

# Flow meters, Flow switches and Flow transmitters

## A Small Vane Style For Liquids



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

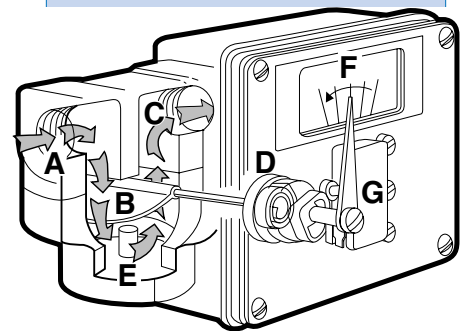
All flow meters are individually calibrated for fluids with the viscosity you specify (up to 3000 SSU/650 Centistokes). We also compensate for your fluid's specific gravity. For NIST Traceability please consult factory.

### 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.

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

**EXAMPLE:** SN - B I 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 |                 |
| Aluminum                         | Lube oil              | = D | SN or SMS/SH    |
| Brass                            | Water                 | = F |                 |
| Stainless steel (316)            | Chemicals, corrosives | = I | HS/SH, SM or SN |
| Carbon steel                     | Oil                   | = M |                 |

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

| INTERNAL MOVING PARTS        |                                     |
|------------------------------|-------------------------------------|
| Stainless steel (316 series) | Water, chemicals and corrosives = I |
| Titanium                     | Sea water = T                       |

| SEAL MATERIAL                       |                          |
|-------------------------------------|--------------------------|
| Buna N                              | Water, oil = B           |
| Viton                               | Acids, some caustics = F |
| Kalrez (dynamic) and Viton (static) | Specialty = K            |

| 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, 10ØØ, 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 | NPT    | SAE  | BSPB | BSPT | Max Flow |
|                                 | In Inches | Female |      |      |      | 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"   |             |                 |       |                     |
| 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. |

**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  
 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. Consult factory for settings out of flow range.

**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 Box | L Box | Z Box |
|--|-------|-------|-------|
|--|-------|-------|-------|

**A, L and Z small control box in the following configurations and materials:** Polysulfone Aluminum 316 SS

| Configuration   | A Box | L Box | Z Box |
|---|-------|-------|-------|
| 4-20 mA transmitter (Intrinsically safe with approved barriers) | AX0   | LX0   | ZX0   |
| HART with programmable switch points                            | AH0   | LH0   | ZH0   |
| Display only  | A0    | L0    | Z0    |
| 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   |



**"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                       | R0  |
| 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* |

NOTE: Flows 5GPM or greater\*

**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) RX0

|                                    |      |
|------------------------------------|------|
| 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 | RH0 |
| HART & 4-20mA output only               | RH1 |
| One SPDT (3 wire)                       | RH2 |
| Two SPDT (3 wire)                       | RH3 |
| One SPDT (4 wire)                       | RH4 |
| Two SPDT (4 wire)                       | RH4 |

**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.



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

|                                    |      |
|------------------------------------|------|
| No switches                        | TX0  |
| 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 | TH0 |
| HART & 4-20mA output only               | TH1 |
| One SPDT (3 wire)                       | TH2 |
| Two SPDT (3 wire)                       | TH3 |
| One SPDT (4 wire)                       | TH4 |
| Two SPDT (4 wire)                       | TH4 |



**LCD readout, 4-20mA with 2 open collectors:**

|                                    |       |
|------------------------------------|-------|
| No switches                        | TXL0  |
| One SPDT (3 wire)                  | 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**

## 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).

## INSTALLATION

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

## 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.

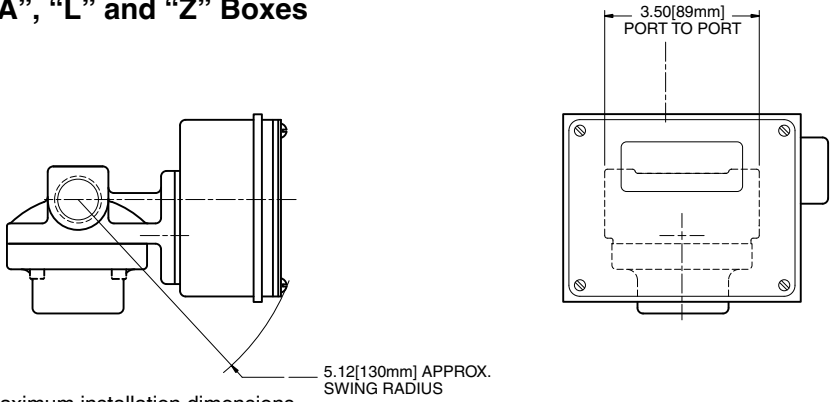
**Safety Glass window:**

(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.

