UNIVERSAL UFM FLOW MONITORS

MAX FLOW SIZES
FROM 5 GPH to 20 GPM
(20 LPH TO 75 LPM)

MAX LIQUID PRESSURE 300 PSI	(20.69 BAR)	**LL SERIES**
MAX LIQUID PRESSURE 500 PSI	(34.48 BAR)	**LP SERIES**
MAX LIQUID PRESSURE 1500 PSI	(103.45 BAR)	**LH SERIES**

Flow meters, Flow switches and Flow transmitters

A piston design for low flows of liquids

LL Series, with standard scale and pointer (control box A).

HART COMMUNICATION PROTOCOL

c SP us

CE

NIST Traceable Calibration Certificate Available

DESCRIPTION

These variable-area meters position an orifice over a tapered shaft to establish flow rate. Mounting is in-line and in any position. Straight pipe runs before or after this monitor are not required. The all-mechanical sensing system directly drives the pointer, 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

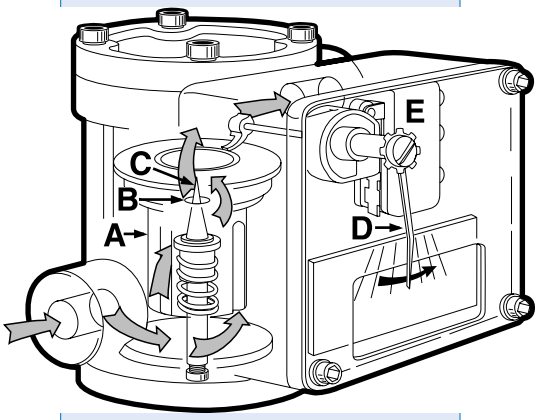
All flow meters are individually calibrated for fluids with the viscosity you specify (up to 3000 SSU/650 Centistokes). We also compensate for your fluid's specific gravity. For NIST Traceability please consult factory.

CONSTRUCTION MATERIALS

Housings and seals are offered in a variety of materials to suit a wide range of applications, such as: water, oil, coolants, paint, solvents and some corrosive fluids. 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 flow causes a spring-loaded piston **A** having a circular opening at its center **B** to move along the axis of a precision-tapered shaft **C**. This creates a variable orifice in direct proportion to the flow rate. The piston is mechanically linked to the readout pointer **D** and actuates switch **E** or a transmitter (not shown).

Viton® and Kalrez™ are registered trademarks

EXAMPLE: LL - B Z P Z B 15GH- 4 U- 32ØV.9 -

SERIES BY PRESSURE RATING		
Normal pressure (150 or 300 PSI)	=	LL
Medium pressure (500 PSI)	=	LP
High pressure (1500 PSI)	=	LH

HOUSING MATERIAL	WHERE USED			
Aluminum	Lube oil	=	A	LL & LP
Brass	Water	=	B	LL & LP
Stainless steel (316)	Chemicals, corrosives	=	Z	LL, LP & LH

PISTON MATERIAL			
Brass	Water, oil	=	B
Stainless steel (316)	Corrosives, chemicals	=	Z

CAP MATERIAL		
Metal (same as housing) use matches housing (300 PSI)	=	M
Polysulfone (150 PSI) (Not available for 10 GPH and below)	=	P (LL only)

INTERNAL MOVING PARTS			
Stainless steel (316 series)	Water, chemicals and corrosives	=	Z

SEAL MATERIAL			
Buna N	Water, oil	=	B
Viton	Acids, some caustics	=	F
Kalrez (dynamic) and Teflon (static)	Corrosives, solvents		
	Available only in metal "Cap Material" (option M)	=	T

MAX FLOW RATE LIQUIDS	SCALES
GPH: **5, 10, 15, 20, 25, 30, 40, 50, 60, 75, 80, 90, 100, 120, 150, 200, 250 & 300**	= GH
GPM: **Ø.25, Ø.5, Ø.75, 1, 1.5, 2, 2.5, 3, 4, 5, 6, 7, 8, 9, 10, 15 & 20**	= GM
LPH: **20, 30, 40, 50, 60, 70, 80, 90, 100, 200, 300, 400, 500, 600, 700, 800, 900 & 1000**	= LH
LPM: **5, 10, 15, 20, 25, 30, 35, 40, 50, 60, 70 & 75**	= LM
CMH: **1, 2, 3 & 4**	= CMH
GLM: Dual scale - gallons & liters per minute	= GLM
NOTE: Dual Scales not available with LCD displays.	

THREADED ATTACHMENT

Pipe size and attachment method

Pipe Size In Inches	NPT Female	SAE	BSPP	BSPT	Max Flow In GPM
1/8	1	2T	2BP	2BT	2
1/4	2	4T	4BP	4BT	5
3/8	3	6T	6BP	6BT	10
1/2	4	8T	8BP	8BT	15
5/8		10T	10BP	10BT	15
3/4	6	12T	12BP	12BT	20

FLANGED

Ex: 2FWCS150RF = 1/4", Welded, Carbon steel, Class 150, Raised Face flange

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

INLET PORT POSITION		
Upper inline (max. 2 GPM)	=	U
Lower offset	=	L

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.

A1 W L - 5D

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	=	ST
Safety Glass window ref. page 4	=	TG
Wall mounting bracket ref. page 4	=	W
Foot mounting bracket ref. page 4	=	F

SWITCH SETTING

No symbol = Lowest possible setting

Desired set point is assumed to be in flow units already selected (GPH). Give flow rate followed by a "D" for flow going down (flow failure) or a "U" for flow going up. Example, 5D indicates a setting of 5 GPH in declining flow. **5D**

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, L and Z small control box in the following configurations and materials:	A Box Polysulfone	L Box Aluminum	Z Box 316 SS
4-20 mA transmitter (Intrinsically safe with approved barriers)	AXØ	LXØ	ZXØ
HART with programmable switch points	AHØ	LHØ	ZHØ
Display only	AØ	LØ	ZØ
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	TXLØ
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	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

Flow rate display, HART & 4-20mA output:

HART protocol is not intrinsically safe HART & 4-20mA output only	THØ
One SPDT (3 wire)	TH1
Two SPDT (3 wire)	TH2
One SPDT (4 wire)	TH3
Two SPDT (4 wire)	TH4

"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:

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)	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 & 4-20mA output:

Hart protocol is not intrinsically safe HART & 4-20mA output only	RHØ
One SPDT (3 wire)	RH1
Two SPDT (3 wire)	RH2
One SPDT (4 wire)	RH3
Two SPDT (4 wire)	RH4

ENGINEERING DATA

Maximum fluid temperature: 200°F (93°C)

Optional max. fluid temperatures: 300 & 400°F (148 & 204°C) (option **HT**)

Maximum ambient temp: 150°F (65°C) CSA listed only to 105°F (41°C)

Series LL max. operating pressures:
With plastic cap: (3:1 safety factor): 150 PSI (10.34 BAR)
With metal cap: (3:1 safety factor): 300 PSI (20.69 BAR)

Series LP max. operating pressures: (2:1 safety factor): 500 PSI (34.48 BAR)

Series LH max. operating pressures: (2:1 safety factor): 1500 PSI (103.45 BAR)

Pressure drop: 5 PSI (.35 BAR) at full scale

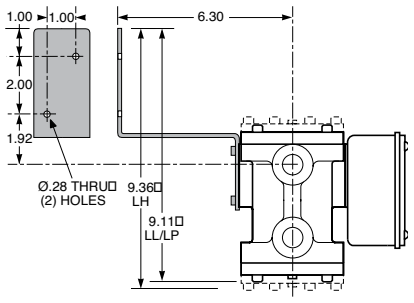
Readout accuracy, full scale: ±5%

Switch repeatability is 1% of actual flow

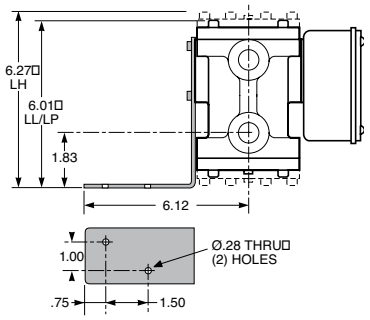
INSTALLATION

Flow monitors mount in-line or offset and are typically supported by rigid pipe. For additional support when using tubing or flexible hose, order special options **W** (wall) or **F** (foot) mounting brackets.

Wall Mount Bracket



Foot Mount Bracket



SPECIAL OPTIONS

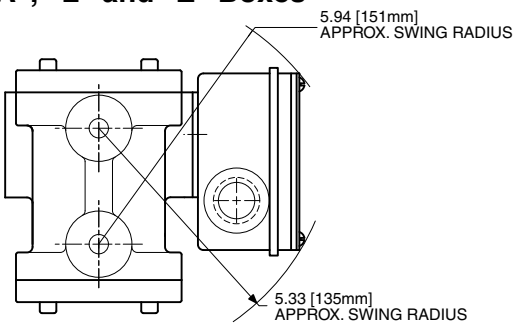
High temperature: (option **HT**) requires all-metal construction (M Cap material) with seals of Viton, EPR, Kalrez or Teflon (compatible with fluid). A thermal barrier (heat-resistant cloth) is added between the housing and the control box, which must be used with service option "W" (weatherproof) or "X" (corrosion resistant). A metal scale is provided.

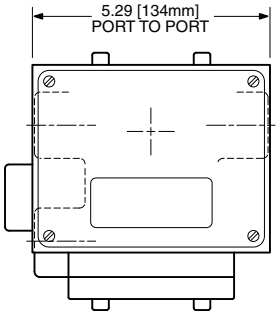
Identification tag: (option **ST**) customer-supplied information is stamped on a stainless steel tag that is attached to the nameplate.

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

CONTROL BOX SELECTION GUIDE

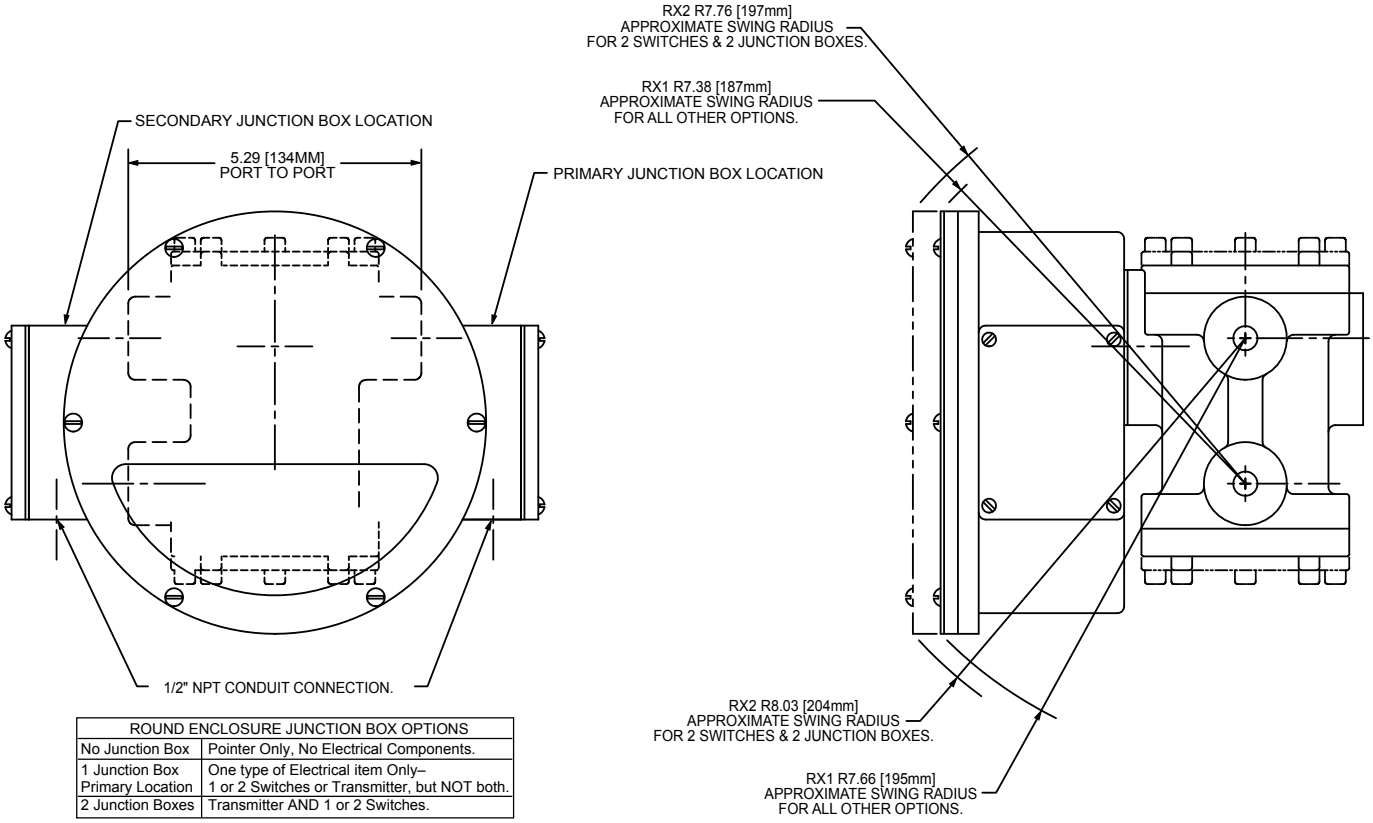
"A", "L" and "Z" Boxes





Maximum installation dimensions

"R" Box

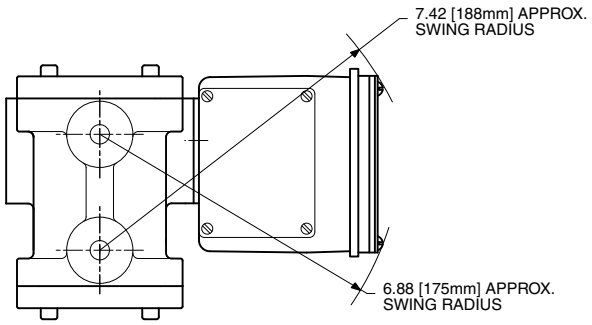


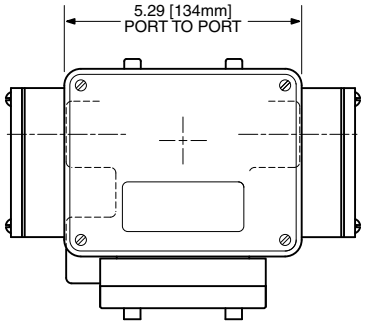
ROUND ENCLOSURE JUNCTION BOX OPTIONS	
No Junction Box	Pointer Only, No Electrical Components.
1 Junction Box Primary Location	One type of Electrical item Only– 1 or 2 Switches or Transmitter, but NOT both.
2 Junction Boxes	Transmitter AND 1 or 2 Switches.

