



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

MAX LIQUID PRESSURE 300 PSI (20.69 BAR) **MN SERIES**  
MAX LIQUID PRESSURE 500 PSI (34.48 BAR) **MM SERIES**  
MAX LIQUID PRESSURE 2000 PSI (137.93 BAR) **MH SERIES**

# UNIVERSAL® Flow Meters

## A Medium Vane-Style For Liquids

CSA Certified NRTL/C  
 CE Marked (as noted)

**NIST** Traceable Calibration  
Certificate Available



*MN Series, with transmitter and LCD readout (control box TTL).*

### DESCRIPTION

These variable-area flow meters have a spring-loaded vane that swings open to accommodate more flow. Mounting is in-line and in any position. Straight pipe runs before or after the meter are not required. The all-mechanical sensing system responds quickly and directly drives the pointer and remote signaling devices. They handle shocks or flow surges beyond their rated capacities.

### CALIBRATION

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

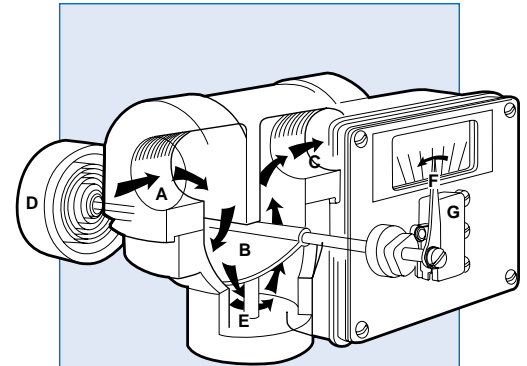
### CONSTRUCTION MATERIALS

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, some corrosives, solvents, and air and gases. Meter bodies are available in aluminum, anodized aluminum, brass, cast-iron or nickel-plated cast-iron, naval bronze, carbon steel or nickel-plated carbon steel, and 316 stainless steel. Aluminum, brass, and naval bronze are also available with optional nylon orifice bowl. We offer internal moving parts in the following materials: 300 series stainless, 316 stainless steel, titanium, monel, and tantalum. Choices of materials for seals are: Buna N, EPR, Viton, Kalrez™, and Teflon™ (Kalrez™ can be combined with the others). Please consult the factory for compatibility of materials with your application.

### LINE CONNECTION

Ports can be threaded or flanged. Threaded ports can be NPT (1/2 to 2") or SAE straight thread (1/2 to 1-1/2"). Metric threads such as BSPP, BSPT or JIS are also available. ANSI Flanges (1/2 to 2") are standard with DIN flanges also available.



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**.

*Maintenance note: particulate can be cleared from the internals by removal of bowl-shaped part of housing, or by manipulating the vane using our manual override, special option E.*

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

**EXAMPLE:** **MN** - **A** **S** **B** **30** **GM** **V** - **8** -

SERIES	
Medium vane style	= <b>MN</b>
Normal pressure (300 PSI)	= <b>MM</b>
Medium pressure (500 PSI)	= <b>MH</b>
High pressure (1500 PSI)	= <b>MH</b>

HOUSING MATERIAL (Series MN & MM)	
Aluminum	= <b>D</b>
Aluminum, nylon bowl	= <b>A*</b>
Aluminum (hard coated)	= <b>E</b>
Brass	= <b>F</b>
Brass, nylon bowl	= <b>B*</b>
Cast iron	= <b>C</b>
Cast iron, nickel plated	= <b>N</b>
Carbon steel	= <b>M</b>
Carbon steel, nickel plated	= <b>J</b>
Naval bronze	= <b>U</b>
Naval bronze, nylon bowl	= <b>W*</b>
Stainless steel (316)	= <b>I</b>

\*Available only on Series MN

HOUSING MATERIAL (Series MH)	
Cast iron	= <b>C</b>
Cast iron, nickel plated	= <b>N</b>
Carbon steel	= <b>M</b>
Stainless steel (316)	= <b>I</b>

