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**

MN Series, "A" style control box

UNIVERSAL® Flow Meters

A Medium Vane-Style For Liquids

CSA Certified NRTL/C

CE Marked (as noted)

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, dials and cams. They are very hardy and overflows or flow shocks are not a problem.

CALIBRATION

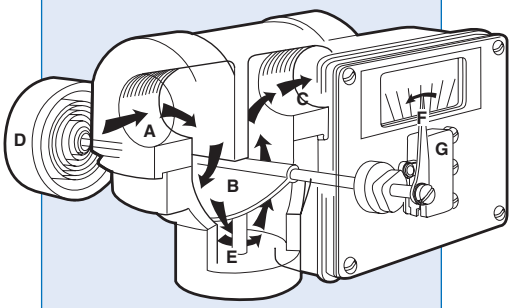
All flow meters are individually calibrated for fluids with the viscosity you specify (up to 3000 SSU/650 centipoise). We also compensate for your fluid's specific gravity. For NIST Traceability please consult factory.

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, corrosives and solvents. 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 bodies are also sold in combination with nylon. 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 Tefl on™ (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**.

Viton® and Kalrez are registered trademarks for DuPont Performance Elastomers.

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	
Normal pressure (300 PSI)	= **MN**
Medium pressure (500 PSI)	= **MM**
High pressure (1500 PSI)	= **MH**

HOUSING MATERIAL (Series MN & MM)

Aluminum	= **D**
Aluminum, nylon bowl	= **A***
Aluminum (hard coated)	= **E**
Brass	= **F**
Brass, nylon bowl	= **B***
Cast iron	= **C**
Cast iron, nickel plated	= **N**
Carbon steel	= **M**
Carbon steel, nickel plated	= **J**
Naval bronze	= **U**
Naval bronze, nylon bowl	= **W***
Stainless steel (316)	= **I**

*Available only on Series MN

HOUSING MATERIAL (Series MH)

Cast iron	= **C**
Cast iron, nickel plated	= **N**
Carbon steel	= **M**
Stainless steel (316)	= **I**

INTERNAL MOVING PARTS

Stainless steel (300 series)	= **S***
Stainless steel (316)	= **I***
Titanium (N/A in MH)	= **T**
Monel (N/A in MH)	= **L**
Tantalum (N/A in MH)	= **R**

*MH available only in 300 and 316

SEAL MATERIAL

Buna N	= **B**
EPR	= **E**
Viton	= **F**
Kalrez	= **J**
Kalrez (dynamic) and Teflon (static) (all metal units only)	= **T**
Kalrez (dynamic) & Buna N (static)	= **A**
Kalrez (dynamic) and EPR (static)	= **H**
Kalrez (dynamic) and Viton (static)	= **K**

THREADED ATTACHMENT

Pipe Size In Inches	NPT	SAE	BSPP	BSPT	Max Flow 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**				**150**

FLANGED Ex: 4 FW CS 150 RF

Pipe Size In Inches	Attachment	Material	Pressure	Style Rating
4= 1/2"	**FW**= Welded	**CS**= Carbon Steel	**150**= 150PSI	**RF**= Ansi raised face
6= 3/4"	FT= Threaded	S= 316 Stainless	300= 300 PSI	D= Din raised face
8= 1"			600= 600 PSI	
10= 1 1/4"				
12= 1 1/2"				
16= 2"				

VALVE (FLOW CONTROL) Series MN only

No Symbol = No Value

V = 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

GH	= Calibrated in gallons per hour
GM	= Calibrated in gallons per minute
LH	= Calibrated in liters per hour
LM	= Calibrated in liters per minute
CMH	= Cubic meters per hour
GLM	= Dual scales (GPM and LPM) (consult factory)
DGM	= Dual viscosity on GPM scale (consult factory)
DLM	= 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 numbered 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, 30, 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 (3 wire) , CE
A1B	=	One high vibration SPDT (3 wire), CE
A2	=	Two SPDT (3 wire), CE
A2B	=	Two SPDT (3 wire) , 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 (3 wire) gold contact
A72	=	Two SPDT (3 wire) gold contact
A53	=	One SPDT (3 wire) hermetically sealed
A54	=	Two SPDT (3 wire) hermetically sealed
A11	=	Pneumatic

