 6Ø, 75	=	**LM**
LPH:	1ØØ	2ØØ	35Ø, 5ØØ	6ØØ, 7ØØ, 8ØØ, 9ØØ, 1ØØØ, 15ØØ, 2ØØØ, 25ØØ, 3ØØØ, 35ØØ, 4ØØØ	=	**LH**
CMH:	.1	.25	.35, .5	.75, 1, 1.25, 1.5, 2, 2.5, 3, 3.5, 4, 4.5	=	**CMH**
GLM: Gallons & liters per minute -dual scale					=	**GLM**
DGM: Dual viscosity scale					=	**DGM**

NOTE: Dual Scales not available with LCD displays

Hand operated globe valve integral to flowmeter body (SN series only)		
No Valve	=	No Symbol
Valve (brass)	=	**V**
Not available on carbon steel or stainless steel housings.		

THREADED ATTACHMENT

Pipe size and attachment method

Pipe Size In Inches	NPT Female	SAE	BSPP	BSPT	Max Flow In GPM
1/4	**2**	**4T**	**4BP**	**4BT**	**8**
3/8	**3**	**6T**	**6BP**	**6BT**	**8**
1/2	**4**	**8T**	**8BP**	**8BT**	**12**
5/8		**1ØT**	**1ØBP**	**1ØBT**	**15**
3/4	**6**	**12T**	**12BP**	**12BT**	**2Ø**

FLANGED

Ex: 2FWCS15ØRF = 1/4", Welded, Class 15Ø, Raised Face flange

Pipe Size In Inches	Attachment	Material	Class	Style
2 = 1/4"	**FW**=Welded	**CS**=Carbon Steel	**15Ø**	**RF**=Ansi raised face
3 = 3/8"	**FT**=Threaded	**S**=316 Stainless	**3ØØ**	
4 = 1/2"			**6ØØ**	
6 = 3/4"				
8 = 1"				

FLUID CHARACTERISTICS

Viscosity number followed by a 'V' (for SSU), 'C' (for centipoise), or 'CS' (for centistokes) followed by the specific gravity. Example: **32ØV.9** would indicate a fluid with a viscosity of 320 SSU with a specific gravity of .9. For dual viscosities (where there is a start up viscosity or where there may be a range) put in both values with a slash. Example: 32Ø/15ØV.9.

A1 W L - ST - 2D

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		
High-temp- 400°F, 300°F for transmitter options	=	HT
High accuracy (+/-3%) ref. page 4	=	HA
Stainless steel ID tag for customer supplied information	=	ST
Safety Glass window ref. page 4	=	TG
Clearance vane for ≥ 5 GPM	=	Z86
Foot mount bracket	=	F
Wall mount bracket	=	W

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. **2D**

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

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.

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

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

"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

ENGINEERING DATA

Maximum fluid temperature: 200°F (95°C)
Optional max. fluid temperatures:
300 & 400°F (150 & 205°C) (option **HT**)
Maximum ambient temp: 150°F (65°C)
CSA listed only to 105°F (40°C)
Series SN max. operating pressure:
(3:1 safety factor): 300 PSI (20.69 BAR)
Series SM max. operating pressure:
(2:1 safety factor): 500 PSI (34.48 BAR)
Series SH max. operating pressure:
(3:1 safety factor) 2000 PSI (137.93 BAR)
Stainless Steel with special option Z67SH,
1500 PSI (103.42 BAR)
Readout accuracy, full scale: ±5%
Repeatability of switches 1% of actual flow rate

INSTALLATION

Flow monitors mount in-line and are typically supported by rigid pipe.

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 temperature: (option **HT**) requires all-metal construction of housing/orifice cover with seals of Viton, EPR, Kalrez or Teflon (compatible with fluid). A thermal barrier (heat-resistant cloth) is added between the housing and the control box, which must be used with service option "W" (weatherproof) or "X" (corrosion resistant). A metal scale is provided.

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.

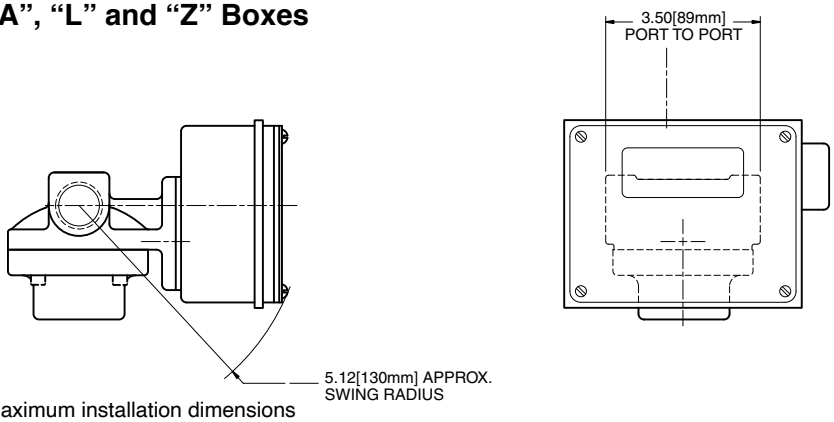
Identification tag: (option **ST**) customer-supplied information is stamped on a stainless steel tag that is attached to the nameplate.

Safety Glass window:
(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.