INTERNAL MOVING PARTS	
Stainless steel (300 series)	= <b>S*</b>
Stainless steel (316)	= <b>I*</b>
Titanium (N/A in MH)	= <b>T</b>
Monel (N/A in MH)	= <b>L</b>
Tantalum (N/A in MH)	= <b>R</b>

\*MH available only in 300 and 316

SEAL MATERIAL	
Buna N	= <b>B</b>
EPR	= <b>E</b>
Viton	= <b>F</b>
Kalrez	= <b>J</b>
Kalrez (dynamic) and Teflon (static) (all metal units only)	= <b>T</b>
Kalrez (dynamic) & Buna N (static)	= <b>A</b>
Kalrez (dynamic) and EPR (static)	= <b>H</b>
Kalrez (dynamic) and Viton (static)	= <b>K</b>

THREADED ATTACHMENT				
Pipe Size In Inches	NPT	SAE	BSPP	BSPT
1/2	4	8T	8BP	8BT
3/4	6	12T	12BP	12BT
1	8	16T	16BP	16BT
1 1/4	10	20T	20BP	20BT
1 1/2	12	24T	24BP	24BT
2	16			

FLANGED Ex: <b>4 FW CS 150 RF</b>				
Pipe Size	Attachment	Material	Pressure Rating	Style
<b>4</b> 1/2 inch	<b>FW</b> Welded	<b>CS</b> Carbon Steel	<b>150</b> 150PSI	<b>RF</b> Ansi raised face
<b>6</b> 3/4 inch	<b>FT</b> Threaded	<b>S</b> 316 Stainless	<b>300</b> 300 PSI	<b>D</b> Din raised face
<b>8</b> 1 inch			<b>600</b> 600 PSI	
<b>10</b> 1 1/4 inch				
<b>12</b> 1 1/2 inch				
<b>16</b> 2 inch				

VALVE (FLOW CONTROL) Series MN only	
No Symbol	= No Value
<b>V</b>	= Valve (brass) Restricted to port sizes to 1-inch and flows to 30 GPM (50 GPM in 1-1/2-inch port housings)

Not available on carbon steel or stainless steel housings

SCALE CALIBRATIONS	
<b>GH</b>	= Calibrated in gallons per hour
<b>GM</b>	= Calibrated in gallons per minute
<b>LH</b>	= Calibrated in liters per hour
<b>LM</b>	= Calibrated in liters per minute
<b>CMH</b>	= Cubic meters per hour
<b>GLM</b>	= Dual scales (GPM and LPM) (consult factory)
<b>DGM</b>	= Dual viscosity on GPM scale (consult factory)
<b>DLM</b>	= Dual viscosity on LPM scale (consult factory)

For specific calibrated increments and other scales consult factory.

MAX FLOW RATING LIQUIDS	
These may be expressed in various engineering units as shown. Here we are selecting the maximum flow that the meter will see. The minimum reading is about 1/10th of the maximum. There are generally 5 to 7 major increments displayed on the analog scales (traditional mechanical pointer and inscribed scale) with that number roughly doubled for the high resolution "R" box which allows more accurate reading. Ultimate resolution is provided by the LCD digital displays standard with some transmitter selections. The following are the most commonly selected options for maximum flow rates for each engineering unit. More are available if you consult with the factory.	
GPM	10, 15, 20, <b>30</b> , 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160
LPM	40, 50, 60, 70, 80, 90, 100, 150, 200, 250, 300, 350, 400, 500, 600
CMH	2.25, 2.5, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30

*Consult factory for compatibility of construction materials with the fluid involved.*

**320V.9 - A1 X R - ST - 10D**

**SWITCH SETTING**

No symbol = Lowest possible  
 Or, give setting(s) in GPM or LPM. Also a symbol to indicate that accuracy is desired during increasing flow (U) or decreasing flow (D). (10D would mean that switch should actuate when flow rate decreases to 10 GPM.)  
 Settings are field adjustable.