R Box
Hazardous location indication and switches

R7	=	One SPDT hazardous location
R17	=	One DPDT hazardous location
R18	=	Two SPDT mechanical
R19	=	Two DPDT mechanical
R3Ø	=	One SPST hazardous location proximity
R31	=	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 (3 wire), CE
R2	=	Two SPDT (3 wire), CE
R3	=	One SPDT (4 wire)
R4	=	Two SPDT (4 wire)
R61	=	One SPDT (3 wire) high temperature
R62	=	Two SPDT (3 wire) high temperature
R71	=	One SPDT (3 wire) gold contact
R72	=	Two SPDT (3 wire) 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 (3 wire), CE
RT3	=	One SPDT (4 wire)
RT53	=	One SPDT (3 wire) hermetically sealed
RT61	=	One SPDT (3 wire) high temperature
RT71	=	One SPDT (3 wire) 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 (3 wire), CE
TT2	=	Two SPDT (3 wire) CE rated switches
TT3	=	One SPDT (4 wire)
TT53	=	One SPDT (3 wire) hermetically sealed
TT61	=	One SPDT (3 wire) high temperature
TT71	=	One SPDT (3 wire) 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 (3 wire), CE
TTL3	=	One SPDT (4 wire)
TTL61	=	One SPDT (3 wire) high temperature

TTZ Box
4-20 mA Intrinsically safe transmitter

TTZ	=	Scale, pointer and transmitted signal

FLUID CHARACTERISTICS

Viscosity number followed by a **'V'** (for SSU), **'C'** (for centipoise), or **'CS'** (for centistokes) followed by the specific gravity. (**320V.9** would mean fluid with 320 SSU viscosity and .9 specific gravity.) 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 Minimum Flow GPM/LPM	BYPASS ONLY Max Pressure Drop PSI	DUAL SPRING* Minimum Flow GPM/LPM	DUAL SPRING* 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.

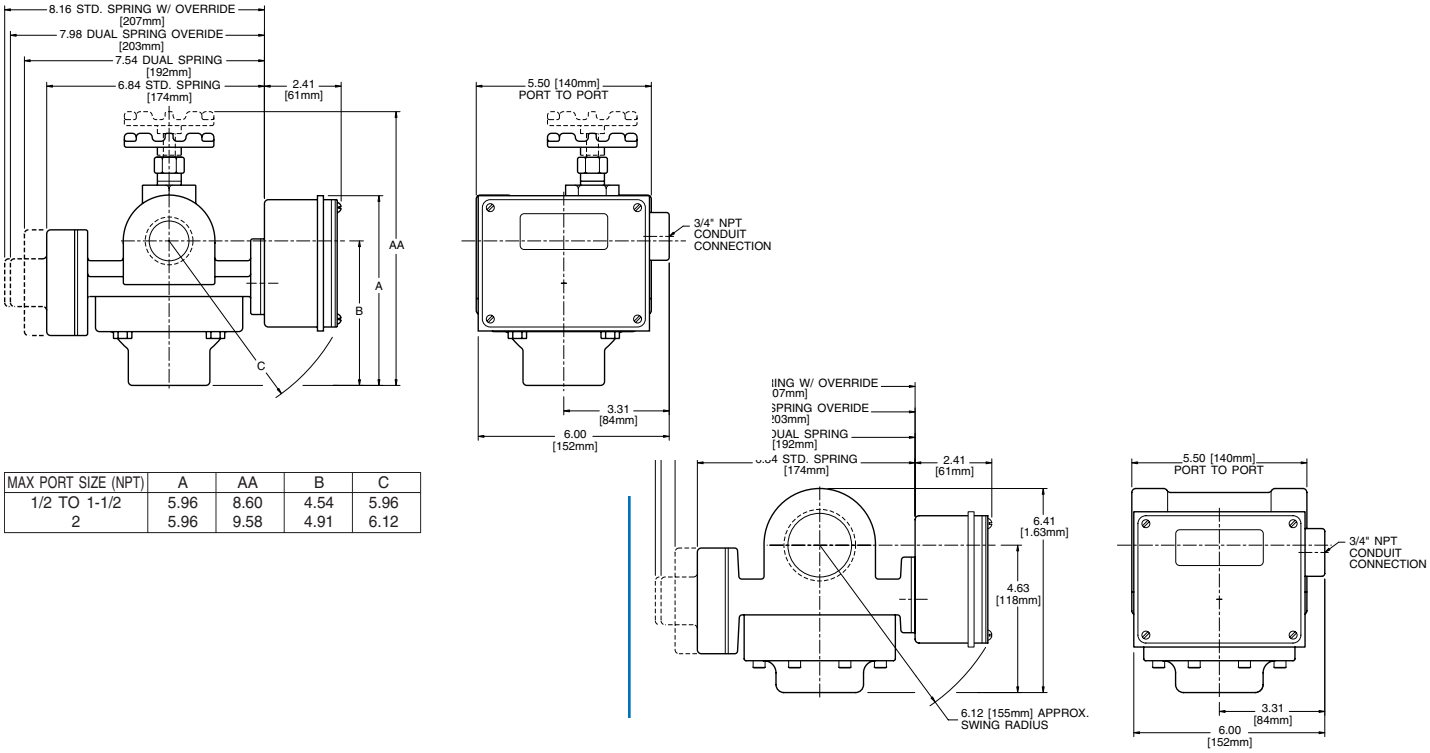
Clearance vane: (option **Z86**) the swing vane is modified to pro-vide extra clearance for liquids that contain particulate. Available for maximum flow range of 16 GPM or greater, this reduces the turndown to a minimum of 4 GPM.