Maximum installation dimensions

CONTROL BOX SELECTION GUIDE

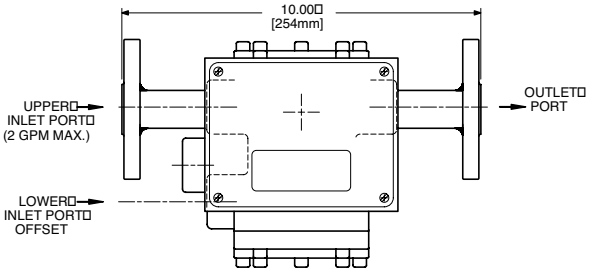
"T" Box

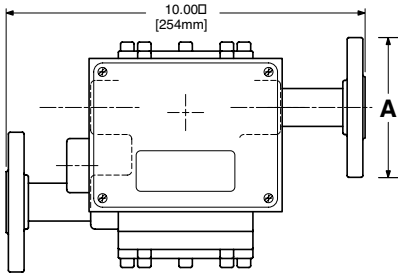




Maximum installation dimensions

Flanged Face to Face Dimensions for In-Line and Offset Installation





With 150 lb R.F. flanges
(for other flanges consult factory)

Port Size (inches)	**A** (inches)
1/2	3.50
3/4	3.88
1	4.25

UNIVERSAL UFM
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

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 500 PSI (34.5 BAR) **LE SERIES**

Flow meters, Flow switches and Flow transmitters

A Large Vane Style For Liquids

HART COMMUNICATION PROTOCOL

c SP 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

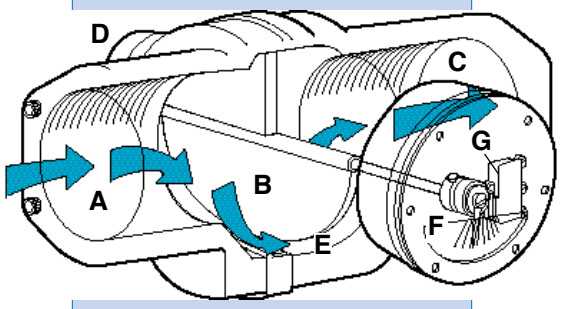
All flow meters are individually calibrated for fluids with the viscosity you specify (up to 3000 SSU/660 Centistokes). We also compensate for your fluid's specific gravity. For NIST Traceability please consult factory.

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**.

EXAMPLE: LN - F I F 2ØØGM - 2Ø - 32V1.Ø -

SERIES BY PRESSURE RATING		
Normal pressure (300 PSI)	=	**LN**
High pressure (500 PSI)	=	**LE**

HOUSING MATERIAL	WHERE USED			
Aluminum	Lube oil	=	**D**	LN
Brass	Water	=	**F**	LN
Carbon steel	Oil	=	**M**	LE or LN
Stainless steel (316)	Chemicals, corrosives	=	**I**	LE or LN

INTERNAL MOVING PARTS			
Stainless steel (316 series)	Chemicals and corrosives	=	**I**

SEAL MATERIAL			
Buna N	Water, oil	=	**B**
Viton	Acids, some caustics	=	**F**
Kalrez (dynamic) and Viton (static)	Corrosives, solvents	=	**K**

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).
No dual scales on LCD displays

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**	= **20W**	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"				
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

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. Consult factory for settings out of flow range. **3ØD**

CONTROL BOX & READOUT

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 dual scales on LCD's

No switches	TXLØ
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	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

Flow rate display, HART & 4-20mA output:

HART protocol is not intrinsically safe	
HART & 4-20mA output only	THØ
One SPDT (3 wire)	TH1
Two SPDT (3 wire)	TH2
One SPDT (4 wire)	TH3
Two SPDT (4 wire)	TH4

"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:

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:

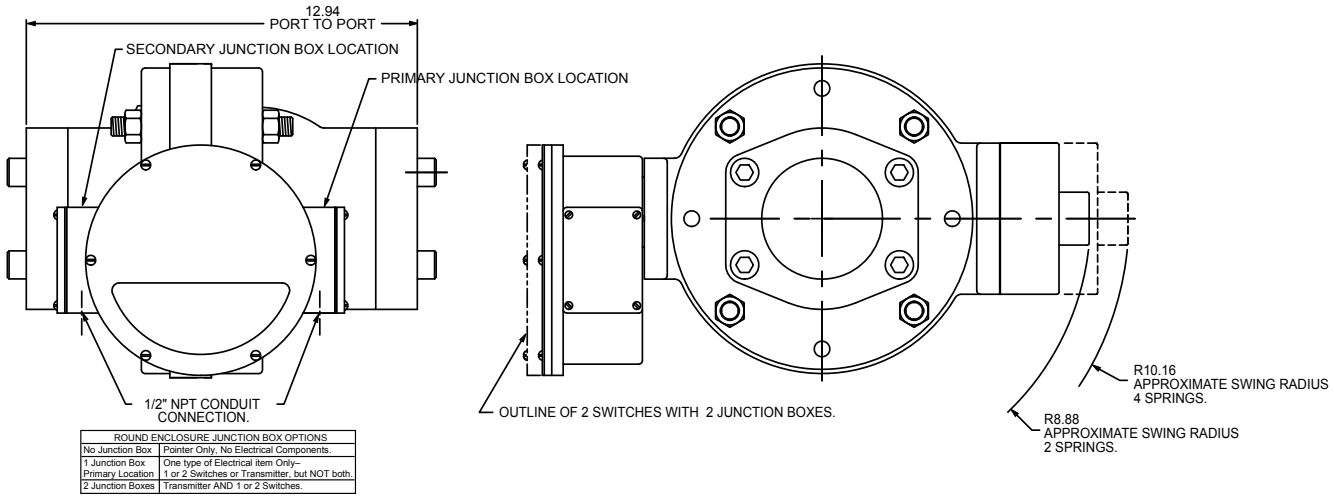
Display and transmitter only (Intrinsically safe with no switch options with approved barriers)	RXØ
One SPDT (3 wire)	RX1
Two SPDT (3 wire)	RX2
One SPDT (4 wire)	RX3
Two SPDT (4 wire)	RX4
One SPDT (3 wire) high temperature	RX61

Flow rate display, HART & 4-20mA output:

Hart protocol is not intrinsically safe	
HART & 4-20mA output only	RHØ
One SPDT (3 wire)	RH1
Two SPDT (3 wire)	RH2
One SPDT (4 wire)	RH3
Two SPDT (4 wire)	RH4

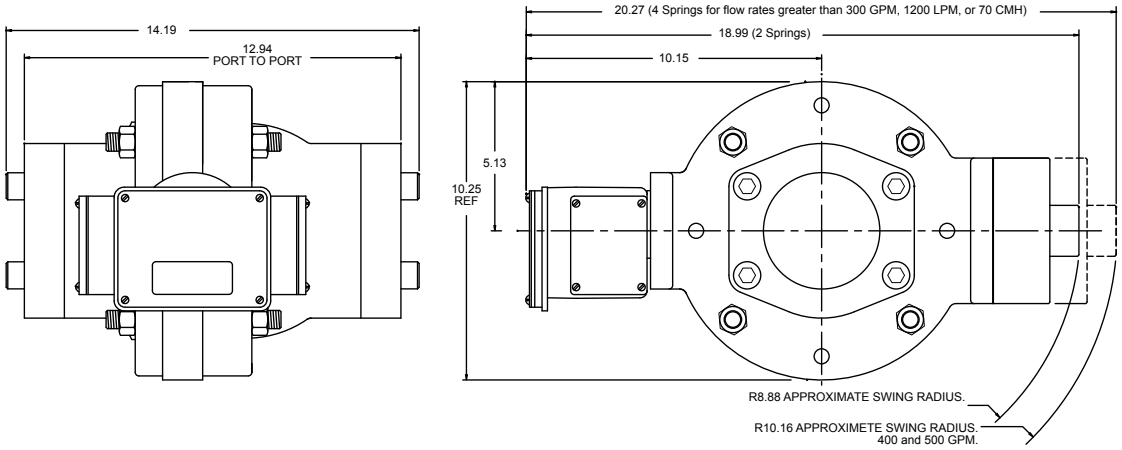
CONTROL BOX SELECTION GUIDE

STANDARD OFFERING: Control Box “R”



ROUND ENCLOSURE JUNCTION BOX OPTIONS	
No Junction Box	Pointer Only, No Electrical Components.
1 Junction Box Primary Location	One type of Electrical item Only– 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): 500 PSI (34.5 BAR)

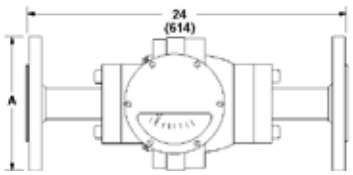
Readout accuracy, full scale: ±2%

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 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

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

Flow meters, Flow switches and Flow transmitters

A Medium Vane-Style For Liquids

HART COMMUNICATION PROTOCOL

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

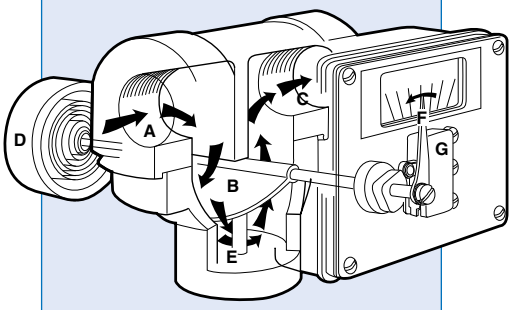
All flow meters are individually calibrated for fluids with the viscosity you specify (up to 3000 SSU/650 Centistokes). We also compensate for your fluid's specific gravity. For NIST Traceability please consult factory.

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.



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**.

for DuPont Performance Elastomers.

EXAMPLE: MN - B I B 7ØGM - 8 - 32ØV.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**	
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	1Ø, 15, 2Ø, 3Ø, 4Ø, 5Ø, 6Ø, **7Ø**, 8Ø, 9Ø, 1ØØ, 11Ø, 12Ø, 13Ø, 14Ø, 15Ø, 16Ø	=	**GM**
LPM	4Ø, 5Ø, 6Ø, 7Ø, 8Ø, 9Ø, 1ØØ, 15Ø, 2ØØ, 25Ø, 3ØØ, 35Ø, 4ØØ, 5ØØ, 6ØØ	=	**LM**
CMH	2.25, 2.5, 3, 4, 5, 6, 7, 8, 9, 1Ø, 15, 2Ø, 25, 3Ø	=	**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**
	No Dual Scales on LCD's		

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 and attachment method

Pipe Size In Inches	NPT Female	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	**1Ø**	**20T**	**2ØBP**	**2ØBT**	**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	**15Ø**	**RF**=Ansi raised face
6	= 3/4"		**S**=316 Stainless	**3ØØ**	
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: **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.

A1 W L - E - 1ØD

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 (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

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, 1ØD indicates a setting of 10 GPM in declining flow. Consult factory for settings out of flow range. **1ØD**

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, L and Z small control box in the following configurations and materials:	A Box Polysulfone	L Box Aluminum	Z Box 316 SS
4-20 mA transmitter (Intrinsically safe with approved barriers)	AXØ	LXØ	ZXØ
HART with programmable switch points	AHØ	LHØ	ZHØ
Display only	AØ	LØ	ZØ
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 dual scales on LCD

No switches	TXLØ
One SPDT (3 wire)	TXL1
One SPDT (4 wire)	TXL3

Pointer, scale and 4-20 mA:

No switches	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

Flow rate display, HART & 4-20mA output:

HART protocol is not intrinsically safe	
HART & 4-20mA output only	THØ
One SPDT (3 wire)	TH1
Two SPDT (3 wire)	TH2
One SPDT (4 wire)	TH3
Two SPDT (4 wire)	TH4

"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:

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)	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 & 4-20mA output:

Hart protocol is not intrinsically safe	
HART & 4-20mA output only	RHØ
One SPDT (3 wire)	RH1
Two SPDT (3 wire)	RH2
One SPDT (4 wire)	RH3
Two SPDT (4 wire)	RH4

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 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.

