

# Flow meters, Flow switches and Flow transmitters

## A Large Vane Style For Liquids

 CSA Certified NRTL/C

 CE Marked (as noted)

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, switches and transmitters. This swinging vane can be manually operated with a wrench (factory supplied) to verify or adjust switch points or to free the vane should it become lodged by debris in the fluid.

### READOUTS

The flowmeter has outputs both visual and electronic. Visual displays are either pointer (with inscribed scale) or numeric. Signal 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

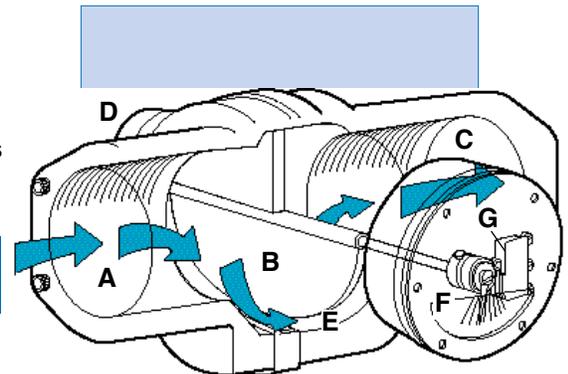
All flow meters are individually calibrated for fluids with the viscosity you specify (up to 3000 SSU/660 Centistokes). We also compensate for your fluid's specific gravity. For NIST Traceability please consult factory.

### 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, some corrosives, solvents, air and gases. See selections in the "How to Order" section.

### LINE CONNECTION

Ports can be from 1-1/2 to 4 inches. All connections and types are specified 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 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:** LN - F S F 200GM - 20 - 32V1.0 -

**SERIES BY PRESSURE RATING**

Normal pressure (300 PSI)	= LN
High pressure (1000 PSI)	= LE

**HOUSING MATERIAL**

**WHERE USED**

Aluminum	Lube oil	= D	LN
Aluminum (hard coated)	Lube oil with exterior corrosion protection	= E	
Brass	Water	= F	
Cast iron	Oil	= C	LE or LN
Cast iron, nickel plated	Water, oil with exterior corrosion protection	= N	
Aluminum with brass center section	Water	= Q	
Carbon steel	Oil	= M	LE or LN
Stainless steel (316)	Chemicals, corrosives	= I	
Carbon steel, nickel plated	Water, oil with exterior corrosion protection	= J	

**INTERNAL MOVING PARTS**

Stainless steel (300 series)	Standard for water, oil	= S
Stainless steel (316 series)	Chemicals and corrosives	= I

**SEAL MATERIAL**

Buna N	Water, oil	= B
EPR	Hot water, caustics	= E
Viton	Acids, some caustics	= F
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	= T
Not available with A, B or W "Housing Materials"		

**MAX FLOW RATE LIQUIDS**

GPM	80, 100, 150, <b>200</b> , 300, 400*, 500*	= GM
LPM	300, 400, 600, 800, 1200, 1500*, 1800*	= LM
CMH	40, 50, 70, 90*, 120*	= CMH

\*Requires special option DS.

**PORT CONNECTION**

Inches	MM	Threaded	Socket-Weld	ANSI	Max. Flow
		SAE-Style Flanges (NPT)	SAE-Style Flanges (Pipe)	Style Flanges	
1-1/2	38.10	= 12	= 12W	= 12F	100 378
2	50.80	= 16	= 16W	= 16F	150 567
2-1/2	63.50	= 20	= 20W	= 20F	300 1134
3	76.20	= 24	= 24W	= 24F	400 1512
4	101.6	= 32	= 32W	= 32F	500 1890

Flanges are steel; stainless steel units have stainless steel flanges. ANSI flanges also available.

**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. 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: 320/150V.9.

