UNIVERSAL UFM FLOW MONITORS

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

HART COMMUNICATION PROTOCOL

C SA US

CE

**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

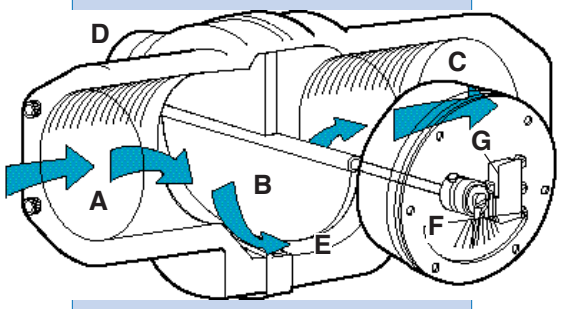
All flow meters are individually calibrated for fluids with the viscosity you specify (up to 3000 SSU/660 Centistokes). We also compensate for your fluid's specific gravity. For NIST Traceability please consult factory.

## 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** | = **2ØW** | 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 or HART) 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.



**LCD readout, 4-20mA plus option:**

| | |
|---|---|
| No switches (Intrinsically safe with approved barriers) | TXLØ |
| One SPDT (3 wire) | TXL1 |
| One SPDT (4 wire) | TXL3 |
| One SPDT (3 wire) high temperature | TXL61 |

**Pointer, scale and 4-20 mA plus option:**

| | |
|---|---|
| No switches (Intrinsically safe with approved barriers) | 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 |

**HART, pointer, scale plus option:**

| | |
|---|---|
| Two programmable HART switches | THØ |
| One SPDT (3 wire) | TH1 |
| Two SPDT (3 wire) | TH2 |
| One SPDT (4 wire) | TH3 |
| Two SPDT (4 wire) | TH4 |
| One SPDT (3 wire) high temperature | TH61 |


## "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:**

**For > 5 amp circuits**

| | |
|---|---|
| One SPDT hazardous location | R7 |
| One DPDT hazardous location | R17 |
| Two SPDT hazardous location | R18 |
| Two DPDT hazardous location | R19 |

**For < 1 amp circuits**

| | |
|---|---|
| One SPDT hazardous location | R20 |
| One DPDT hazardous location | R21 |
| Two SPDT hazardous location | R22 |
| Two DPDT hazardous location | R23 |
| One SPST hazardous location proximity | R30 |
| Two SPST hazardous location proximity | R31 |

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

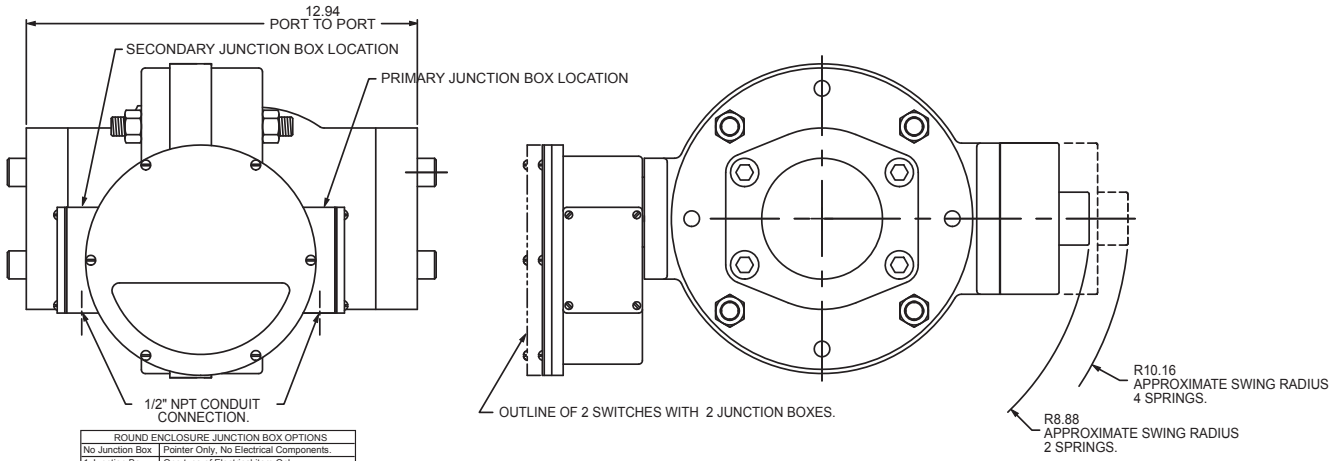
| | |
|---|---|
| Display and transmitter only (Intrinsically safe with approved barriers) | RXØ |
| One SPDT (3 wire) | RX1 |
| Two SPDT (3 wire) | RX2 |
| One SPDT (4 wire) | RX3 |
| Two SPDT (4 wire) | RX4 |
| One SPDT (3 wire) high temperature | RX61 |

**Flow rate display, HART output plus options as follows:**

| | |
|---|---|
| HART output only | RHØ |
| One SPDT (3 wire) | RH1 |
| Two SPDT (3 wire) | RH2 |
| One SPDT (4 wire) | RH3 |
| Two SPDT (4 wire) | RH4 |

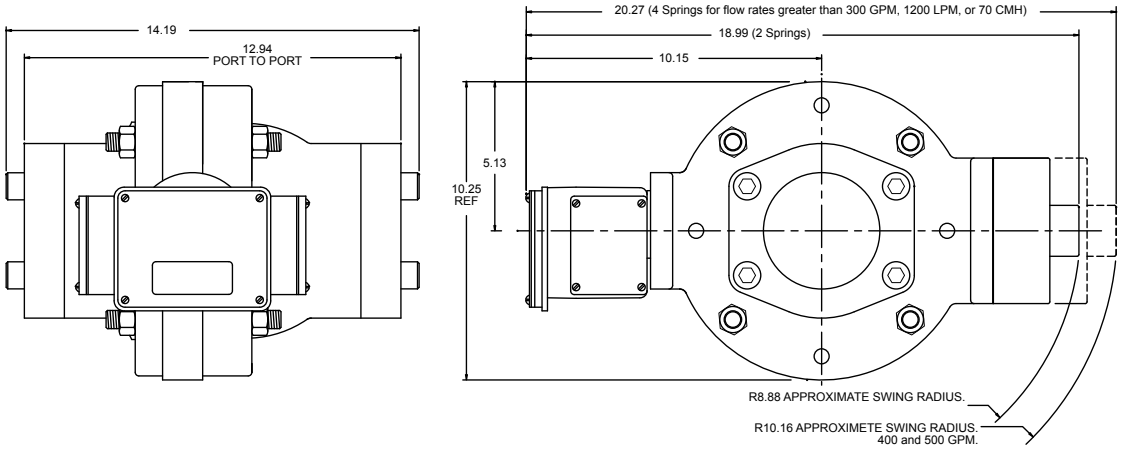
# CONTROL BOX SELECTION GUIDE

## STANDARD OFFERING: Control Box “R”




| ROUND ENCLOSURE JUNCTION BOX OPTIONS | |
|---|---|
| No Junction Box | Pointer Only, No Electrical Components. |
| 1 Junction Box<br>Primary Location | One type of Electrical item Only–<br>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)

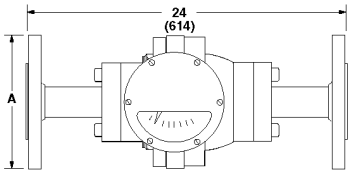
**Readout accuracy, full scale:** ±2%

## 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.

UNIVERSAL UFM FLOW MONITORS

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