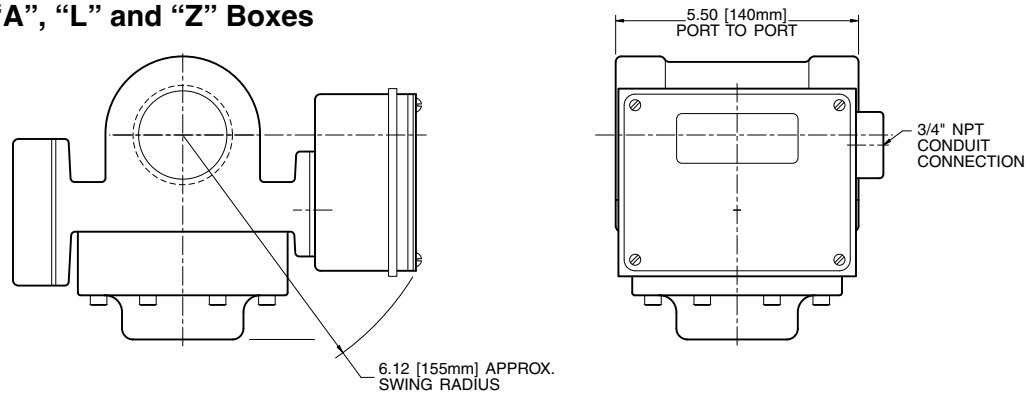
Safety Glass window: (option **TG**) replaces the standard window with "Laminated Safety Glass" ANSI Z97.1 and CPSC 1601 CFR 1201.

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.

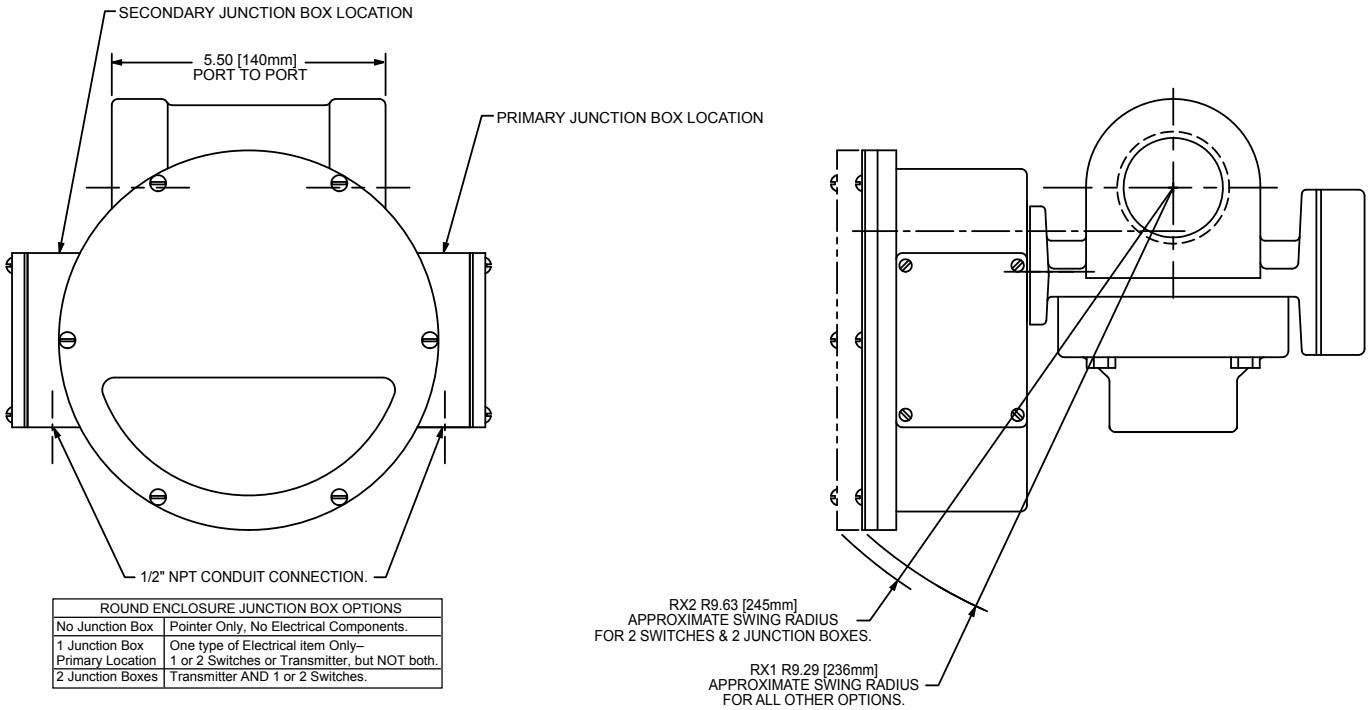
CONTROL BOX INSTALLATION DRAWINGS

"A", "L" and "Z" Boxes



Maximum installation dimensions

"R" Box

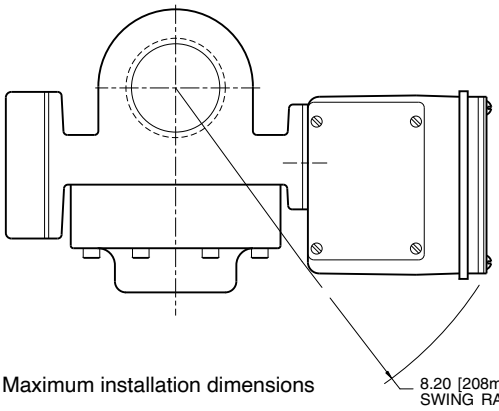


ROUND ENCLOSURE JUNCTION BOX OPTIONS	
No Junction Box	Pointer Only, No Electrical Components.
1 Junction Box Primary Location	One type of Electrical item Only– 1 or 2 Switches or Transmitter, but NOT both.
2 Junction Boxes	Transmitter AND 1 or 2 Switches.

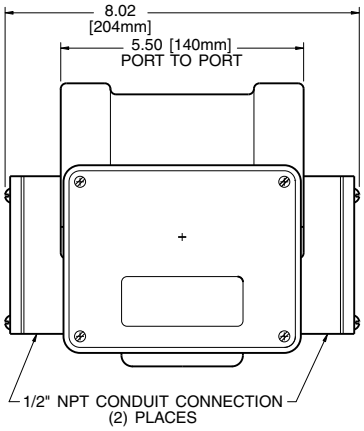
Maximum installation dimensions

CONTROL BOX INSTALLATION DRAWINGS

"T" Box

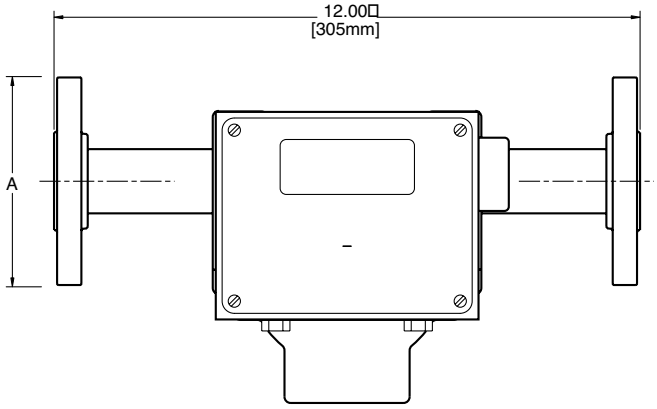


Maximum installation dimensions



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

Flow meters, Flow switches and Flow transmitters

A Medium Vane-Style For Corrosive Fluids

MX shown with "A" style control box.

HART COMMUNICATION PROTOCOL

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 and remote signaling devices.

CALIBRATION

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

READOUTS

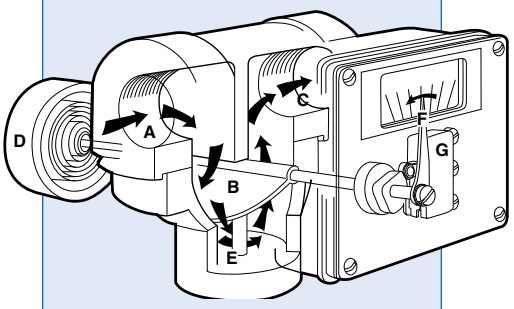
The flowmeter has outputs both visual and electronic. Visual displays are either pointer (with inscribed scale) or numeric (digital LCD). Electronic outputs can be mechanical switch closure, 4-20 mA analog, HART or some combination of switches with electronic outputs (for signal redundancy). The switches can be general purpose or rated for hazardous locations (all classes, groups and divisions).

CONSTRUCTION MATERIALS

These flowmeters have plastic bodies, a wide variety of metal internals, and fittings. They are ideally suited to monitor flows of such fluids as corrosive liquids,seawater, deionized water, acids,caustics, and plating solutions. See selections in the “How to Order” section.

LINE CONNECTION

Threaded units have 2 ½ inch -12 SAE ports. Adapters are used to offer NPT female port connections in a variety of materials and sizes (see “How to Order” section). Van Stone flanges are offered in a variety of sizes in PVC.



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 increase in 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

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

EXAMPLE: MX - P I F 70 GM - 12I - 32V1.0 -

SERIES		
Medium	=	MX

HOUSING MATERIAL		
Polysulfone	=	P

INTERNAL MOVING PARTS		
316 Stainless Steel	=	I
Titanium	=	T

SEAL MATERIAL		
Buna N	=	B
Viton	=	F
Kalrez (dynamic)/Viton (static)	=	K

MAX FLOW RATE LIQUIDS			
GPM	1Ø, 15, 2Ø, 3Ø, 4Ø, 5Ø, 6Ø, 7Ø, 8Ø, 9Ø, 10Ø, 11Ø, 12Ø, 13Ø, 14Ø, 15Ø, 16Ø	=	GM
LPM	4Ø, 5Ø, 6Ø, 7Ø, 8Ø, 9Ø, 10Ø, 15Ø, 20Ø, 25Ø, 30Ø, 35Ø, 40Ø, 50Ø, 60Ø	=	LM
CMH	2.25, 2.5, 3, 4, 5, 6, 7, 8, 9, 1Ø, 15, 2Ø, 25, 3Ø	=	CMH

PORT CONNECTION					
NPT (Female adapters)					
316 stainless steel	1	25.40	70	=	8I
	1 1/2	38.10	100	=	12I
Titanium	1	25.40	70	=	8T
	1 1/2	38.10	100	=	12T
Monel	1	25.40	70	=	8L
	1 1/2	38.10	100	=	12L
*PVC	1	25.40	70	=	8V
	1 1/2	38.10	100	=	12V
*Polysulfone	1	25.40	70	=	8P
	1 1/2	38.10	100	=	12P

*Material will be same as housing;
Adapter O-ring will be same as static seal material.

FLUID CHARACTERISTICS

Viscosity number followed by a 'V' (for SSU), 'C' (for centipoise), or 'CS' (for centistokes) followed by the specific gravity. Example: **32V1.0** would indicate a fluid with a viscosity of 32 SSU with a specific gravity of 1.0 (water).