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

	AC switch options			**1, 1B, 61, 71**		**3**		**53**
	DC switch options	**0**	**1, 1B, 61, 71**	**3**	**2, 2B, 54, 62, 72**		**53**	
Box	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						

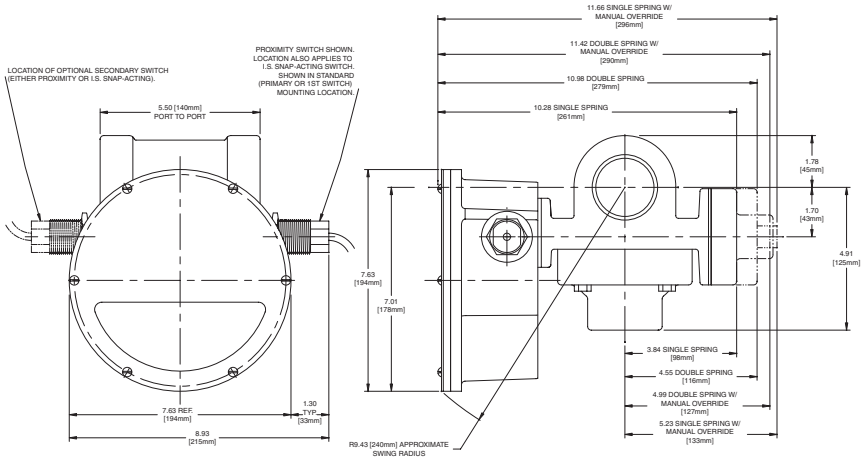
*This box allows micro pin connectors only. Eg. PC3M or PC5M.

STANDARD OFFERING: Control Box "A"

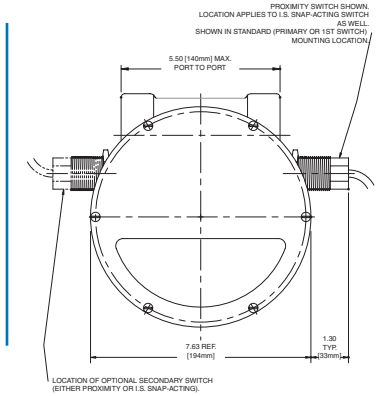


MAX PORT SIZE (NPT)	A	AA	B	C
1/2 TO 1-1/2	5.96	8.60	4.54	5.96
2	5.96	9.58	4.91	6.12

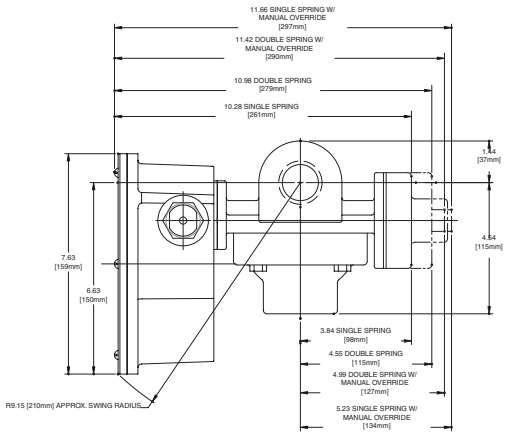
SPECIAL OFFERING: Control Box "R for Hazardous Location"



