



**MAX FLOW SIZES FROM**  
10 TO 160 GPM  
(60 TO 600 LPM)

|                              |              |                  |
|------------------------------|--------------|------------------|
| MAX LIQUID PRESSURE 300 PSI  | (20.69 BAR)  | <b>MN SERIES</b> |
| MAX LIQUID PRESSURE 500 PSI  | (34.48 BAR)  | <b>MM SERIES</b> |
| MAX LIQUID PRESSURE 2000 PSI | (137.93 BAR) | <b>MH SERIES</b> |

# Flow meters, Flow switches and Flow transmitters

## A Medium Vane-Style For Liquids



**NIST Traceable Calibration  
Certificate Available**

### 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.

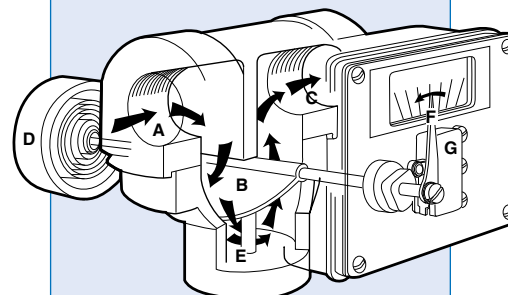
### CONSTRUCTION MATERIALS

The meter body, internal moving parts, and seals are offered in a variety of materials to suit a wide range of applications, such as: 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.

*MN Series, "A" style control box*



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:** MN - B I B 70GM - 8 - 320V.9 -

### SERIES BY PRESSURE RATING

|                           |   |    |
|---------------------------|---|----|
| Normal pressure (300 PSI) | = | MN |
| Medium pressure (500 PSI) | = | MM |
| High pressure (2000 PSI)  | = | MH |

### 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 SM SH, SM or SN |
| Brass                            | Water                 | = | F |                       |
| Stainless steel (316)            | Chemicals, corrosives | = | I | SN                    |
| Carbon steel                     | Oil                   | = | M |                       |

### INTERNAL MOVING PARTS

|                              |                          |   |   |
|------------------------------|--------------------------|---|---|
| Stainless steel (316 series) | Chemicals and corrosives | = | I |
| Titanium                     | Sea water                | = | T |

### SEAL MATERIAL

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

### CHOOSE FROM THE MAXIMUM FLOW RATES SHOWN HERE

|                                                                                        |                                                                           |   |     |
|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------|---|-----|
| GPM                                                                                    | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160 | = | GM  |
| LPM                                                                                    | 40, 50, 60, 70, 80, 90, 100, 150, 200, 250, 300, 350, 400, 500, 600       | = | LM  |
| CMH                                                                                    | 2.25, 2.5, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30                        | = | CMH |
| This is a dual scale that has both the gallons per minute and liters per minute scales |                                                                           | = | GLM |
| This option has two scales for two viscosities with flow shown in GPM                  |                                                                           | = | DGM |

### Hand operated globe valve integral to flowmeter body (MN series only)

|                                                                                             |   |           |
|---------------------------------------------------------------------------------------------|---|-----------|
| No Valve                                                                                    | = | No Symbol |
| Valve (brass)                                                                               | = | V         |
| Not available on carbon steel or stainless steel housings.                                  |   |           |
| Restricted to port sizes to 1-inch and flows to 30 GPM (50 GPM in 1-1/2-inch port housings) |   |           |

### THREADED ATTACHMENT

| Pipe Size<br>Inches | NPT<br>Female | SAE | BSPP | BSPT | Max Flow<br>In GPM |
|---------------------|---------------|-----|------|------|--------------------|
| 1/2                 | 4             | 8T  | 8BP  | 8BT  | 25                 |
| 3/4                 | 6             | 12T | 12BP | 12BT | 50                 |
| 1                   | 8             | 16T | 16BP | 16BT | 70                 |
| 1 1/4               | 10            | 20T | 20BP | 20BT | 70                 |
| 1 1/2               | 12            | 24T | 24BP | 24BT | 100                |
| 2                   | 16            |     | 32BP | 32BP | 160                |

