UNIVERSAL UFM FLOW MONITORS

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

CSA Certified NRTL/C

CE Marked (as noted)

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 or both (for signal redundancy). The switches can be general purpose or rated for hazardous locations (all classes, groups and divisions). The 4-20 mA transmitters are Intrinsically Safe if used with approved barriers.

CALIBRATION

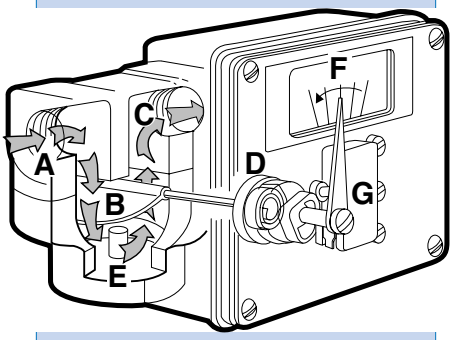
All flow meters are individually calibrated for fluids with the viscosity you specify (up to 3000 SSU/650 Centistokes). We also compensate for your fluid's specific gravity. For NIST Traceability please consult factory.

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.

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

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	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 for A & R Box, 300°F for transmitter options	=	HT
High accuracy (+/-3%)	=	HA
Stainless steel ID tag for customer supplied information	=	ST
Pin connector (See explanation for special options.)	=	PC
CSA enclosure / PVC window	=	C
Tempered glass window	=	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

Basic Features	Additional Options	Standard resolution pointer and inscribed scale "A", "L" and "Z" Box Materials of Construction: Polysulfone	Standard resolution pointer and inscribed scale "A", "L" and "Z" Box Materials of Construction: Aluminum	Standard resolution pointer and inscribed scale "A", "L" and "Z" Box Materials of Construction: 316 Stainless	High resolution pointer and inscribed scale "R" Box Materials of Construction: Aluminum	Separate junction boxes (with terminal strips) for switch & transmitter "T" Box Materials of Construction: Aluminum
These options all include inscribed scale and pointer plus one of the standard (non hazardous location) switches selected to the right.	No switch	A0	L0	Z0	R0	
	One SPDT (3 wire), CE	A1	L1	Z1	R1	
	One high vibration SPDT (3 wire), CE	A1B	L1B	Z1B	R1B	
	Two SPDT (3 wire), CE	A2	L2	Z2	R2	
	Two high vibration SPDT (3 wire), CE	A2B	L2B	Z2B	R2B	
	One SPDT (4 wire)	A3	L3	Z3	R3	
	Two SPDT (4 wire)	A4	L4	Z4	R4	
	One SPDT (3 wire) high temperature	A61	L61	Z61	R61	
	Two SPDT (3 wire) high temperature	A62	L62	Z62	R62	
	One SPDT (3 wire) gold contact	A71	L71	Z71	R71	
	Two SPDT (3 wire) gold contact	A72	L72	Z72	R72	
These options all contain inscribed scale with pointer plus hazardous location switches selected to the right. Note that the box is not rated, only the switches.	One SPDT hazardous location (all classes, groups and divisions)				R7	
	One DPDT hazardous location (all classes, groups and divisions)				R17	
	\One SPST hazardous location proximity (all classes, groups and divisions)				R3Ø	
	Two SPST hazardous location proximity (all classes, groups and divisions)				R31	
	One SPDT (3 wire) hermetically sealed	A53	L53	Z53		
	Two SPDT (3 wire) hermetically sealed	A54	L54	Z54		
These options all contain a 4-20 mA transmitter and one of the selections to the right.	No switches (Instrinsically safe with barrier)	AXØ	LXØ	ZXØ	RXØ	TXØ
	One SPDT (3 wire), CE				RX1	TX1
	Two SPDT (3 wire), CE				RX2	TX2
	One SPDT (4 wire)				RX3	TX3
	Two SPDT (4 wire)				RX4	TX4
	One SPDT (3 wire) high temperature				RX61	TX61
These options all include a 4-20 mA transmitter with a digital LCD display plus one of the selections to the right.	No switches					TXLØ
	One SPDT (3 wire), CE					TXL1
	One SPDT (4 wire)					TXL3
	One SPDT (3 wire) high temperature					TXL61

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, 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.

Multi-pin connector: Pin connectors (option **PC**) are available for rapid field installation. Meters are provided with the male half of either a micro or a mini pin connector. Check the chart below for the number of pins required for your control box selection and current type. Insert the number of pins in the code PC__ for a mini connector or PC__M for a micro connector. For example, a PC5 would be a 5 pin mini and PC5M would be a 5 pin Micro. (See table below for number of pins required for each option.)

Tempered-glass window: (option **TG**) replaces the standard window. A tempered-glass window is employed where airborne solvents or high-ambient temperatures are common.

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.

Number of pins required for various combinations of current type, box type and switch option.

	AC switch options			**1, 1B, 61, 71**		**3**		**53**
	DC switch options	**0**	**1, 1B, 61, 71**	**3**	**2, 2B, 54, 62, 72**		**53**	
Box	A		3	4	6	5	3	4
	R		3	4	6	5	3	4
	RX	3						
	TX	3	3	4			3	4
	TXL	3	3	4			3	4

*This box allows micro pin connectors only. Eg. PC3M or PC5M.