A3 W R - E - ST - 5D

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		
Stainless steel ID tag for customer supplied information	=	ST
Safety Glass window ref. page 4	=	TG
Manual override ref. page 4	=	E
Dual spring	=	DS
Clearance vane for ≥ 16 GPM	=	Z86

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, 5D indicates a setting of 5 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, L and Z small control box in the following configurations and materials:	A Box Polysulfone	L Box Aluminum	Z Box 316 SS
4-20 mA transmitter (Intrinsically safe with approved barriers)	AXØ	LXØ	ZXØ
HART with programmable switch points	AHØ	LHØ	ZHØ
Display only	AØ	LØ	ZØ
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 dual scales on LCD's

No switches	TXLØ
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	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

Flow rate display, HART & 4-20mA output:

HART protocol is not intrinsically safe	
HART & 4-20mA output only	THØ
One SPDT (3 wire)	TH1
Two SPDT (3 wire)	TH2
One SPDT (4 wire)	TH3
Two SPDT (4 wire)	TH4

"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:

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)	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 & 4-20mA output:

Hart protocol is not intrinsically safe	
HART & 4-20mA output only	RHØ
One SPDT (3 wire)	RH1
Two SPDT (3 wire)	RH2
One SPDT (4 wire)	RH3
Two SPDT (4 wire)	RH4

Rometec srl - www.rometec.it - info@rometec.it - Rometec srl - www.rometec.it - info@rometec.it

ENGINEERING DATA

Maximum operating temperature:
PVC housing: 100°F (38°C)
Polysulfone housing: 200°F (95°C)

Maximum ambient temperature:
130°F (UL listed to 105°F (40°C; for hazardous locations -13 to +104°F)

Maximum operating pressures:(3:1 safety factor)
PVC housing: 100 PSI (6.90 BAR)
Polysulfone housing: 200 PSI (13.79 BAR)

Readout accuracy, full scale: ±2%

Switch repeatability is 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 a partial bypass (which raises minimum indicated flow), or dual springs (which raises the pressure drop). 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	50/190	6.5	20/90	6.8
150/570	50/190	6.5	30/100	6.8
160/600	50/190	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

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

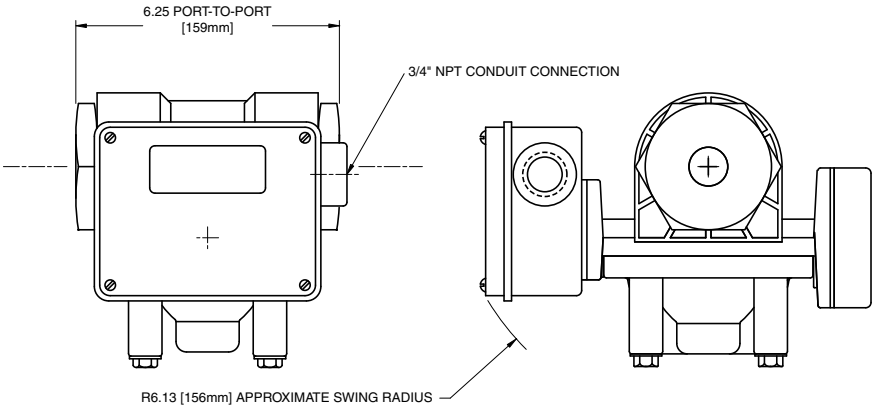
Safety Glass window:
(option **TG**) replaces the standard window with "Laminated Safety Glass" ANSI Z97.1 and CPSC 1601 CFR 1201.

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.

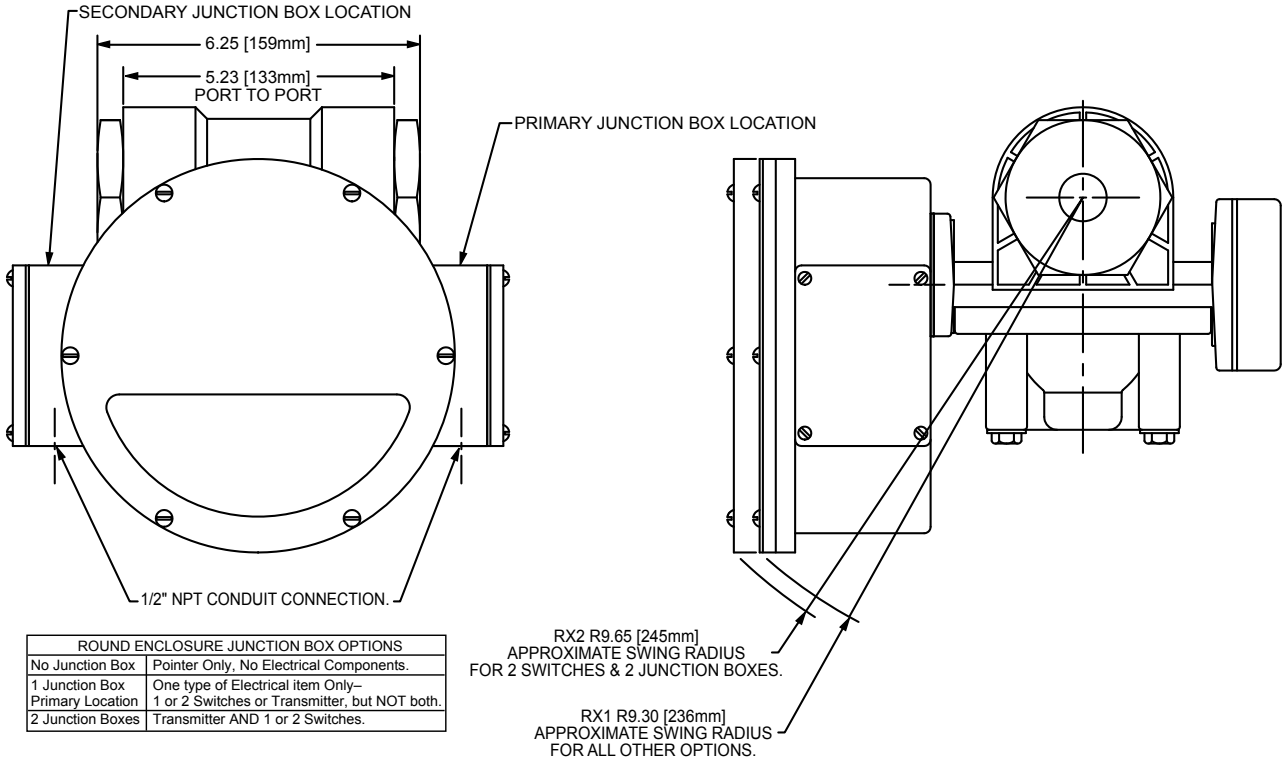
CONTROL BOX SELECTION GUIDE

"A", "L" and "Z" Boxes



Maximum installation dimensions

"R" Box

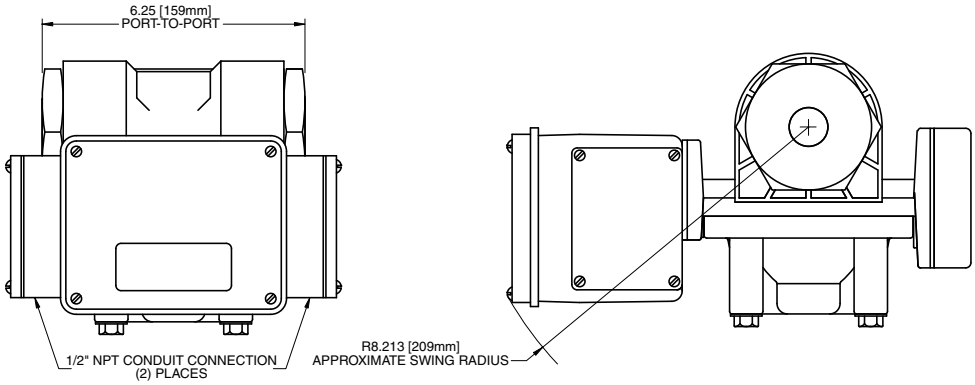


ROUND ENCLOSURE JUNCTION BOX OPTIONS	
No Junction Box	Pointer Only, No Electrical Components.
1 Junction Box Primary Location	One type of Electrical item Only– 1 or 2 Switches or Transmitter, but NOT both.
2 Junction Boxes	Transmitter AND 1 or 2 Switches.

Maximum installation dimensions

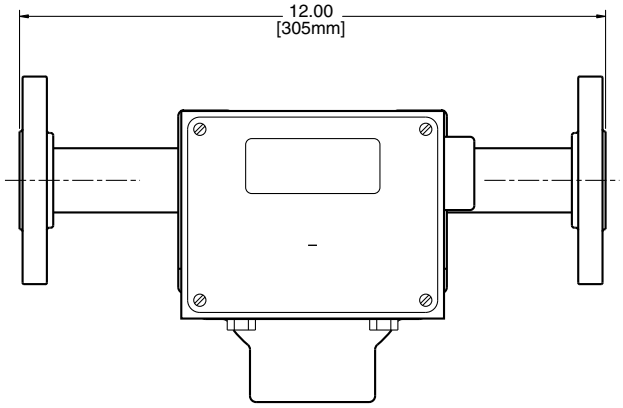
CONTROL BOX SELECTION GUIDE

“T” Box



Maximum installation dimensions

Vanstone Flanges
(PVC units only)



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

UNIVERSAL UFM
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

MAX FLOW SIZES	From 5 GPH to 30 GPM (20 LPH to 110 LPM)
MAX LIQUID PRESSURE	500 PSI (34.48 Bar) or
MAX LIQUID PRESSURE	1500 PSI (103.42 BAR)
	1% FS accuracy available (1 GPM and higher)

PI 1/4 to 1 inch

UNIVERSAL® Flow Monitors

Piston Inline PI

Flow meters,
Flow switches and
Flow transmitters

Piston - In Line

HART COMMUNICATION PROTOCOL

c SP us

CE

NIST Traceable Calibration Certificate Available

PI Series, with standard scale and pointer (control box A).

DESCRIPTION

These variable-area meters position an orifice over a tapered shaft to establish flow rate. Mounting is in-line and in any position. Straight pipe runs before or after this monitor are not required. The all-mechanical sensing system directly drives the pointer, 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

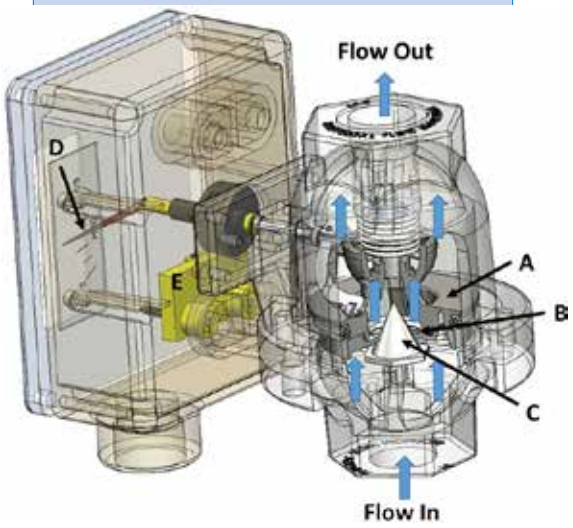
All flow meters are individually calibrated for fluids with the viscosity you specify (up to 3000 SSU/650 Centistokes). We also compensate for your fluid's specific gravity. For NIST Traceability please consult factory.

CONSTRUCTION MATERIALS

Housings and seals are offered in a variety of materials to suit a wide range of applications, such as: water, oil, coolants, paint, solvents and some corrosive fluids. 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 flow causes a spring-loaded piston **A** having a circular opening at its center **B** to move along the axis of a precision-tapered shaft **C**. This creates a variable orifice in direct proportion to the flow rate. The piston is mechanically linked to the readout pointer **D** and actuates switch **E** or a transmitter (not shown).

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

EXAMPLE: PI - B Z F 10GM- 4 32V1.Ø -

SERIES BY PRESSURE RATING		
Piston Inline	=	PI

HOUSING MATERIAL 500PSI	WHERE USED		
Aluminum	Lube oil	=	A
Brass	Water	=	B

HOUSING MATERIAL 1500PSI	WHERE USED		
Stainless steel (316)	Chemicals, corrosives, oil	=	Z

INTERNAL MOVING PARTS			
Stainless steel (316L series)	Water, oil, chemicals and corrosives	=	Z

SEAL MATERIAL			
Buna N	Water, oil	=	B
Viton	Acids, some caustics	=	F

MAX FLOW RATE LIQUIDS	SCALES
GPH: **5, 1Ø, 15, 2Ø, 25, 3Ø, 4Ø, 5Ø, 6Ø, 75, 8Ø, 9Ø, 1ØØ, 12Ø, 15Ø, 2ØØ, 25Ø & 3ØØ**	= GH
GPM: **Ø.25, Ø.5, Ø.75, 1, 1.5, 2, 2.5, 3, 4, 5, 6, 7, 8, 9, 1Ø, 15, 2Ø & 3Ø**	= GM
LPH: **2Ø, 3Ø, 4Ø, 5Ø, 6Ø, 7Ø, 8Ø, 9Ø, 1ØØ, 2ØØ, 3ØØ, 4ØØ, 5ØØ, 6ØØ, 7ØØ, 8ØØ, 9ØØ & 1ØØØ**	= LH
LPM: **5, 1Ø, 15, 2Ø, 25, 3Ø, 35, 4Ø, 5Ø, 6Ø, 70, 75, 80, 90, 100**	= LM
CMH: **1, 2, 3, 4, 5, 6**	= CMH
GLM: Dual scale - gallons & liters per minute	= GLM
Dual Viscosity	= DGM
NOTE: Dual Scales not available with LCD displays.	

THREADED ATTACHMENT

Pipe size and attachment method

Pipe Size In Inches	NPT	SAE	BSPP	BSPT	Max Flow In GPM
1/4	2	4T	4BP	4BT	5
3/8	3	6T	6BP	6BT	10
1/2	4	8T	8BP	8BT	15
3/4	6	12T	12BP	12BT	20
1	8	16T	16BP	16BT	30

FLANGED

Ex: 2FWCS150RF = 1/4", Welded, Carbon steel, Class 150, Raised Face flange

Pipe Size In Inches		Attachment	Material	Class	Style
2	= 1/4"	FW=Welded	CS=Carbon Steel	15Ø	RF=ANSI raised face
4	= 1/2"			300	
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: **32V1.0** would indicate a fluid with a viscosity of 32 SSU and specific gravity of 1.0

A61 W L - HT - 5D

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
High accuracy (+/-1%) ref. page 4	=	HA
Stainless steel ID tag	=	ST
Safety Glass window ref. page 4	=	TG
Wall mounting bracket (Optional brackets are not available with flanged units)	=	W
Foot mounting bracket (Optional brackets are not available with flanged units)	=	F

SWITCH SETTING

No symbol = Lowest possible setting (usually 10% of maximum flow)

Desired set point is assumed to be in flow units already selected (GM). Give flow rate followed by a "D" for flow going down (flow failure) or a "U" for flow going up. Example, 5D indicates a setting of 5 GPM in declining flow. **5D**

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, L and Z small control box in the following configurations and materials:	A Box Polysulfone	L Box Aluminum	Z Box 316 SS
4-20 mA transmitter (Intrinsically safe with approved barriers)	AXØ	LXØ	ZXØ
HART with programmable switch points	AHØ	LHØ	ZHØ
Display only	AØ	LØ	ZØ
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	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:	
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)	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 & 4-20mA output:	
Hart protocol is not intrinsically safe	
HART & 4-20mA output only	RHØ
One SPDT (3 wire)	RH1
Two SPDT (3 wire)	RH2
One SPDT (4 wire)	RH3
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.