### FLANGED

Ex: 4FTCS150RF = 1/2" threaded, Carbon Steel, Class 150, Raised Face flange

| Pipe Size In Inches | Attachment             | Material        | Class | Style               |
|---------------------|------------------------|-----------------|-------|---------------------|
| 4 = 1/2"            | FW=Welded, FT=Threaded | CS=Carbon Steel | 150   | RF=Ansi raised face |
| 6 = 3/4"            |                        | S=316 Stainless | 300   |                     |
| 8 = 1"              |                        |                 |       |                     |
| 10 = 1 1/4"         |                        |                 |       |                     |
| 12 = 1 1/2"         |                        |                 |       |                     |
| 16 = 2"             |                        |                 |       |                     |

NOTE: Manual Override Option (E) is required (by UFM manufacturing) on welded medium flanged vane meters.

### FLUID CHARACTERISTICS

Viscosity number followed by a 'V' (for SSU), 'C' (for centipoise), or 'CS' (for centistokes) followed by the specific gravity. Example: 320V.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: 320/150V.9.

A1

W L -

E - 10D

**SERVICE**

|                                                                 |   |   |
|-----------------------------------------------------------------|---|---|
| Oil and dust tight (Type 12) Available on "A", "L" and "Z" only | = | N |
| 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 (See explanations below)**

|                                                                                                              |   |       |
|--------------------------------------------------------------------------------------------------------------|---|-------|
| High-temp- 400°F, 300°F for transmitter options                                                              | = | HT    |
| Stainless steel ID tag for customer supplied information                                                     | = | ST    |
| Safety Glass window ref. page 4                                                                              | = | TG    |
| Manual override ref. page 4                                                                                  | = | E     |
| Dual spring for reading lower flow rates on high flow units<br>(see "Flow and pressure drop" section page 4) | = | DS    |
| Clearance vane for ≥ 16 GPM (for better particulate tolerance)                                               | = | Z86   |
| 316 SS external bolts on MH-I but limits pressure max to 1500 PSI                                            | = | Z67MH |

**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, 10D indicates a setting of 10 GPM in declining flow.

10D

**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**

|                                                                 |     |     |     |
|-----------------------------------------------------------------|-----|-----|-----|
| 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 |

**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                        | TXL0  |
| 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                        | 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)                       |     |

**"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 |
| 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) | 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)                       |     |

## ENGINEERING DATA

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

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

**Maximum ambient temperature:** 150°F (65°C)

**Readout accuracy, full scale:** ±2%

**Series MN max. operating pressures:** (3:1 safety factor): 300 PSI (20.69 BAR)

**Series MM max. operating pressures:** (3:1 safety factor): 500 PSI (34.48 BAR)

**Series MH max. operating pressures:** (3:1 safety factor): 2,000 PSI (137.93 BAR)

**Repeatability of switches 1% of actual flow rate**

## FLOW & PRESSURE DROP

Units with max flows to 80 GPM (300 LPM) impose a pressure drop that increases with flow from 1.9 to 3.8 PSI. Higher flow-rated models are made possible by having either a partial bypass (which raises minimum indicated flow), dual springs (which raises the pressure drop), or both. The table shows minimum flow rates and pressure drops (PSI) (at max flow rates) for models rated from 100 to 160 GPM.

| MAX<br>FLOW<br>RATE<br>GPM/LPM | BYPASS ONLY                |                                | DUAL SPRING*               |                                |
|--------------------------------|----------------------------|--------------------------------|----------------------------|--------------------------------|
|                                | Minimum<br>Flow<br>GPM/LPM | Max<br>Pressure<br>Drop<br>PSI | Minimum<br>Flow<br>GPM/LPM | Max<br>Pressure<br>Drop<br>PSI |
| 90/340                         | 20/75                      | 4.5                            | 10/40                      | 6.0                            |
| 100/380                        | 30/100                     | 4.5                            | 10/50                      | 8.0                            |
| 110/400                        | 30/100                     | 5.0                            | 20/90                      | 6.8                            |
| 120/450                        | 40/150                     | 5.8                            | 20/90                      | 6.8                            |
| 130/500                        | 40/150                     | 5.8                            | 20/90                      | 6.8                            |
| 140/550                        | 50/170                     | 6.5                            | 20/90                      | 6.8                            |
| 150/570                        | 50/170                     | 6.5                            | 30/100                     | 6.8                            |
| 160/600                        | 50/170                     | 6.5                            | 30/100                     | 7.5                            |

\*When dual-spring is ordered you must specify special option **DS**. Some dual-spring units also have partial bypass to achieve high flow ranges.