CONTROL BOX SELECTION GUIDE

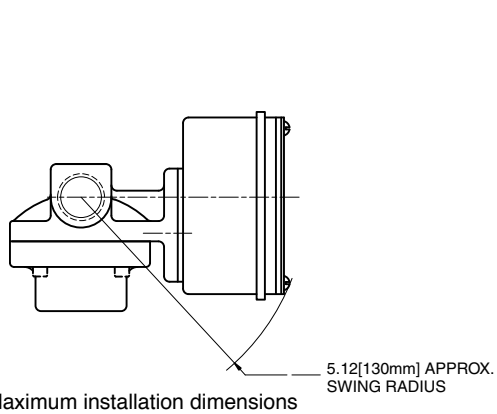
“A”, “L” and “Z” Boxes

“A” box is selected for price and simplicity.

It holds switches (general purpose and hermetically sealed) or 4-20mA transmitter.

You get this control box when you order any CONTROL BOX & READOUT starting with an “A” (see "How to Order" page). Examples: A1WR is a one switch, weatherproof box with flow from left to right.

This control box is made of Polysulfone (standard low cost “A”) with options for aluminum (“L”) or 316 stainless steel (“Z”).



Maximum installation dimensions

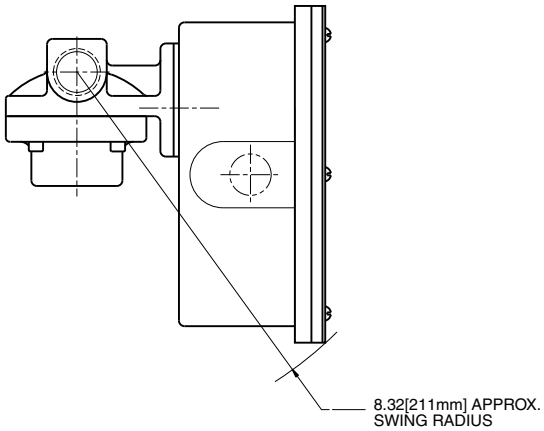
“R” Box

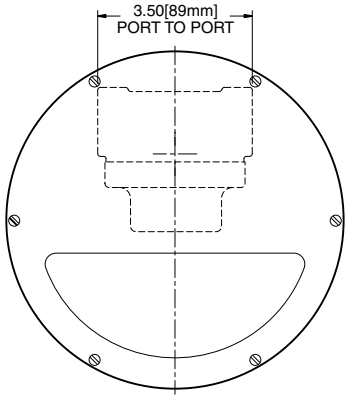
“R” box is selected for greater resolution (more increments on the inscribed scale).

It holds switches (general purpose and hazardous location all classes groups and divisions) and 4-20mA transmitter. Switch (standard service) and transmitter are offered in this control box together when signal redundancy is desired.

You get this control box when you order any CONTROL BOX & READOUT starting with an “R” (see "How to Order" page). Examples: R1WR is a one switch, weatherproof box with flow from left to right.

This control box is made from epoxy coated aluminum.





Maximum installation dimensions

CONTROL BOX SELECTION GUIDE

"T" Box

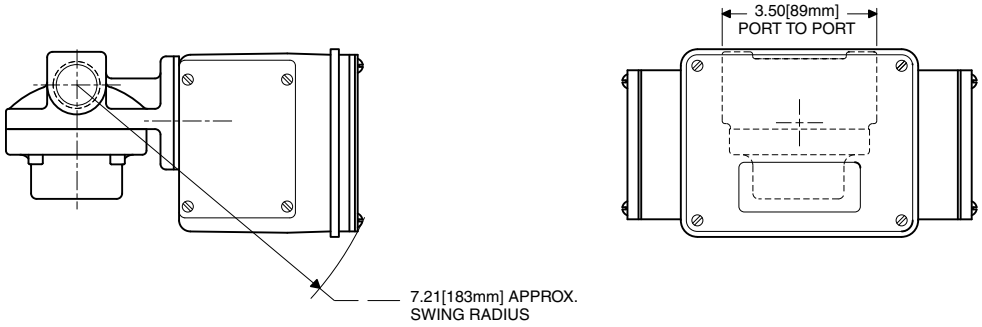
"T" box is selected for availability of two isolated junction boxes with terminal strips. This means that no direct wiring to switches or transmitters is required.

Digital LCD display of flow is optional ("TXL").

It holds switches (general purpose) and 4-20mA transmitter. Switch (standard service) and transmitter are offered in this control box together when signal redundancy is desired. These are wired to separate junction boxes for signal isolation.

You get this control box when you order any CONTROL BOX & READOUT starting with a "T" (see "How to Order" page). Examples: TX1WR is a one switch with 4-20mA transmitter, weatherproof box with flow from left to right.

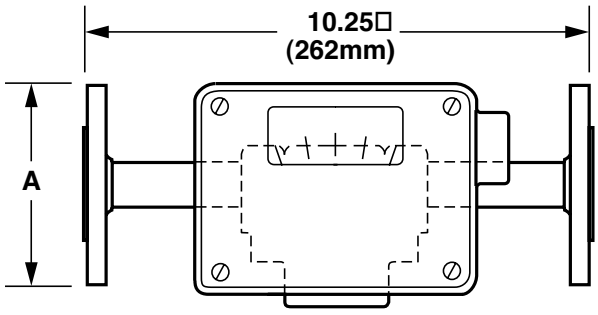
This control box is made from epoxy coated aluminum.



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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