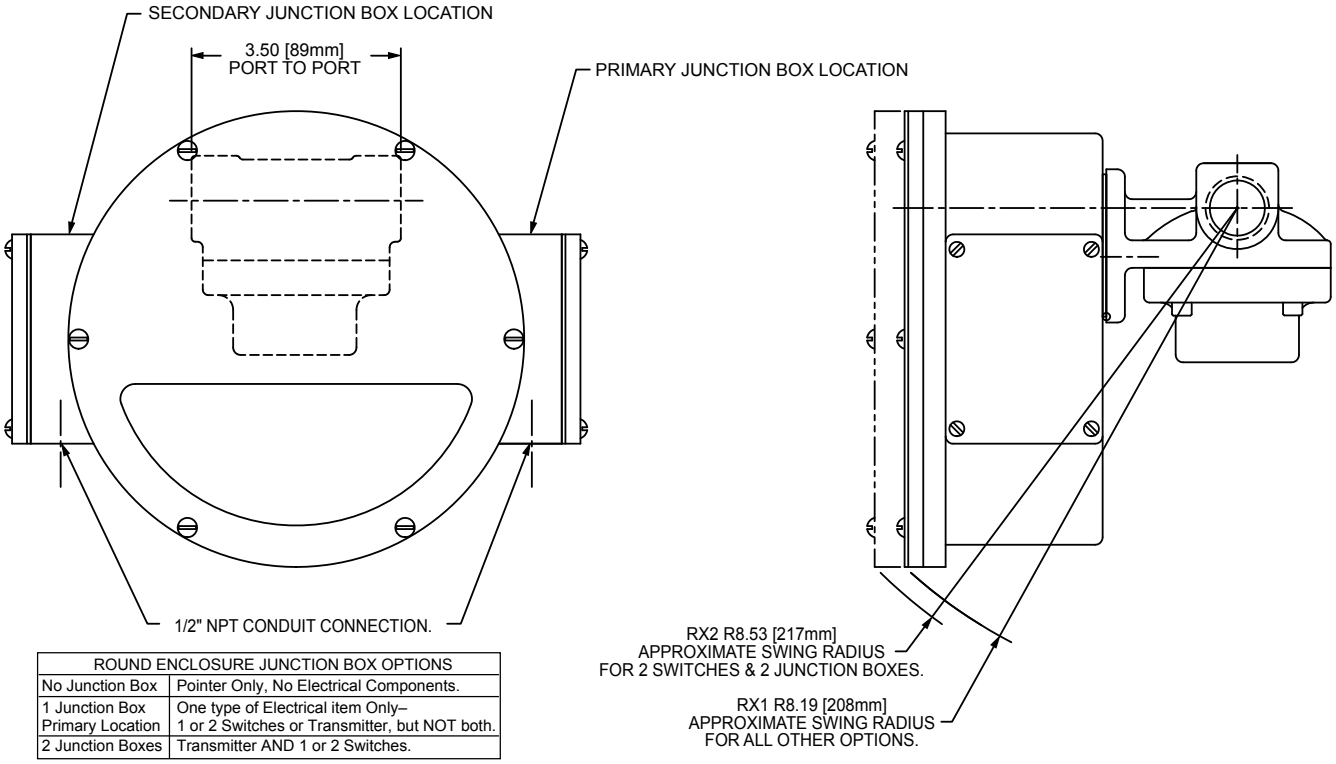
CONTROL BOX SELECTION GUIDE

“A”, “L” and “Z” Boxes



Maximum installation dimensions

“R” Box

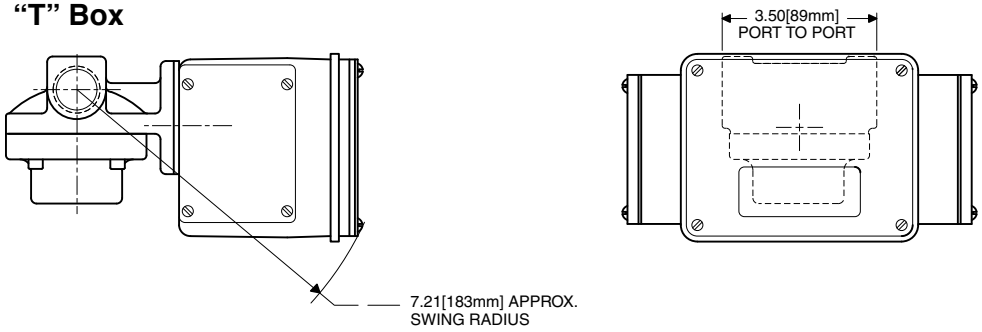


ROUND ENCLOSURE JUNCTION BOX OPTIONS	
No Junction Box	Pointer Only, No Electrical Components.
1 Junction Box Primary Location	One type of Electrical item Only– 1 or 2 Switches or Transmitter, but NOT both.
2 Junction Boxes	Transmitter AND 1 or 2 Switches.

Maximum installation dimensions

CONTROL BOX SELECTION GUIDE

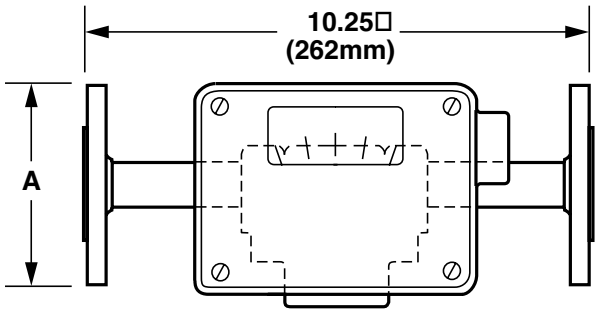
"T" Box



Maximum installation dimensions

With 150 lb R.F. flanges
(for other flanges consult factory)

Port Size (inches)	A (inches)
1/2	3.50
3/4	3.87
1	4.25



"Flow up" or "flow down" dimensions are the same.
Scale numbers are turned 90° to read correctly.

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