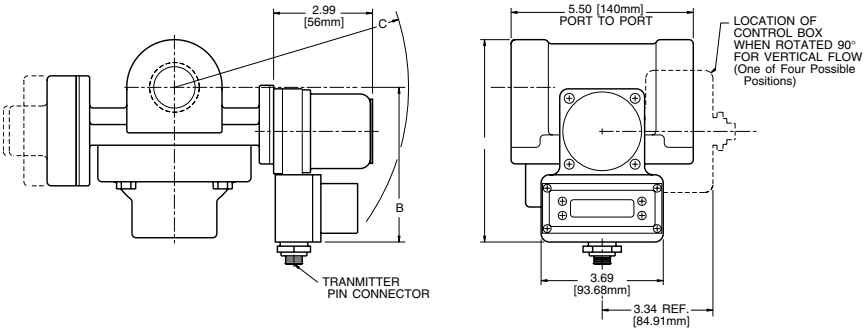
2" Port Size



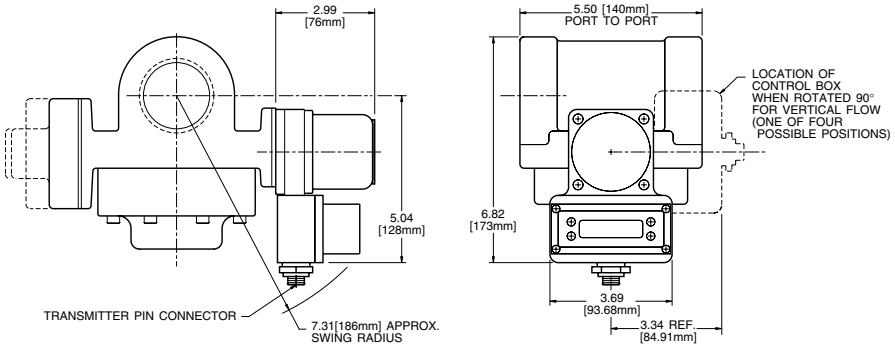
1/2 to 1-1/2" Port Size



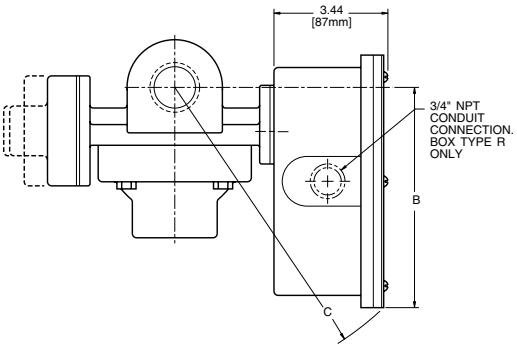
STANDARD OFFERING: Control Box "G"

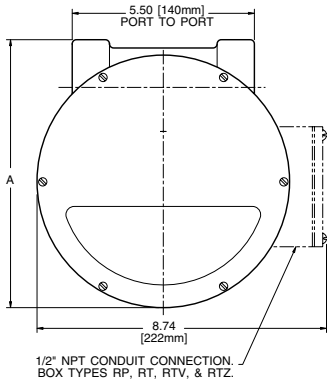


MAX PORT SIZE (NPT)	A	B	C
1/2 TO 1-1/2	6.11	4.67	7.07
2	6.82	5.04	7.31

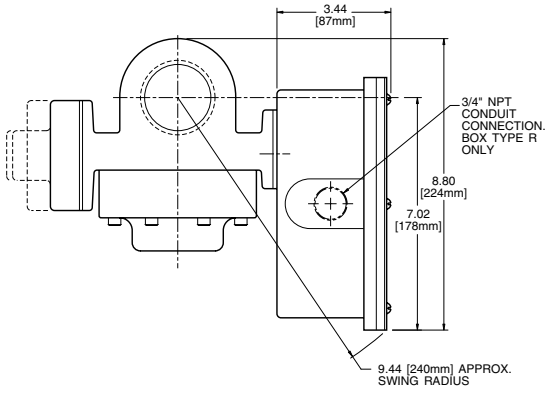


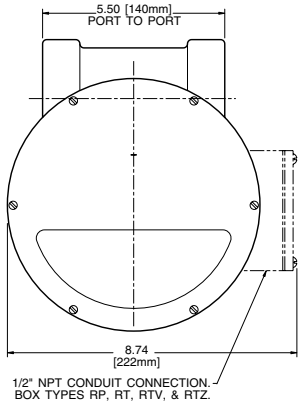
SPECIAL OFFERING: Control Box "R"