## 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.

**Identification tag:** (option **ST**) customer-supplied information is stamped on a stainless steel tag that is attached to the nameplate.

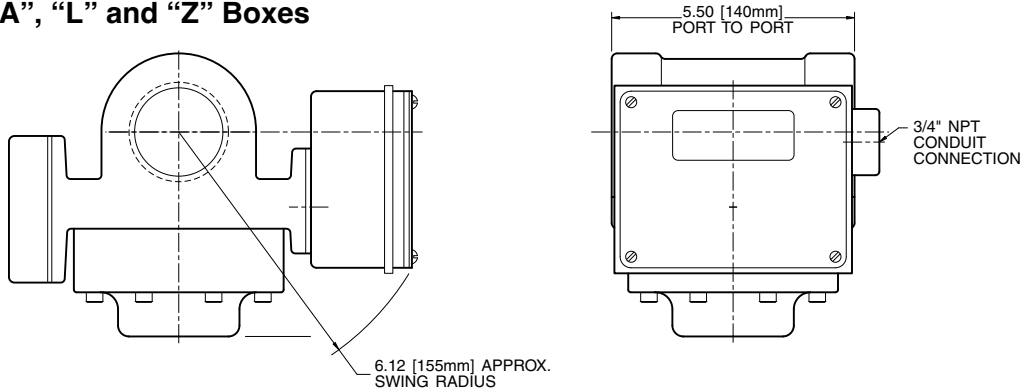
**Safety Glass window:** (option **TG**) replaces the standard window with "Laminated Safety Glass" ANSI Z97.1 and CPSC 1601 CFR 1201.

**Manual override:** (option **E**) provides an extended shaft you can manipulate to clear debris, simulate flow, adjust switch settings, etc. Same material as internals specified.

**Clearance vane:** (option **Z86**) the swing vane is modified to provide extra clearance for liquids that contain particulate. Available for maximum flow range of 16 GPM or greater, this reduces the turndown to a minimum of 4 GPM.