LCD readout, 4-20mA with 2 open collectors:	
No switches	TXLØ
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	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

Flow rate display, HART & 4-20mA output:	
HART protocol is not intrinsically safe	
HART & 4-20mA output only	THØ
One SPDT (3 wire)	TH1
Two SPDT (3 wire)	TH2
One SPDT (4 wire)	TH3
Two SPDT (4 wire)	TH4

Rometec srl - www.rometec.it - info@rometec.it - Rometec srl - www.rometec.it - info@rometec.it

ENGINEERING DATA

Maximum fluid temperature: 200°F (93°C)

Maximum ambient temp: 150°F (65°C) CSA listed only to 105°F (41°C)

Series PI max. operating pressures: (3:1 safety factor): 500 PSI (34.48 BAR) or 1500 PSI (103.42 BAR)

Pressure drop: 5 PSI (.35 BAR) at full scale

Readout accuracy, full scale: ±2%
1% HA (high accuracy) available on 1 GPM and above. Reference Special Options below

Switch repeatability is 1% of actual flow

INSTALLATION

Piston Inline (PI) meters mount in-line and are typically supported by rigid pipe.

For additional support when using tubing or flexible hose, order special options W (Wall) or F (Foot) mounting brackets.

SPECIAL OPTIONS

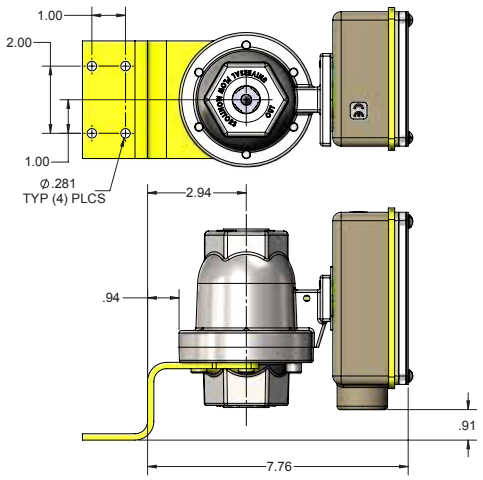
High temperature: (option **HT**) requires all-metal construction with seals of Viton, EPR, Kalrez or Teflon (compatible with fluid). A thermal barrier (heat-resistant cloth) is added between the housing and the control box, which must be used with service option "W" (weatherproof) or "X" (corrosion resistant). A metal scale is provided.

High Accuracy: (option **HA**) Modification of full scale to +/-1%. HA not available on R7, R17, R18, R19 switch options. Requires flow rates of 1 GPM or greater.

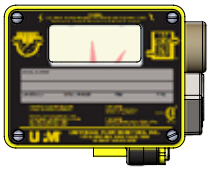
Identification tag: (option **ST**) customer-supplied information is stamped on a stainless steel tag that is attached to the nameplate.

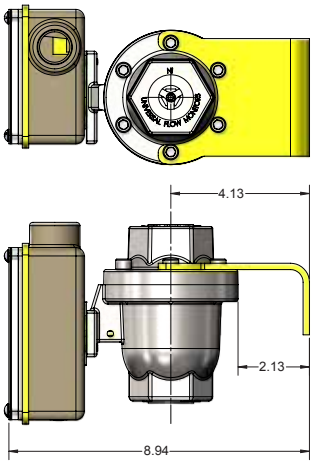
Safety Glass window: (option **TG**) replaces the standard window with "Laminated Safety Glass" ANSI Z97.1 and CPSC 1601 CFR 1201.

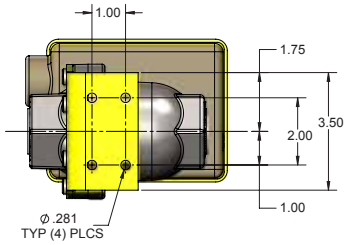
Foot Mount Bracket



Wall Mount Bracket

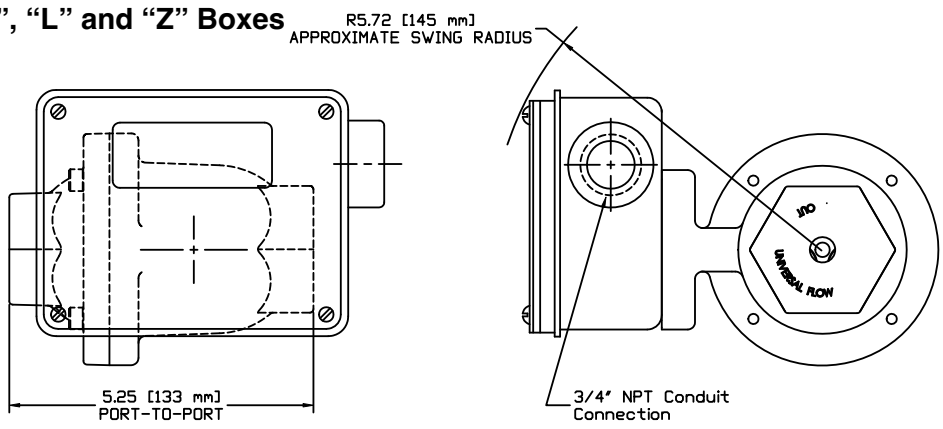






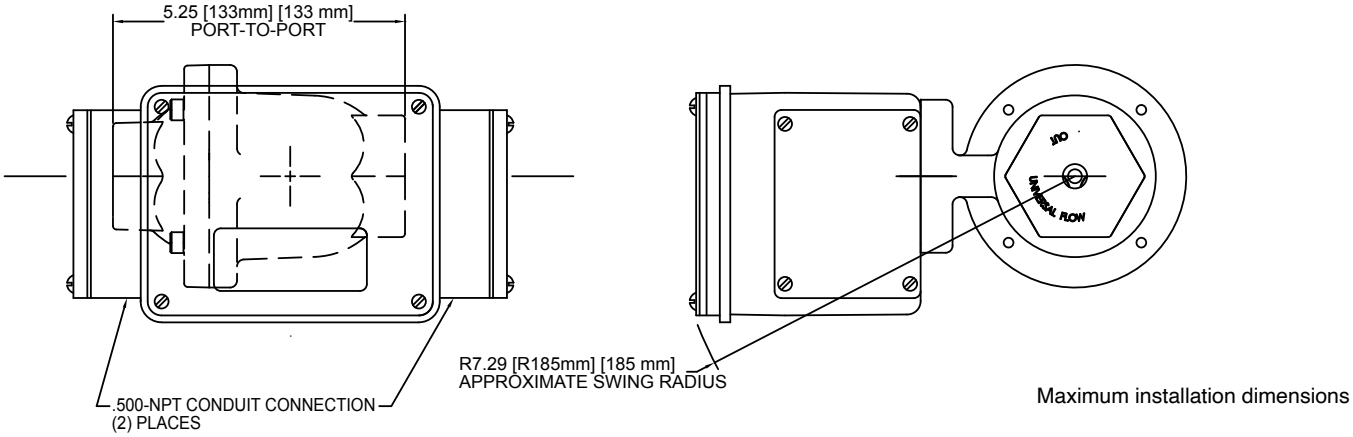
CONTROL BOX SELECTION GUIDE

"A", "L" and "Z" Boxes



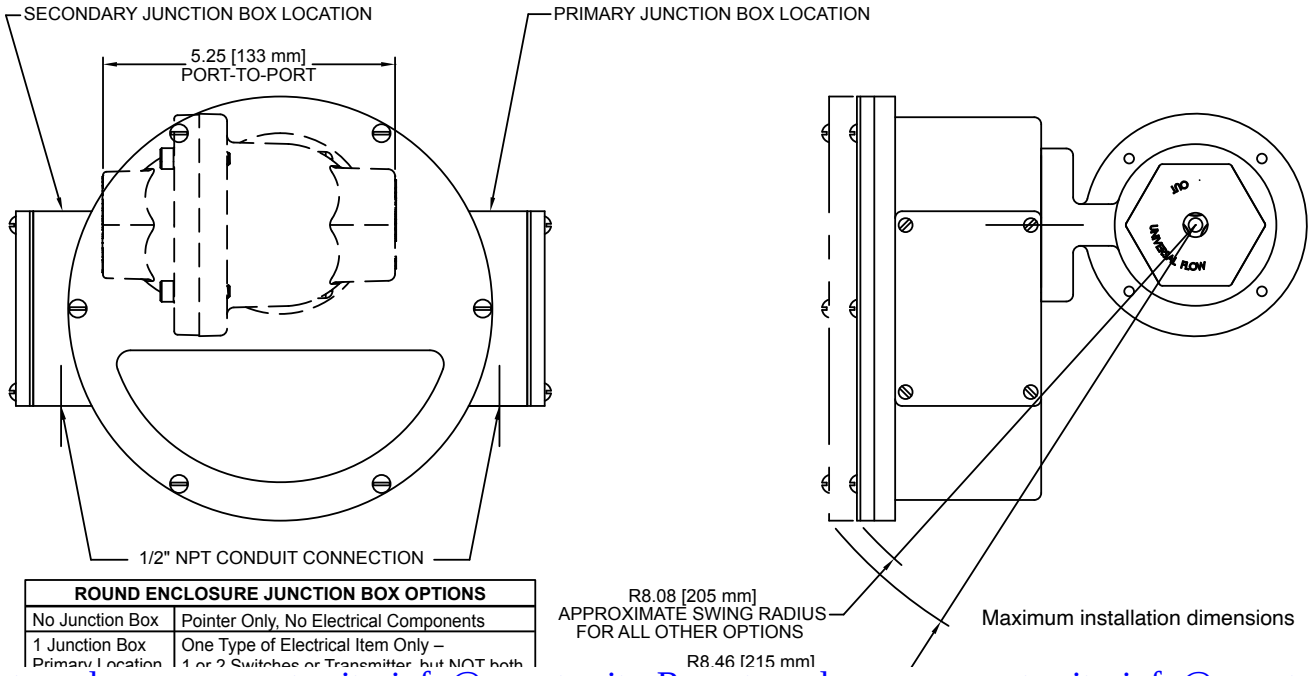
Maximum installation dimensions

"T" Box



Maximum installation dimensions

"R" Box



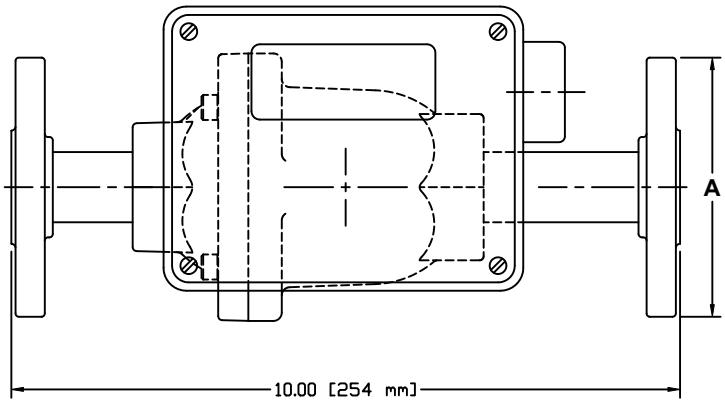
Maximum installation dimensions

ROUND ENCLOSURE JUNCTION BOX OPTIONS	
No Junction Box	Pointer Only, No Electrical Components
1 Junction Box	One Type of Electrical Item Only –
Primary Location	1 or 2 Switches or Transmitter, but NOT both

A-Box for PI Series w Flanges

Face-to-Face Dimensions With 150# R.F. Flanges

(for other flanges consult factory)



Port Size (Inches)	Dia. **A**
1/2 3/4 1	3 1/2 3 7/8 4 1/4

"Flow Up" or "Flow Down" dimensions are the same.
Scale numbers are rotated 90° to read correctly.