**FLOW DIRECTION**

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

**SERVICE**

- N = Oil and dust tight (Type 12)
- W = Weatherproof (Type 4)
- X = Weatherproof, corrosion proof (Type 4X)

**SPECIAL OPTIONS**

**Standard**

- HT = High-temp- 400°F for A & R Box, 300°F for transmitter options all boxes (RT, T & G)
- ST = Stainless steel ID tag for customer supplied information
- PC = Pin connector (See explanation for special options.)
- FL = Fault light (See explanation for special options.)
- C = CSA enclosure / PVC window
- TG = Tempered glass window
- E = Manual override
- DS = Dual spring
- Z86 = Clearance vane for ≥ 16 GPM

**STANDARD CONTROL BOX & READOUT (switches)**

**A Box**

**Simple indication with or without switches**

- AØ = Scale & pointer only
- A1 = One SPDT (3wire) , CE
- A1B = One high vibration SPDT (3 wire), CE
- A2 = Two SPDT (3 wire), CE
- A2B = Two SPDT (3wire) , CE
- A3 = One SPDT (4 wire)
- A4 = Two SPDT (4 wire)
- A61 = One SPDT (3 wire) high temperature
- A62 = Two SPDT (3 wire) high temperature
- A71 = One SPDT (3wire) gold contact
- A72 = Two SPDT (3wire) gold contact
- A53 = One SPDT (3 wire) hermetically sealed
- A54 = Two SPDT (3 wire) hermetically sealed
- A11 = Pneumatic

**X Box**

**Hazardous location indication and switches**

- X7 = One SPDT hazardous location
- X7C = One SPDT, CE
- X17 = One DPDT hazardous location
- X17C = One DPDT, CE
- X3Ø = One SPST hazardous location proximity
- X31 = Two SPST hazardous location proximity

**G Box**

**Transmitter with digital display and 2 open collectors (standard), or remote display (optional)**

- GTLØ = internal 4-20 mA transmitter with two open collector alarms
- GTLZØ = intrinsically safe 4-20 mA transmitter (no alarms)
- GPØ = G Box with remote transmitter. This requires a remote display and transmitter to be ordered as a separate line item. Model UT-PM-DTLCD.

Note: G Box requires "W" service selection (weatherproof). G Box has a terminal strip but can be used with pin connectors ordered as Special Options as described on next page. Select PC5M for GTL and PC3M for GTLZ or GP.

**SPECIAL CONTROL BOX OFFERINGS**

**R Box**

**High resolution pointer and scale for more accurate reading, optional switches**

- RØ = Scale & pointer only
- R1 = One SPDT (3wire) , CE
- R2 = Two SPDT (3 wire), CE
- R3 = One SPDT (4 wire)
- R4 = Two SPDT (4 wire)
- R53 = One SPDT (3 wire) hermetically sealed
- R54 = Two SPDT (3 wire) hermetically sealed
- R61 = One SPDT (3 wire) high temperature
- R62 = Two SPDT (3 wire) high temperature
- R71 = One SPDT (3wire) gold contact
- R72 = Two SPDT (3wire) gold contact

**RT Box**

**High resolution pointer and scale for more accurate reading, 4-20 mA Transmitter, optional high amp mechanical switch**

- RTØ = Scale & pointer only
- RT1 = One SPDT (3wire) , CE
- RT3 = One SPDT (4 wire)
- RT53 = One SPDT (3 wire) hermetically sealed
- RT61 = One SPDT (3 wire) high temperature
- RT71 = One SPDT (3wire) gold contact

**TT Box**

**4-20 mA Transmitter with pointer & scale, optional high amp mechanical switch, separate junction boxes for switch & transmitter**

- TTØ = Scale & pointer only
- TT1 = One SPDT (3wire) , CE
- TT3 = One SPDT (4 wire)
- TT53 = One SPDT (3 wire) hermetically sealed
- TT61 = One SPDT (3 wire) high temperature
- TT71 = One SPDT (3wire) gold contact

