MAX FLOW SIZES FROM
80 TO 500 GPM (300 TO 1800 LPM)

MAX LIQUID PRESSURE 300 PSI (20.69 BAR) **LN SERIES**
MAX LIQUID PRESSURE 1000 PSI (68.97 BAR) **LE SERIES**

Flow meters, Flow switches and Flow transmitters

A Large Vane Style For Liquids

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 (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

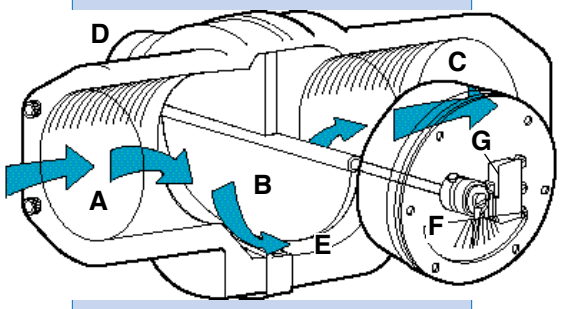
All flow meters are individually calibrated for fluids with the viscosity you specify (up to 3000 SSU/660 Centistokes). We also compensate for your fluid's specific gravity. For NIST Traceability please consult factory.

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**.

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

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

EXAMPLE: LN - F S F 2ØØGM - 2Ø - 32V1.Ø -

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

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**

MAX FLOW RATE LIQUIDS

GPM	8Ø, 1ØØ, 15Ø, **2ØØ**, 3ØØ, 4ØØ*, 5ØØ*	=	**GM**
LPM	3ØØ, 4ØØ, 6ØØ, 8ØØ, 12ØØ, 15ØØ*, 18ØØ*	=	**LM**
CMH	4Ø, 5Ø, 7Ø, 9Ø*, 12Ø*	=	**CMH**
Dual viscosity scale		=	**DGM**
Dual gallons and liters per minute		=	**GLM**

Contact factory for other type scales

*Requires special option DS (for flows greater than 400gpm).

PORT CONNECTION

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

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

FLANGED

Ex: Ex: 24FTCS150RF = 3" Threaded, Carbon Steel Class 150 Raised Face Flange

Pipe Size In Inches	Attachment	Material	Class	Style
12 = 1 1/2"	FW=Welded FT=Threaded	**CS**=Carbon Steel	**15Ø**	**RF**=Ansi raised face
16 = 2"		**S**=316 Stainless	**3ØØ**	
20 = 2 1/2"			**6ØØ**	
24 = 3"				
32 = 4"				

FLUID CHARACTERISTICS

Viscosity number followed by a 'V' (for SSU), 'C' (for centipoise), or 'CS' (for centistokes) followed by the specific gravity. Example: **32V1.Ø** 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: 32Ø/15ØV.9.

RX1 W L - ST - 3ØD

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

FLOW DIRECTION		
Left to right	=	R
Right to left	=	L
Up	=	U
Down	=	D

SPECIAL OPTIONS		
High-temp- 400°F std and 300°F for transmitter options	=	HT
Stainless steel ID tag for customer supplied information	=	ST
Safety Glass window ref. page 5	=	TG
Dual spring (required for flows 400gpm or greater)	=	DS

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. **3ØD**

CONTROL BOX & READOUT

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
Two SPDT hazardous location	R18
Two DPDT hazardous location	R19