UNIVERSAL UFM
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

MAX FLOW SIZES FROM
0.5 TO 20 GPM (2 TO 75 LPM)

MAX LIQUID PRESSURE 300 PSI	(20.69 BAR)	**SN SERIES**
MAX LIQUID PRESSURE 500 PSI	(34.48 BAR)	**SM SERIES**
MAX LIQUID PRESSURE 2000 PSI	(137.93 BAR)	**SH SERIES**

Flow meters, Flow switches and Flow transmitters

A Small Vane Style For Liquids

SN Series shown with "A" style control box

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

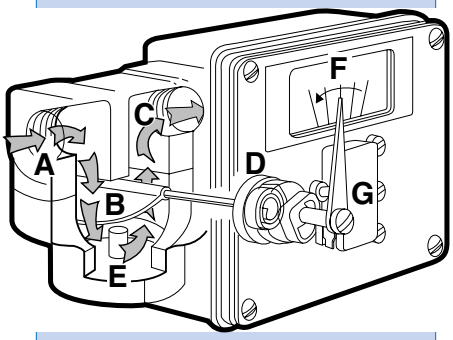
All flow meters are individually calibrated for fluids with the viscosity you specify (up to 3000 SSU/650 Centistokes). We also compensate for your fluid's specific gravity. For NIST Traceability please consult factory.

CONSTRUCTION MATERIALS

The meter body, internal moving parts, and seals are offered in a variety of materials to suit a wide range of applications: 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 - 32Ø.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 SM
Brass	Water	=	F	
Stainless steel (316)	Chemicals, corrosives	=	I	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, 1ØØØ, 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 In Inches	NPT Female	SAE	BSPP	BSPT	Max Flow 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: 32Ø.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.

A1 W L - ST - 2D

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. **2D**

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, L and Z small control box in the following configurations and materials:	A Box Polysulfone	L Box Aluminum	Z Box 316 SS
4-20 mA transmitter (Intrinsically safe with approved barriers)	AXØ	LXØ	ZXØ
HART with programmable switch points	AHØ	LHØ	ZHØ
Display only	AØ	LØ	ZØ
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	TXLØ
One SPDT (3 wire)	TXL1
One SPDT (4 wire)	TXL3

Pointer, scale and 4-20 mA:

No switches	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

Flow rate display, HART & 4-20mA output:
HART protocol is not intrinsically safe

HART & 4-20mA output only	THØ
One SPDT (3 wire)	TH1
Two SPDT (3 wire)	TH2
One SPDT (4 wire)	TH3
Two SPDT (4 wire)	TH4

"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:

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)	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 & 4-20mA output:

Hart protocol is not intrinsically safe HART & 4-20mA output only	RHØ
One SPDT (3 wire)	RH1
Two SPDT (3 wire)	RH2
One SPDT (4 wire)	RH3
Two SPDT (4 wire)	RH4

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.

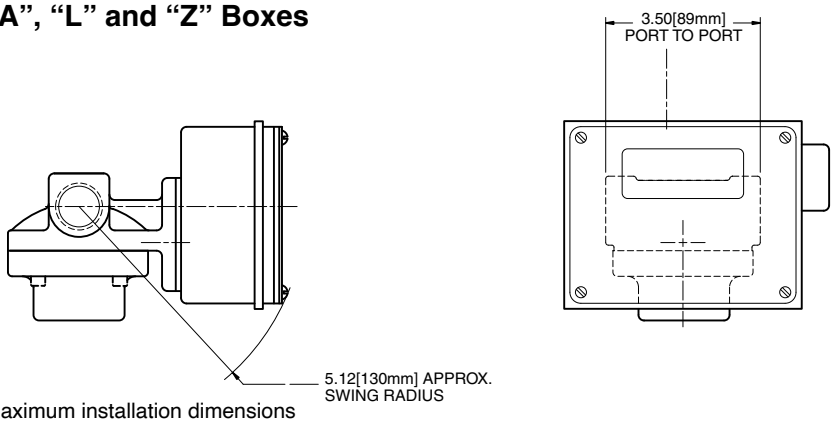
Identification tag: (option **ST**) customer-supplied information is stamped on a stainless steel tag that is attached to the nameplate.

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.

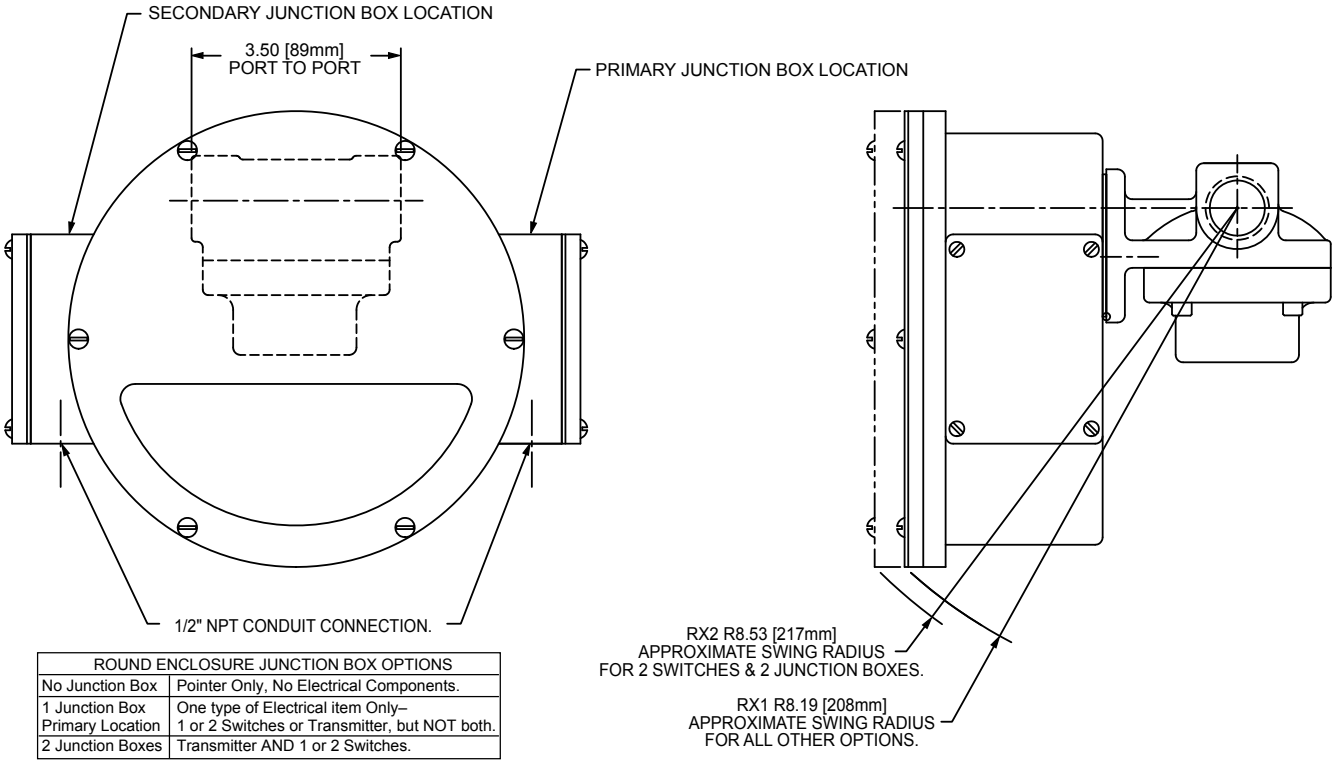
CONTROL BOX SELECTION GUIDE

"A", "L" and "Z" Boxes



Maximum installation dimensions

"R" Box

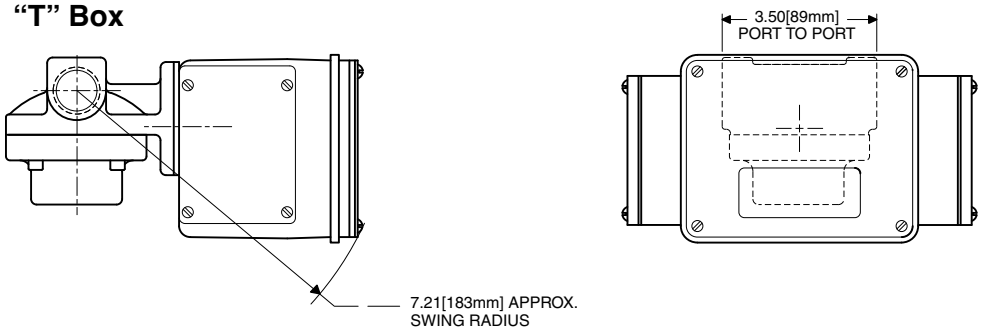


ROUND ENCLOSURE JUNCTION BOX OPTIONS	
No Junction Box	Pointer Only, No Electrical Components.
1 Junction Box Primary Location	One type of Electrical item Only– 1 or 2 Switches or Transmitter, but NOT both.
2 Junction Boxes	Transmitter AND 1 or 2 Switches.

Maximum installation dimensions

CONTROL BOX SELECTION GUIDE

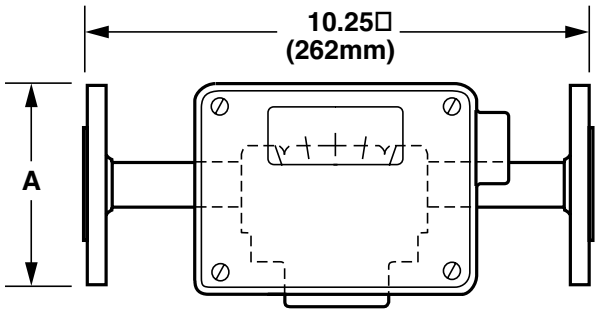
"T" Box



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



"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

Flow meters, Flow switches and Flow transmitters

A Small Vane-Style For Corrosive Fluids

HART COMMUNICATION PROTOCOL

C SP US

CE

NIST Traceable Calibration Certificate Available

SX shown with "A" style control box.

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 and remote signaling devices.

CALIBRATION

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

READOUTS

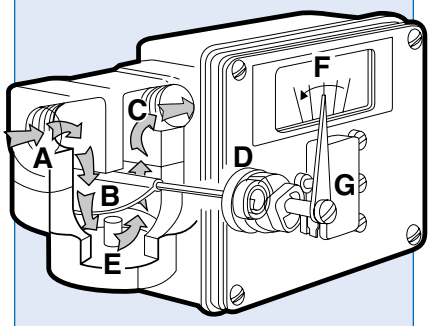
The flowmeter has outputs both visual and electronic. Visual displays are either pointer (with inscribed scale) or numeric (digital LCD). Electronic outputs can be mechanical switch closure, 4-20 mA analog, HART or some combination of switches with electronic outputs (for signal redundancy). The switches can be general purpose or rated for hazardous locations (all classes, groups and divisions).

CONSTRUCTION MATERIALS

These flowmeters have plastic bodies, a wide variety of metal internals, and fittings. They are ideally suited to monitor flows of such fluids as corrosive liquids, seawater, deionized water, acids,caustics, and plating solutions. See selections in the “How to Order” section.

LINE CONNECTION

Threaded units have a 7/8-14 inch SAE ports. Adapters are used to offer NPT port connections both male and female and in plastic or 316 SS (see “How to order” section). One inch diameter Van Stone flanges are offered in PVC.



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 increase in 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

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

EXAMPLE: SX - P I F 6 GM-8R 4FS - 32V1.0 -

SERIES	
Small vane style corrosion resistant =	**SX**

HOUSING MATERIAL		
PVC	=	**V**
Polysulfone	=	**P**

INTERNAL MOVING PARTS		
316 Stainless Steel	=	**I**
Titanium	=	**T**

SEAL MATERIAL		
Buna N	=	**B**
Viton®	=	**F**
Kalrez (dynamic)/Viton (static)	=	**K**

MAX FLOW RATE LIQUIDS	
GPM	3, 4, 5, 6, 7, 8, 9, 10, 15 & 20
LPM	10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 75
CMH	.75, 1, 1.25, 1.5, 2, 2.5, 3, 3.5, 4, 4.5

SCALE CALIBRATIONS		
Calibrated in gallons per minute	=	**GM**
Calibrated in liters per minute	=	**LM**
Calibrated in cubic meters per hour	=	**CMH**
Dual gallons & liters per minute	=	**GLM**

Note: For specific calibrated increments and other scales consult factory

PORTING

PORT ADAPTER

NPT Inches	NPT MM	Max Flow (gpm)	Plastic* Male	Plastic* Female	316 S.S. Female
1/4	6.350	8	**2MP**	**2FP**	–
1/2	12.70	10	**4MP**	**4FP**	**4FS**
3/4	19.05	10	**6MP**	**6FP**	**6FS**
1	25.40	20	**8MP**	**–**	**–**

*Material will be same as housing

VAN STONE PIPE FLANGE

Inches	Flanged Max Flow	Plastic (PVC only)
1/2	10	**4R**
1	20	**8R**

FLUID CHARACTERISTICS

Viscosity number followed by a 'V' (for SSU), 'C' (for centipoise), or 'CS' (for centistokes) followed by the specific gravity. Example: **32V1.0** would indicate a fluid with a viscosity of 32 SSU with a specific gravity of 1.0 (water).