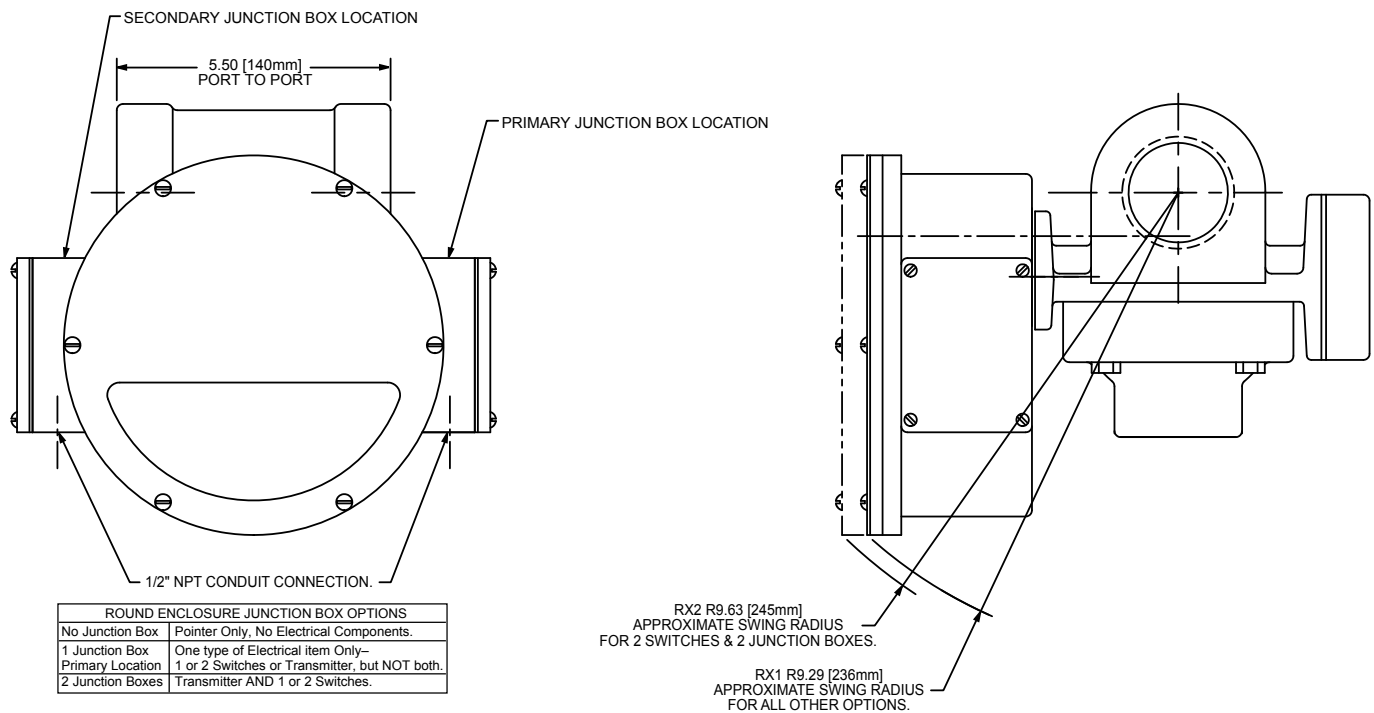
## CONTROL BOX INSTALLATION DRAWINGS

### “A”, “L” and “Z” Boxes



Maximum installation dimensions

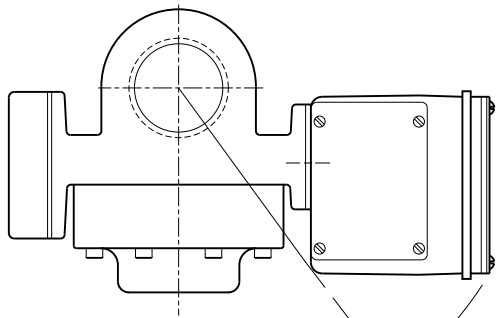
### “R” Box



Maximum installation dimensions

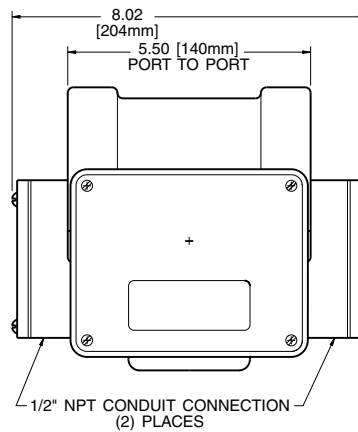
## CONTROL BOX INSTALLATION DRAWINGS

### “T” Box



Maximum installation dimensions

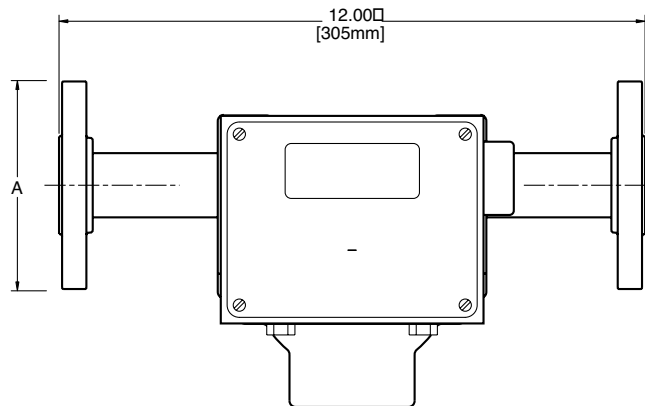
8.20 [208mm] APPROX.  
SWING RADIUS



### With 150 lb R.F. flanges

(for other flanges consult factory)

| Port Size (inches) | A     |
|--------------------|-------|
| 1/2                | 3-1/2 |
| 3/4                | 3-7/8 |
| 1                  | 4-1/4 |
| 1-1/2              | 5     |
| 2                  | 6     |



“Flow up” or “Flow down” dimensions are the same.  
Scale numbers are turned 90° to be right reading.



### Universal Flow Monitors, Inc.

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