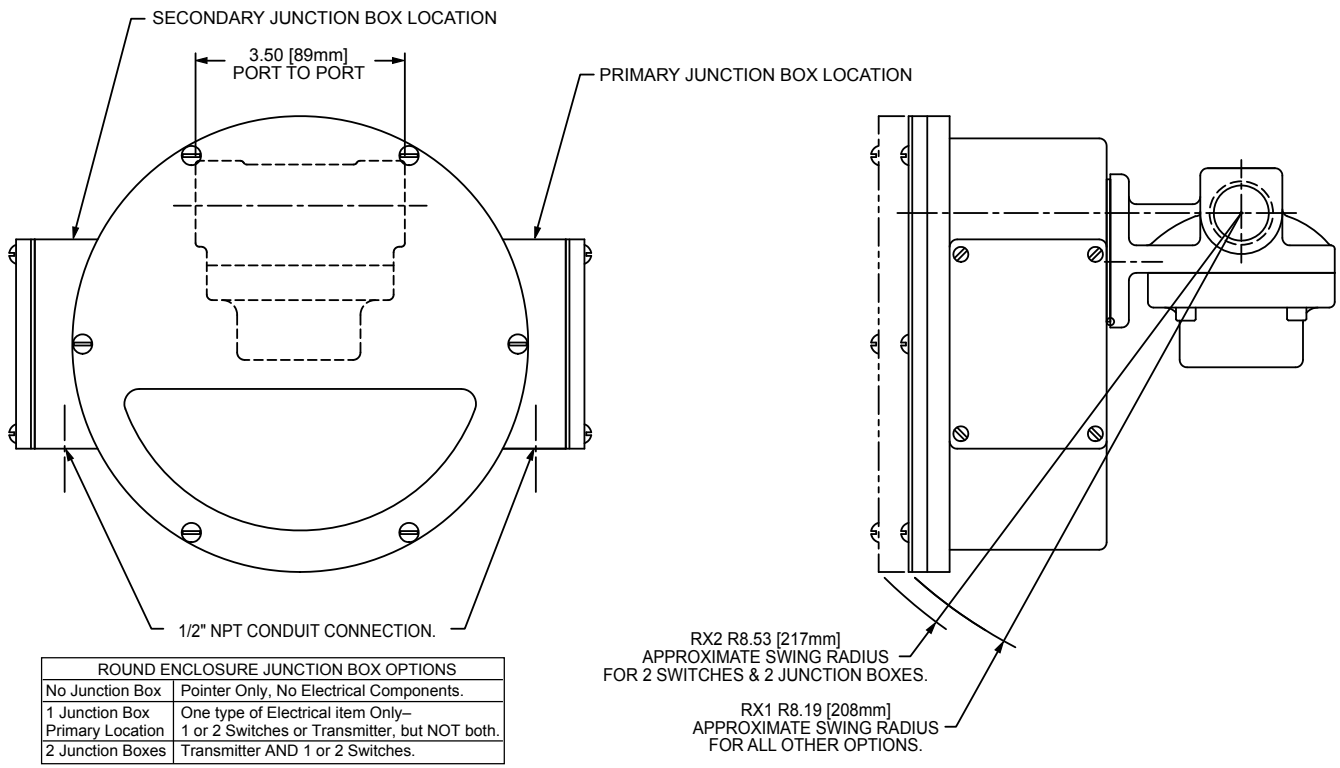
# CONTROL BOX SELECTION GUIDE

## “A”, “L” and “Z” Boxes



Maximum installation dimensions

## “R” Box

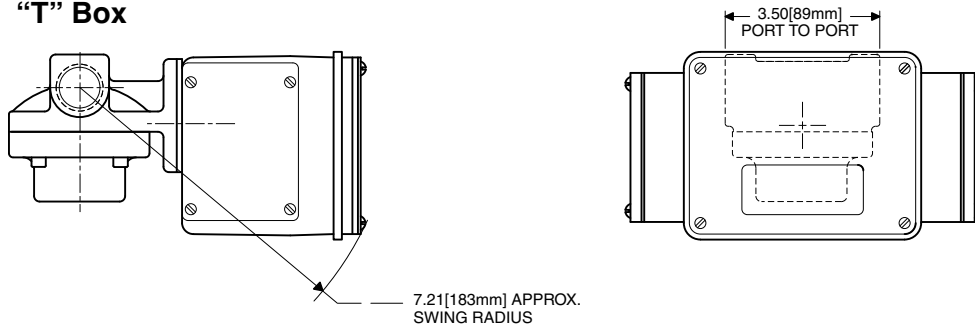


| ROUND ENCLOSURE JUNCTION BOX OPTIONS |  |
|--------------------------------------|--|
| No Junction Box                      | Pointer Only, No Electrical Components.  |
| 1 Junction Box<br>Primary Location   | One type of Electrical item Only—<br>1 or 2 Switches or Transmitter, but NOT both. |
| 2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

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       |

10.25" (262mm)

A

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



### Universal Flow Monitors, Inc.

1755 E. Nine Mile Road ▪ P.O. Box 249 ▪ Hazel Park, MI 48030  
Tel: 248-542-9635 ▪ Fax: 248-398-4274  
www.flowmeters.com ▪ E-mail: ufm@flowmeters.com