A1 W R - - 2D

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		
Stainless steel ID tag for customer supplied information	=	ST
High accuracy (+/-3%) ref. page 4	=	HA
Safety Glass window ref. page 4	=	TG
Clearance vane for ≥ 5 GPM	=	Z86
Wall mounting bracket ref. page 4	=	W
Foot mounting bracket ref. page 4	=	F

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, L and Z small control box in the following configurations and materials:	A Box Polysulfone	L Box Aluminum	Z Box 316 SS
4-20 mA transmitter (Intrinsically safe with approved barriers)	AXØ	LXØ	ZXØ
HART with programmable switch points	AHØ	LHØ	ZHØ
Display only	AØ	LØ	ZØ
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	TXLØ
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	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

Flow rate display, HART & 4-20mA output:
HART protocol is not intrinsically safe

HART & 4-20mA output only	THØ
One SPDT (3 wire)	TH1
Two SPDT (3 wire)	TH2
One SPDT (4 wire)	TH3
Two SPDT (4 wire)	TH4

"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:

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)	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 & 4-20mA output:
Hart protocol is not intrinsically safe

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

ENGINEERING DATA

Maximum fluid temperature:
PVC housing: 100°F (38°C)
Polysulfone housing: 200°F (95°C)

Maximum ambient temperature:
130°F (55°C) (UL listed to 105°F (40°C);
for hazardous locations -13 to +104°F.)

Maximum operating pressures: (3:1 safety factor)
PVC housing: 100 PSI (6.90 BAR)
Polysulfone housing: 200 PSI (13.79 BAR)

Readout accuracy, full scale: ±5%

Switch repeatability is 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).

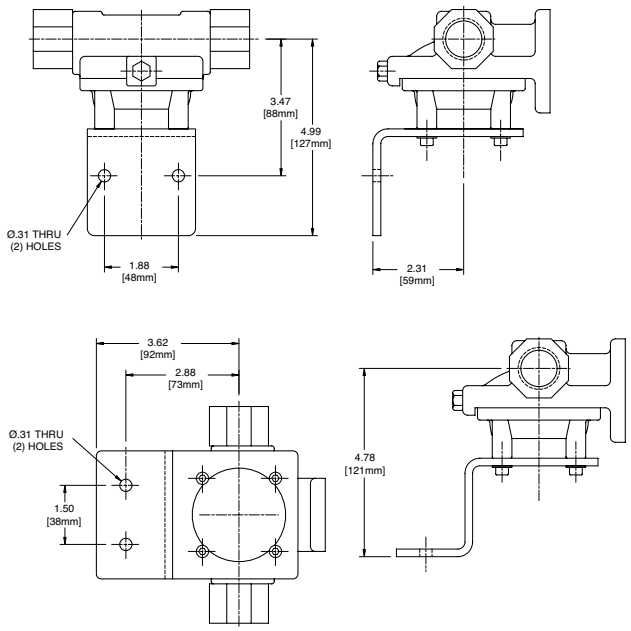
Maximum flow ranges to 16 GPM/60 LPM = pressure drop from 1.9 to 5.5 PSID (3.7 PSID average).

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. For additional support when using tubing or flexible hose, order special options **W** (wall) or **F** (foot) mounting brackets.

MOUNTING BRACKETS
(9/32-inch mounting holes)



SPECIAL OPTIONS

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.

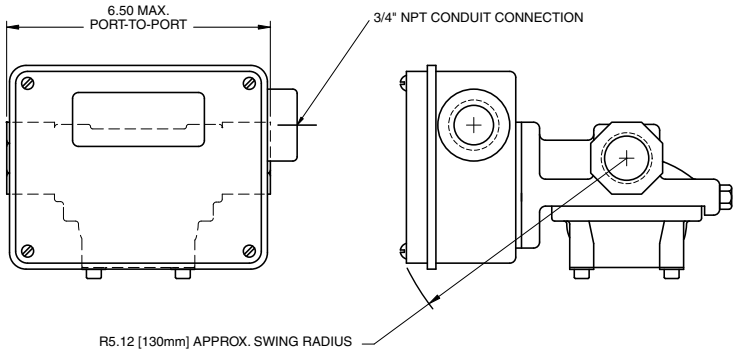
Identification tag: (option **ST**) customer-supplied information is stamped on a stainless steel tag that is attached to the nameplate.

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.

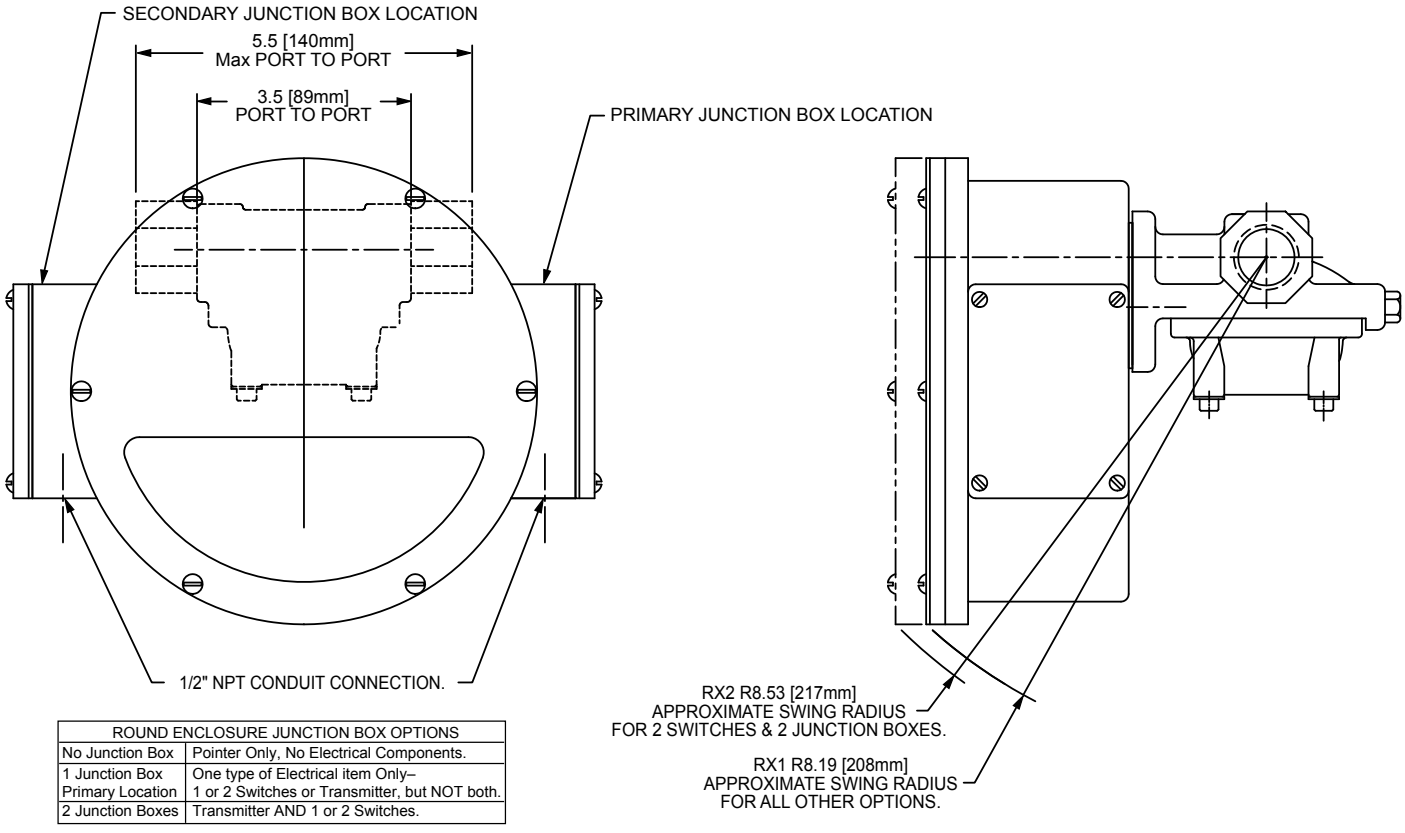
CONTROL BOX SELECTION GUIDE

“A”, “L” and “Z” Boxes



Maximum installation dimensions

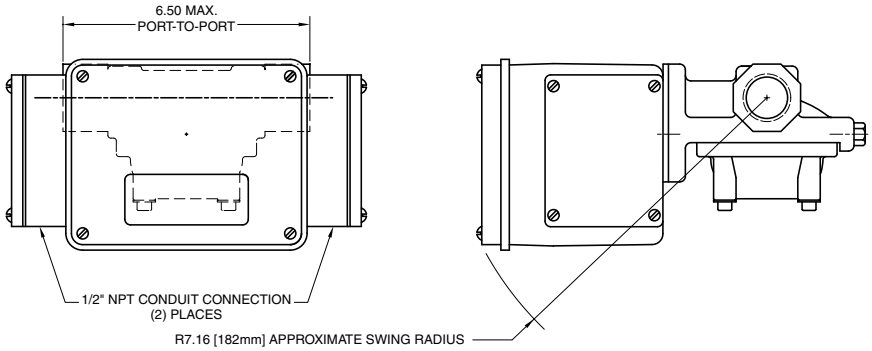
“R” Box



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

Maximum installation dimensions

"T" Box



Maximum installation dimensions

OVERALL PORT-TO-PORT DIMENSIONS FOR ALL SX METERS WITH ADAPTER FITTINGS. ALL DRAWINGS ARE SHOWN WITH FEMALE PLASTIC FITTINGS.

FITTING SIZE NPTF	A (INCHES)
1/4, MALE	6.00
1/2, MALE	6.25
3/4 OR 1, MALE	6.50
ALL FEMALE PLASTIC	5.50
ALL FEMALE S.S.	5.88

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

MAX FLOW SIZES FROM
500 TO 1500 GPM
(2000 TO 5600 LPM)

MAX LIQUID PRESSURE 300 PSIG (20.69 BAR) **XHF SERIES**

UNIVERSAL® Flow Meters

An Extra-Large Vane Style For Liquids

NIST Traceable Calibration Certificate Available

XHF meter with R Box

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 are not required on the 4-inch meter. The meters require 2 pipe diameters straight run before and after the meter. The all-mechanical sensing system directly drives the pointer and remote signaling devices. They handle shocks or flow surges beyond their rated capacities.

The swinging vane can be manually operated with a factory supplied wrench 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).

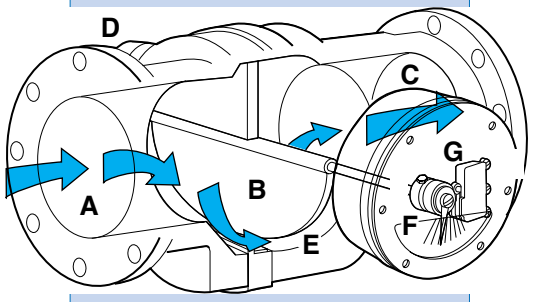
The switches can be general purpose or rated for hazardous locations (all classes, groups and divisions).

CALIBRATION

All flow meters are individually calibrated on fluids suitable to maintain the stated accuracy for viscosities up to 3000 SSU (650 Centipoise). We also compensate for specific gravity. For NIST Traceability please consult factory.

CONSTRUCTION MATERIALS

The meter body, 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, and air and gases. The flowmeter body is made up of the “center section” which is where the moving parts are. Sometimes it is cost effective to match this to other materials for the in and outflow sections of the meter body and flanges. See selectiohns 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**.

EXAMPLE: XHF - Q I B 8ØØGM - 32V1.Ø -

SERIES BY PRESSURE RATING		
Extra high vane style	=	XHF

Material of meter body, center section and flanges				
In and outflow body portions	Center section	Flange		
Aluminum	Aluminum	Aluminum	Oil	D
Carbon steel	Carbon steel	Carbon steel	Oil	M
Stainless steel (316)	Stainless steel (316)	Stainless steel (316)	Chemicals, corrosives, water	I
Aluminum	Brass	Aluminum	Water	Q
Carbon steel	Stainless steel (316)	Carbon steel	Water, oil	X

INTERNAL MOVING PARTS		
Stainless steel (316 series)	=	I

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

MAX FLOW RATE LIQUIDS			
GPM	500, 600, **800**, 1000, 1500	=	GM
LPM	2000, 2500, 3000, 3500, 5600	=	LM
CMH	120, 140, 180, 220, 340	=	CMH

PORT CONNECTION

150-lb ANSI Weld-Neck Flanges

Size		Max. Flow		
Inches	MM	(GPM)	(LPM)	Symbol
4	101.6	600	2271	32W
6	152.4	1000	3785	48W
8	203.2	1500	5677	64W

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.

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

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

Rometec srl - www.rometec.it - info@rometec.it - Rometec srl - www.rometec.it - info@rometec.it

RX1 W L - ST - 75D

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, 300°F for transmitter options	=	HT
Stainless steel ID tag for customer supplied information	=	ST
Safety Glass window ref. page 5	=	TG

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, 75D indicates a setting of 75 GPM in declining flow. Consult factory for settings out of flow range. **75D**

CONTROL BOX & READOUT

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 dual scales on LCD's

No switches	**TXLØ**
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	**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**

Flow rate display, HART & 4-20mA output:
HART protocol is not intrinsically safe

HART & 4-20mA output only	**THØ**
One SPDT (3 wire)	**TH1**
Two SPDT (3 wire)	**TH2**
One SPDT (4 wire)	**TH3**
Two SPDT (4 wire)	**TH4**

"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:

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)	**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 & 4-20mA output:
Hart protocol is not intrinsically safe

HART & 4-20mA 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"

"R" box is selected for greater resolution (more increments on the inscribed scale).