**RX1 W L - ST - 3ØD**

SERVICE	
Weatherproof (Type 4) Available on all boxes	= <b>W</b>
Weatherproof, corrosion proof (Type 4X) Available on all boxes	= <b>X</b>

FLOW DIRECTION	
Left to right	= <b>R</b>
Right to left	= <b>L</b>
Up	= <b>U</b>
Down	= <b>D</b>

SPECIAL OPTIONS	
High-temp- 400°F for A & R Box, 300°F for transmitter options	= <b>HT</b>
Stainless steel ID tag for customer supplied information	= <b>ST</b>
Pin connector (See explanation for special options.)	= <b>PC</b>
CSA enclosure / PVC window	= <b>C</b>
Tempered glass window	= <b>TG</b>
Dual spring (for higher flows)	= <b>DS</b>

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, 3ØD indicates a setting of 30 GPM in declining flow.	

CONTROL BOX & READOUT			
Basic Features	Additional Options	High resolution pointer and inscribed scale	Separate junction boxes (with terminal strips) for switch & transmitter
		"R" Box	"T" Box
		Materials of Construction	
		Aluminum	Aluminum
These options all include inscribed scale and pointer plus one of the standard (non hazardous location) switches selected to the right.	No switch	<b>RØ</b>	
	One SPDT (3 wire), CE	<b>R1</b>	
	One high vibration SPDT (3 wire), CE	<b>R1B</b>	
	Two SPDT (3 wire), CE	<b>R2</b>	
	Two high vibration SPDT (3 wire), CE	<b>R2B</b>	
	One SPDT (4 wire)	<b>R3</b>	
	Two SPDT (4 wire)	<b>R4</b>	
	One SPDT (3 wire) high temperature	<b>R61</b>	
	Two SPDT (3 wire) high temperature	<b>R62</b>	
	One SPDT (3 wire) gold contact	<b>R71</b>	
Two SPDT (3 wire) gold contact	<b>R72</b>		
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)	<b>R7</b>	
	One DPDT hazardous location (all classes, groups and divisions)	<b>R17</b>	
	Two SPDT hazardous location (all classes, groups and divisions)	<b>R18</b>	
	Two DPDT hazardous location (all classes, groups and divisions)	<b>R19</b>	
	One SPST hazardous location proximity (all classes, groups and divisions)	<b>R3Ø</b>	
	Two SPST hazardous location proximity (all classes, groups and divisions)	<b>R31</b>	
These options all contain a 4-20 mA transmitter and one of the selections to the right.	No switches (Intrinsically safe with barrier)	<b>RXØ</b>	<b>TXØ</b>
	One SPDT (3 wire), CE	<b>RX1</b>	<b>TX1</b>
	Two SPDT (3 wire), CE	<b>RX2</b>	<b>TX2</b>
	One SPDT (4 wire)	<b>RX3</b>	<b>TX3</b>
	Two SPDT (4 wire)	<b>RX4</b>	<b>TX4</b>
	One SPDT (3 wire) high temperature	<b>RX61</b>	<b>TX61</b>
These options all include a 4-20 mA transmitter with a digital LCD display plus one of the selections to the right.	No switches		<b>TXLØ</b>
	One SPDT (3 wire), CE		<b>TXL1</b>
	One SPDT (4 wire)		<b>TXL3</b>
	One SPDT (3 wire) high temperature		<b>TXL61</b>

## CONTROL BOX SELECTION GUIDE

### STANDARD OFFERING: Control Box "R"

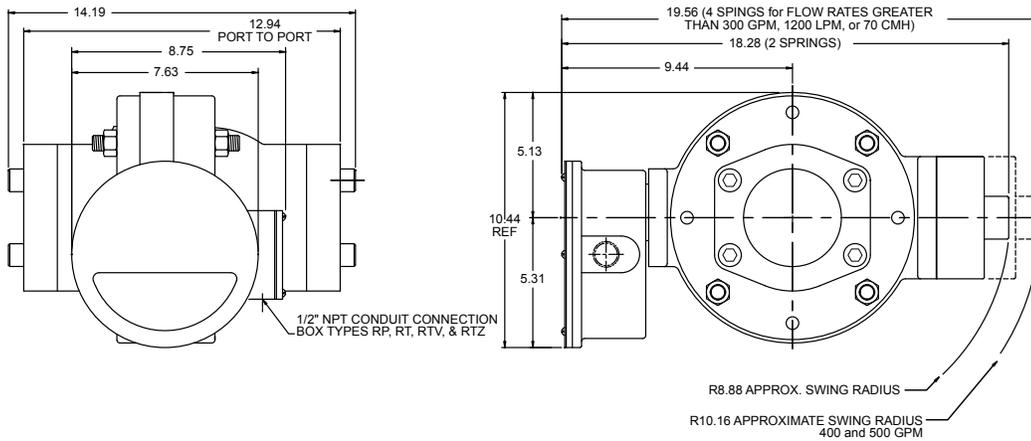


"R" box is selected for greater resolution (more increments on the inscribed scale).