**TTL Box**

**4-20 mA Transmitter with digital display, optional high amp mechanical switch, separate junction boxes for switch & transmitter**

- TTLØ = Scale & pointer only
- TTL1 = One SPDT (3wire) , CE
- TTL3 = One SPDT (4 wire)
- TTL53 = One SPDT (3 wire) hermetically sealed
- TTL61 = One SPDT (3 wire) high temperature
- TTL71 = One SPDT (3wire) gold contact

**FLUID CHARACTERISTICS**

Viscosity number followed by a 'V' (for SSU), 'C' (for centipoise), or 'CS' (for centistokes) followed by the specific gravity. (32V1.0 would mean water.) For dual viscosity give two numbers separated by a slash (example: 320/500V1.0)

## 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)

## 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 FLOW RATE GPM/LPM	BYPASS ONLY		DUAL SPRING*	
	Minimum Flow GPM/LPM	Max Pressure Drop PSI	Minimum Flow GPM/LPM	Max Pressure Drop 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.

**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.

**Fault light:** (option FL) a red LED in the nameplate to indicate when a flow limit has been reached by internal switch contact. Helpful with multiple meters. Add to end of symbol: 1 (1 light), 2 (2 lights), A (AC), D (DC), i.e. FL2D. Only available with service option "W" weatherproof enclosures or "X" corrosive service. For optional LED colors, consult factory.

**Tempered-glass window:** (option TG) replaces the standard window. A

tempered-glass window is employed where airborne solvents or high-ambient temperatures are common.

**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.

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

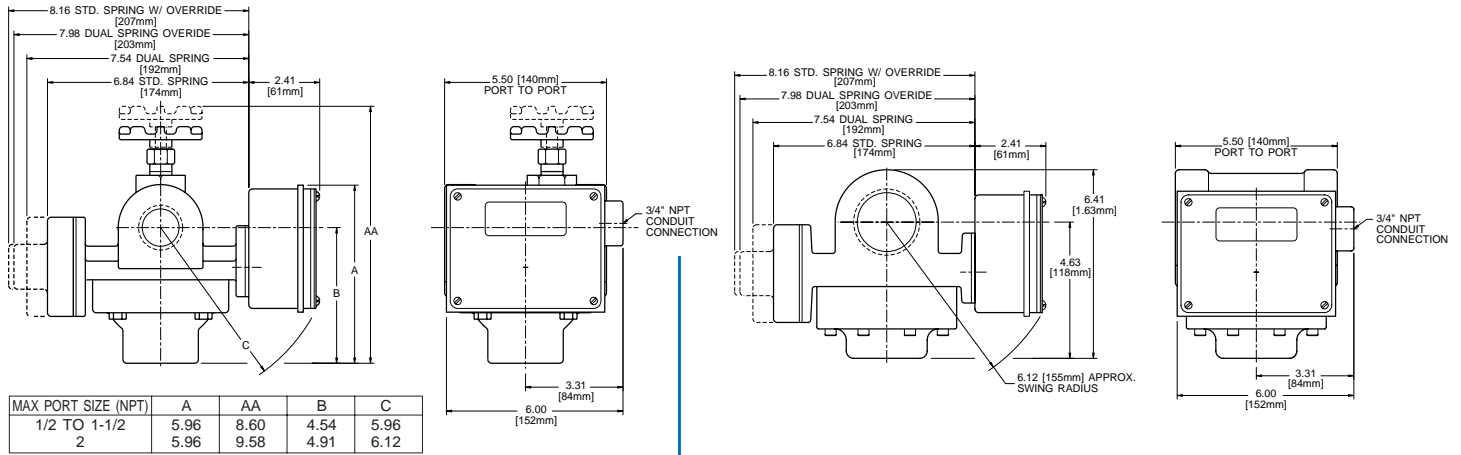
**Clearance vane:** (option Z86) the swing vane is modified to provide extra clearance for liquids that contain particulate. Available for maximum flow range of 16 GPM or greater, this reduces the turndown to a minimum of 4 GPM.