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

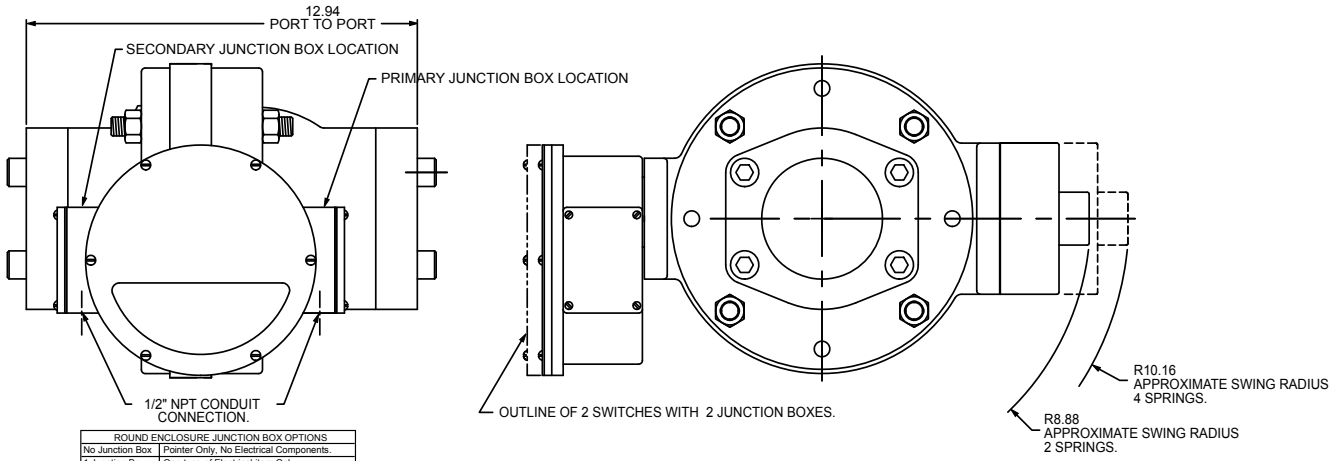
Display and transmitter only (Intrinsically safe with no switch options with approved barriers)	RXØ
One SPDT (3 wire)	RX1
Two SPDT (3 wire)	RX2
One SPDT (4 wire)	RX3
Two SPDT (4 wire)	RX4
One SPDT (3 wire) high temperature	RX61

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

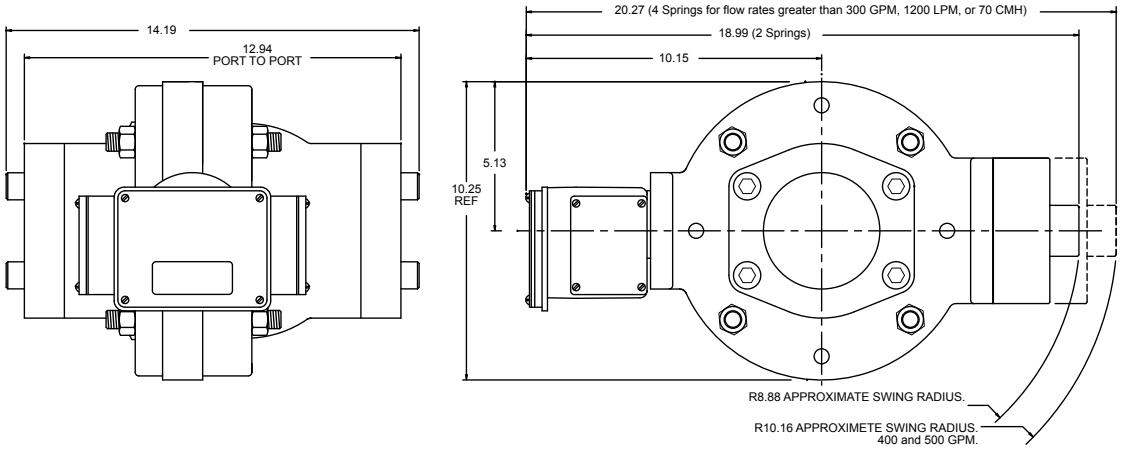
CONTROL BOX SELECTION GUIDE

STANDARD OFFERING: Control Box “R”



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.

SPECIAL OFFERING: Control Box “T”



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" (weatherproof) or "X" (corrosion resistant). A metal scale is provided.

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

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)

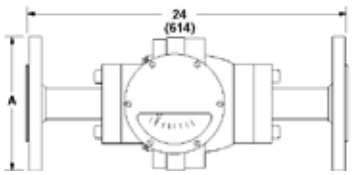
Readout accuracy, full scale: ±2%

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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