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.



### SPECIAL OFFERING: Control Box "T"



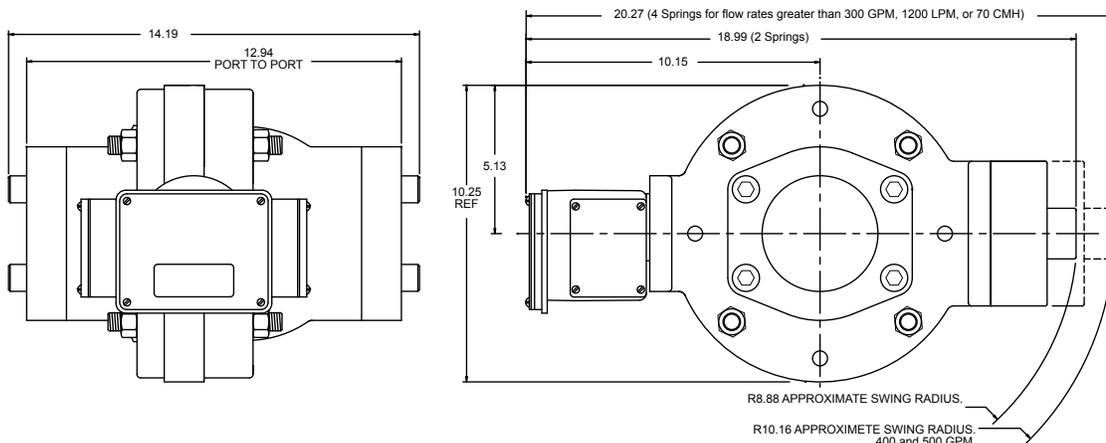
"T" box is selected for availability of two isolated junction boxes with terminal strips. This means that no direct wiring to switches or transmitters is required.

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.



## SPECIAL OPTIONS

**High temperature:** (option HT) requires 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" (weather-proof) or "X" (corrosion resistant). A metal scale is provided.

**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.)

**CE marked switches:** (option CE) SPDT 3-wire switch for general purpose use. Standard on switches 1, 1B, 2 and 2B, optional on 3, 4, 61, 62, 71 and 72.

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

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

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

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

### ENGINEERING DATA

**Maximum fluid temperature:**  
200°F (95°C)

**Optional max. fluid temperatures:**  
300 & 400°F (150 & 205°C)  
(option HT)

**Max. ambient temp:** 150°F (65°C)  
CSA listed only to 105°F (40°C)

#### SERIES LN

**Max. operating pressures**  
(3:1 safety factor):  
300 PSI (20.69 BAR)

#### SERIES LE

**Max. operating pressures**  
(2:1 safety factor):  
1000 PSI (68.97 BAR)

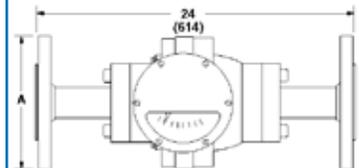
**Readout accuracy, full scale:** ±2%

### FLOW & PRESSURE DROP

Meters with maximum flows to 300 GPM (1200 LPM) impose a pressure drop that increases with flow from 1.9 to 3.8 PSI (avg. 2.2). Flows greater than 400 GPM have a maximum pressure drop of 5.5 PSI.

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

Port Size (inches)	A
1-1/2	5
2	6
2-1/2	7
3	7-1/2
4	9



"Flow up" or "flow down" dimensions are the same. Scale numbers are turned 90° to be right reading. For additional information on flanged connection see page 129.



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