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

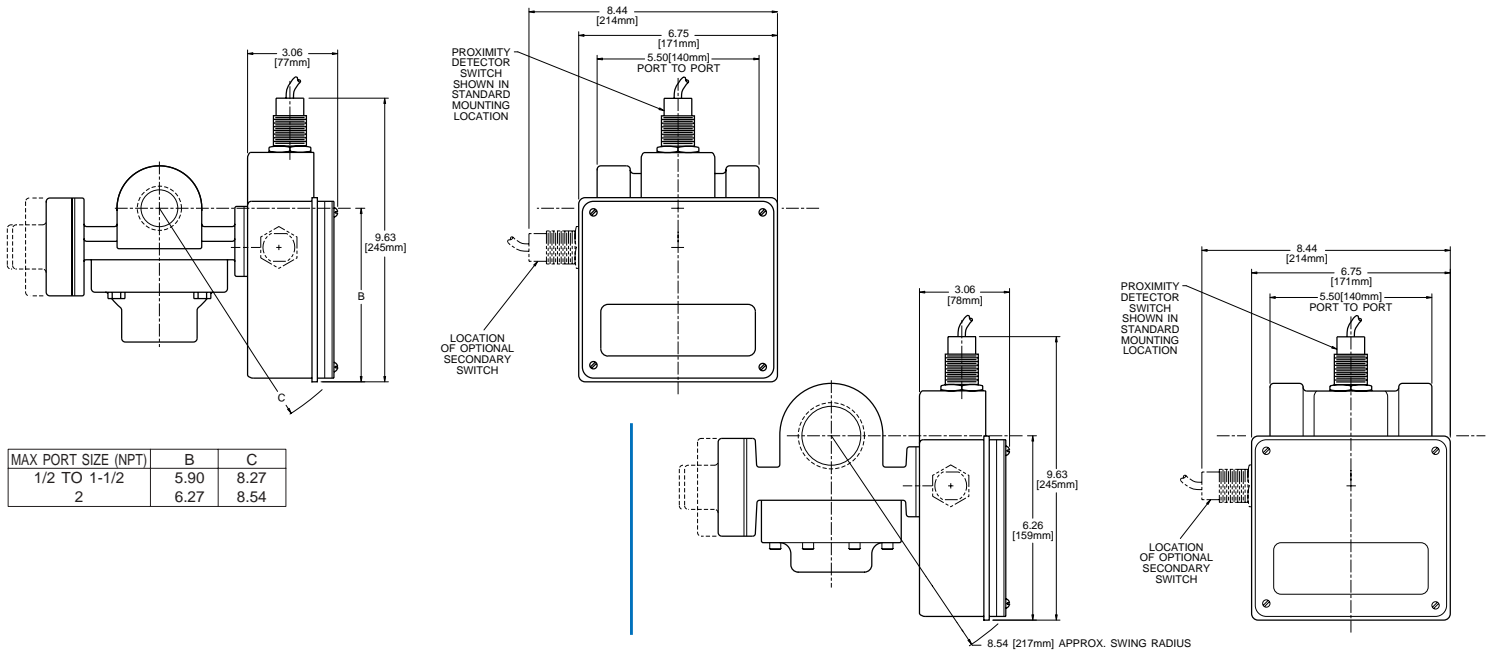
Box	AC switch options			1, 1B, 61, 71			3			53
	DC switch options	0	1, 1B, 61, 71	3	2, 2B, 54, 62, 72		53			
A			3	4	6		5	3	4	
M			3	4			5			
R			3	4	6		5	3	4	
RT	3									
TT	3		3	4				3	4	
TTL	3		3	4				3	4	
GTL*	5									
GTLZ*	3									
GP*	3									