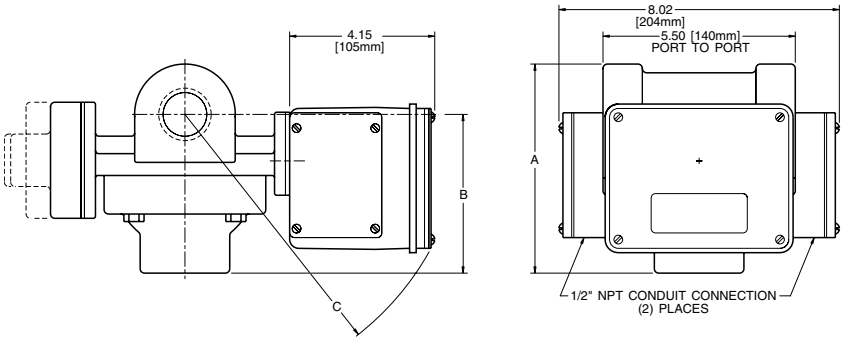


MAX PORT SIZE (NPT)	A	B	C
1/2 TO 1-1/2	8.08	6.64	9.17
2	8.80	7.02	9.44

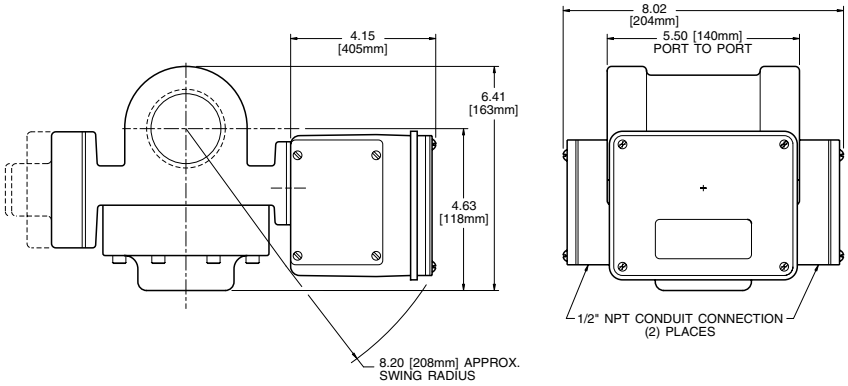




SPECIAL OFFERING: Control Box "T"

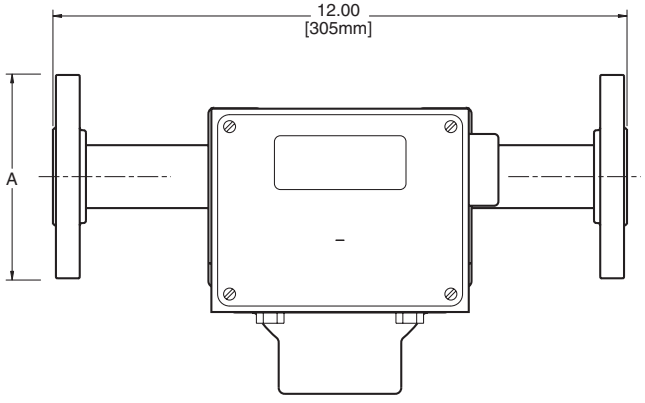


MAX PORT SIZE (NPT)	A	B	C
1/2 TO 1-1/2	5.98	4.54	8.02
2	6.69	4.91	8.20



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.

We are serious about flow

At UFM, we understand that profits are a byproduct of dedication to customer service, as well as good pricing and high quality. When you call us, someone who knows flow will answer.

Flowmeters for Automation

Our focus is on automation and robotics. This means products that are hardy, fast response, low maintenance and centered on support applications such as cooling water, shielding gas, lubrication, compressed air and paint. CoolPoint® vortex shedding flowmeters offer a low cost flow transmitter for cooling water with no moving parts to jam or bind. Universal® vane and piston variable area meters are used for water, compressed air, automotive paint and lubrication oil. Insite® plastic rotameters are a lower cost option for water and compressed air. FlowStream® mass flowmeters for gas are used for fast response measurement (suitable for robotics) of air and other gasses commonly used in automation like Argon, Helium and CO2. The emphasis is on practical solutions that are cost effective backed by excellent customer support.

FlowMeters.com

Detailed information on our products, pricing, distribution and flow technology in general is viewable at FlowMeters.com. We invite you to go there where we will help you find the correct technology for your application with "just in time" flowmeter education. The product information is also cross-referenced by industries served and applications.

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