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

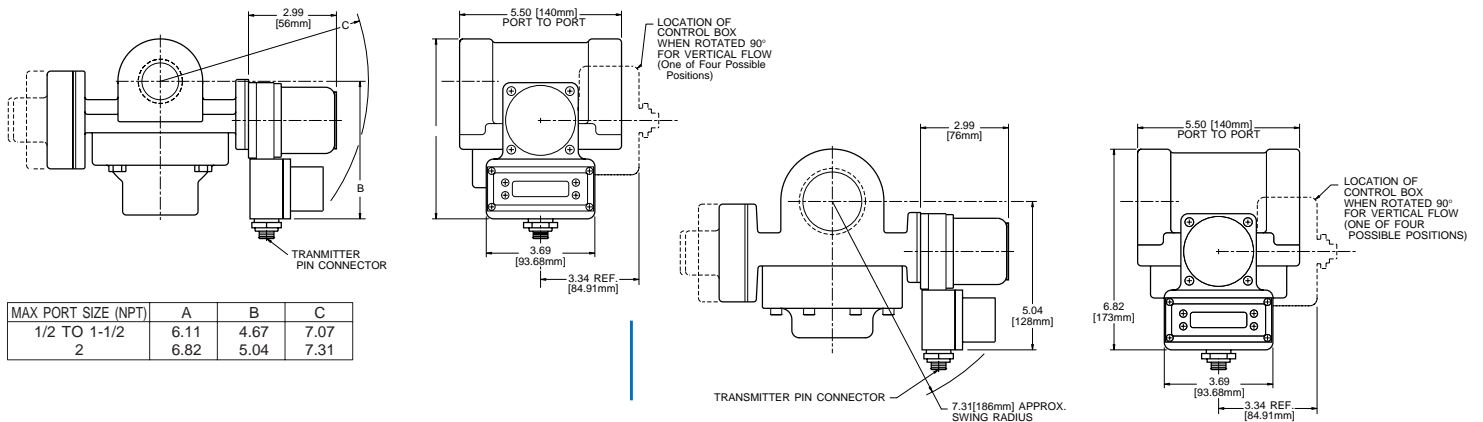
STANDARD OFFERING: Control Box "A"



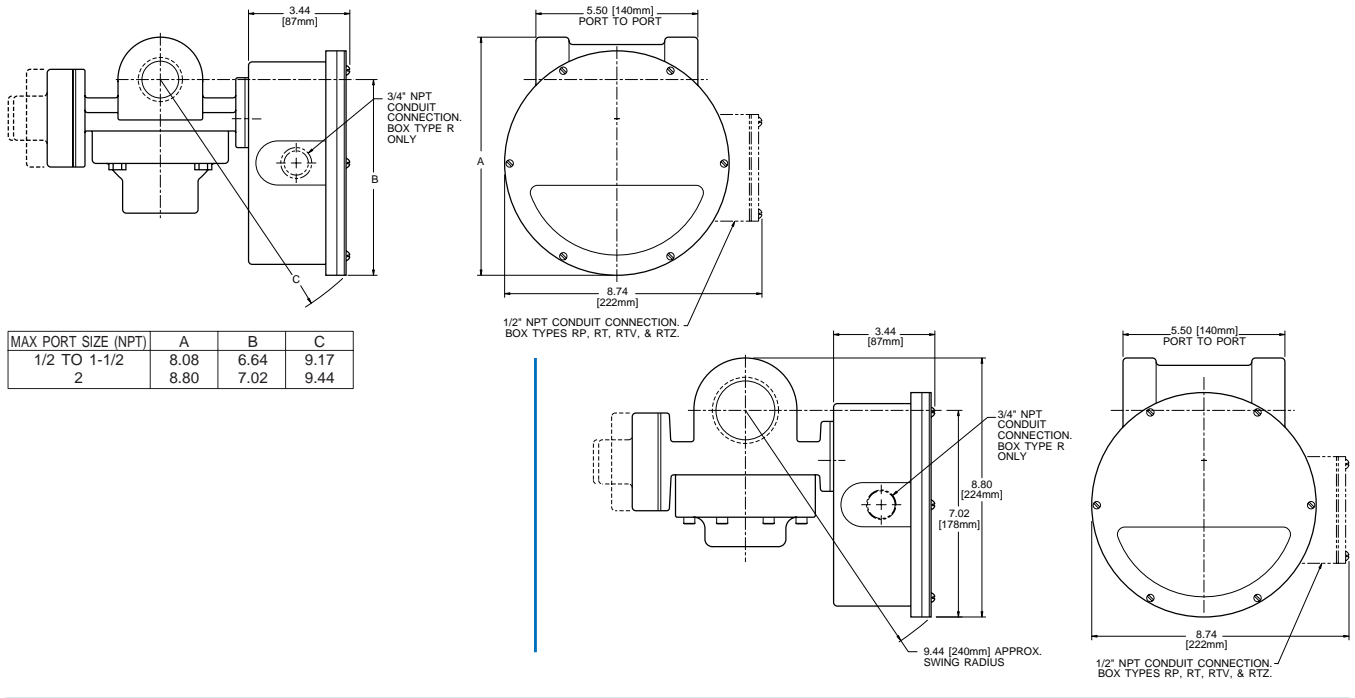
STANDARD OFFERING: Control Box "X"



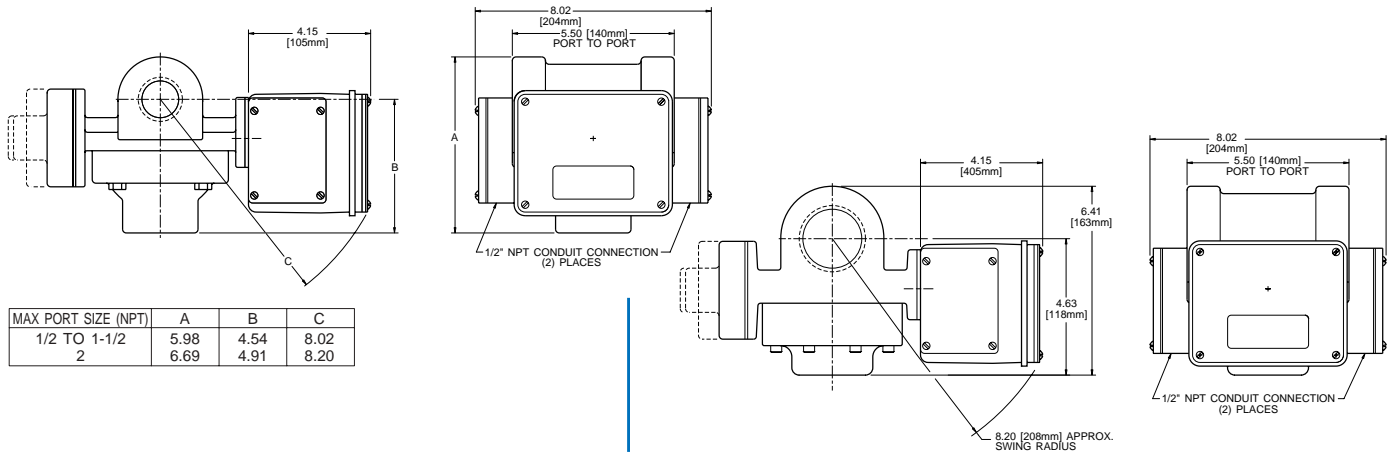
STANDARD OFFERING: Control Box "G"



**SPECIAL OFFERING: Control Box "R"**

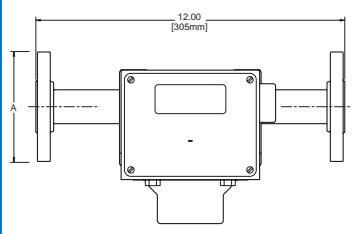


**SPECIAL OFFERING: Control Box "T"**



**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.



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