It holds switches (general purpose and hazardous location all classes groups and divisions) and 4-20mA transmitter. Switch (standard service) and transmitter are offered in this control box together when signal redundancy is desired.

You get this control box when you order any CONTROL BOX & READOUT starting with an "R" (see "How to Order" page). Examples: R1WR is a one switch, weatherproof box with flow from left to right.

This control box is made from epoxy coated aluminum.

SPECIAL OFFERING: Control Box "T"

"T" box is selected for availability of two isolated junction boxes with terminal strips. This means that no direct wiring to switches or transmitters is required.

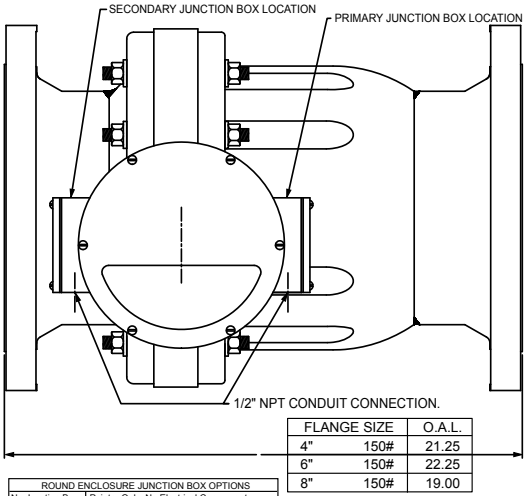
Digital LCD display of flow is optional ("TXL").

It holds switches (general purpose) and 4-20mA transmitter. Switch (standard service) and transmitter are offered in this control box together when signal redundancy is desired. These are wired to separate junction boxes for signal isolation.

You get this control box when you order any CONTROL BOX & READOUT starting with a "T" (see "How to Order" page). Examples: TX1WR is a one switch with 4-20mA transmitter, weatherproof box with flow from left to right.

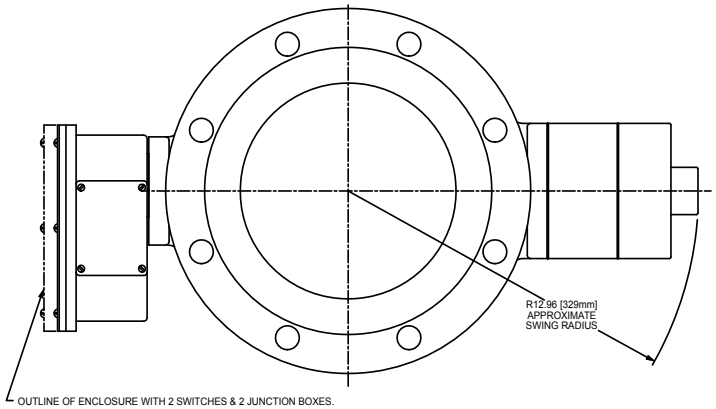
This control box is made from epoxy coated aluminum.

Outline drawing for all control box options



FLANGE SIZE		O.A.L.
4"	150#	21.25
6"	150#	22.25
8"	150#	19.00

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



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" (weather-proof) 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.

ENGINEERING DATA

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

Optional max. fluid temperature:
400°F (205°C)

Maximum ambient temperature:
150°F (65°C)
CSA listed only to 105°F (40°C)

Maximum operating pressure

(3:1 safety factor):
300 PSI (20.69 BAR)

Readout accuracy, full scale:
±2%

FLOW & PRESSURE DROP

Units with max flow of 800 GPM or less have a max pressure drop of 3.8 PSI. All others have maximum pressure drop of 5.5 PSI.

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

Rometec srl - www.rometec.it - info@rometec.it - Rometec srl - www.rometec.it - info@rometec.it

UNIVERSAL®

Flow Monitors Inc.

High Pressure Coolant Sensor Manifold MSM Series
For Deep Hole Drilling, Reaming, and Machining

Rometec srl - www.rometec.it - info@rometec.it - Rometec srl - www.rometec.it - info@rometec.it

Modular Sensor Manifold MSM Series

High Pressure Coolant Flow Monitoring

TYPICAL APPLICATIONS

Deep Hole Drilling	Miscellaneous Machining
Grinding	Multiple Spindles
Milling	Reaming

Features

- **Fast response reduces tool breakage**
- **Eliminates downtime**
- **Rugged Compact Manifold Design (combine up to 6 flow sensors)**
- **Easy to install, operate, and maintain**
- **Two Programmable Set Points (open collectors) per unit**
- **LED Set Point Alarm Indicators**
- **Integral or Remote Digital LCD Rate Indicators**
- **Type 4 Enclosure, Weatherproof**
- **Process Connections: SAE, BSPP, ISO 6149**
- **Standard Operating Pressure to 1000 PSIG (69 BAR). Optional 2000 PSIG (138 BAR)**
- **Easy, quick field wiring — standard with 5-pin micro style connectors and cable**
- **Output of 4-20mA**
- **Subplate mounting design allows fast meter change-out due to tool changes**

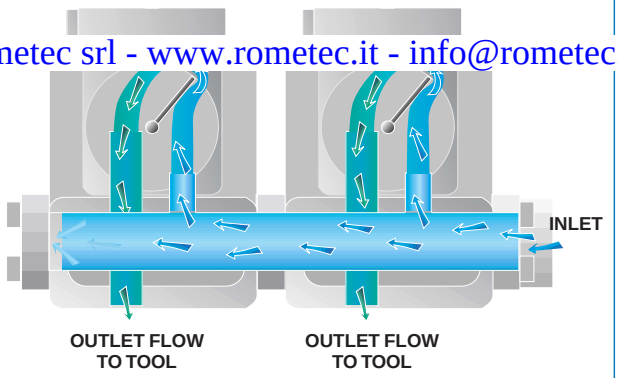
General Description

Universal offers a reliable flow metering system for machining coolant that is backed by extensive field experience. The shock absorbing design reliably withstands typical flow and pressure surges. The response is fast enough to save tools. Flow set-points are quickly adjustable through the meter display. If a tool change necessitates a new meter, UFM's new manifold mounted design cuts downtime and spares. Up to six monitors per manifold can be assembled to minimize space while simplifying piping, hosing, and wiring layouts. Linear 4-20mA transmitted signals and open collector outputs are pin connected.

This truly modular Sensor Manifold allows easy replacement and maintenance of the flow metering unit without disturbing the piping. When tooling changes require flow monitor changes, it is now very simple. A tie-rod system holds the manifold sections together, with O-ring seal between each section. Each manifold section has its own flow monitor that is attached using four bolts. To change the flow monitor, simply remove the bolts, and replace the unit.

The flow monitor offers an integral LCD display with optional remote. Display is shown in liters or gallons per minute. Additionally, two open collector outputs are available for configuration of high and low flow alarms. These are set using membrane switches, and have two integral LEDs that show when the flow reaches the preset levels. The full-complement of electronic options offer a range of local and remote control strategies.

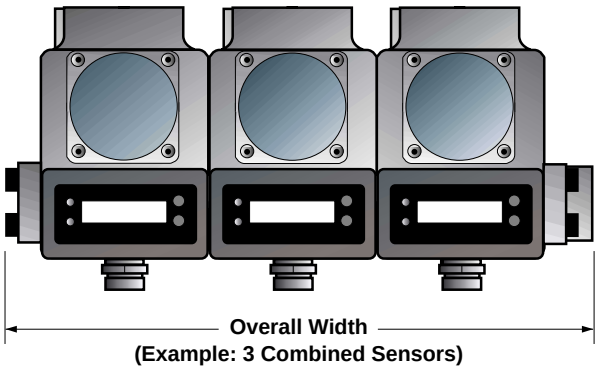
The simplicity of this mechanical design provides ease of maintenance, quick replacement, simple capacity modifications, use and stocking of common components, thus reducing inventory of spares and associated costs dramatically.



HOW IT WORKS:
Fluid enters a common manifold and then is divided through separate metering chambers (up to 6 destinations). Each separate flow has it's own linear 4-20mA signal, digital display, and 2 programmable alarm points.

Dimensions of MSM Series

Approximate in inches

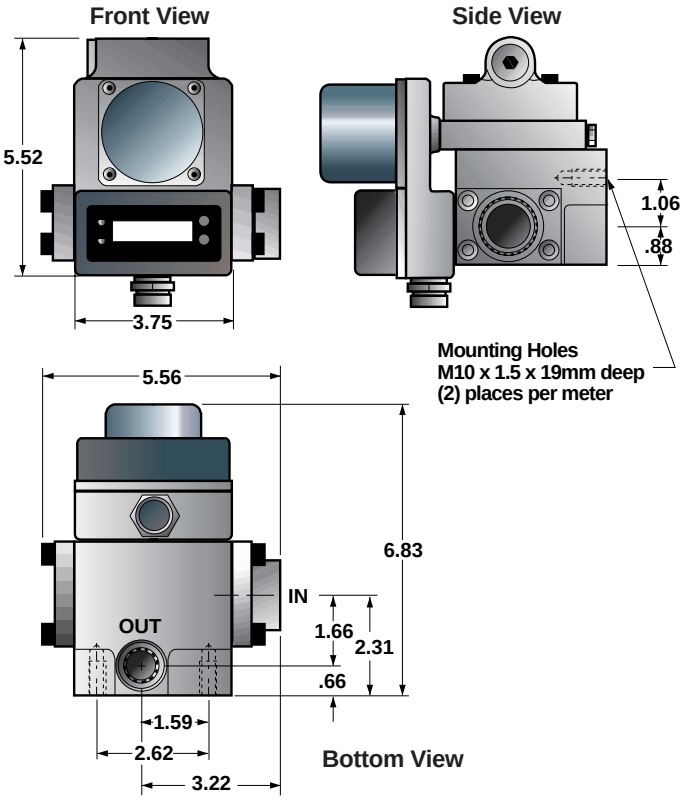


No. of Sensors	1	2	3	4	5	6
Overall Width	5.56	9.31	13.06	16.81	20.56	24.31

Specifications

Maximum Fluid Temperature ..... 200°F (93°C)
Maximum Ambient Temperature ..... 175°F (80°C)
Maximum Operating Pressure ..... 1000 PSIG (69 BAR)
..... (Optional 2000 PSIG, consult factory)
Signal Output (Flow Rate) 4-20mA
Response Time ..... 250 milliseconds response to 100% of flow
..... Output clamped at 21mA
Alarm Outputs ..... 2 Opto-Isolated Open Collector Transistor Outputs
..... Maximum load is 50mA at 30 VDC
LED Indicators ..... 2 LED alarm output status indicators
Display LCD ..... 4 1/2 Digit LCD, 0.375" high
Input Power ..... 24 VDC Loop Powered (2-wire transmitter)
Unit of Measure ..... Flow rate in GPM or LPM
Mounting ..... Remote mounting of display and transmitter (optional)
Set Points ..... High and low setpoints displayed and adjusted on LCD
Ratings ..... Enclosure, TYPE 4
Readout Accuracy ..... ±5% of F.S.
Approvals ..... CSA and CE for heavy industrial applications

MSM Meter with integral LCD

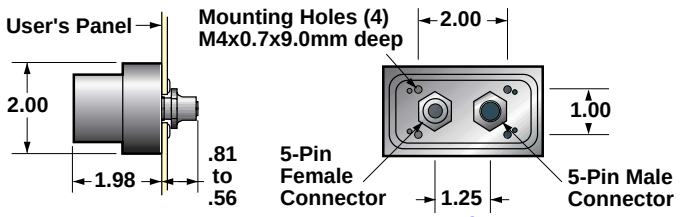


Theoretical Tool Flows

Hole Size In Tool (Inches)	250 PSI (GPM)	500 PSI (GPM)	1000 PSI (GPM)
.055 ID x 12	.065	0.82	1.2
.055 ID x 24	0.50	0.65	0.85
.065 ID x 12	0.82	1.2	1.3
.065 ID x 24	0.8	1.0	1.2
.092 ID x 12	1.2	2.8	4.0
.092 ID x 24	1.0	1.5	3.0
.115 ID x 12	3.0	4.5	6.0
.115 ID x 24	2.0	3.0	4.75
.120 ID x 12	4.0	5.8	7.5
.120 ID x 24	3.0	4.1	6.0
.181 ID x 12	12.6	17.0	20.5
.181 ID x 24	10.0	13.0	17.5

Above chart for various hydraulic conditions

Remote Transmitter / LCD Readout



How To Order MSM Series

Select the appropriate symbols to build a model code:

Example: MSM-N S F 10GPM-B-32V1.0-GTLI-CC

SERIES

Modular Sensor Manifold Meter & Transmitter Only = **MSM**
(To order without a manifold, omit the "MSM" portion of the model code)

Meter Only = **No Symbol**
(To order without a manifold and transmitter, omit the "MSM" portion of the model code and select "GP" under CONTROL BOX selection)

MATERIALS OF CONSTRUCTION

Housing Material
Cast Iron Nickel Plated = **N**

Internals
Stainless Steel = **S**

Seal Material
Viton = **F**

Maximum Flow Rate

5 GPM	= **5GPM**
10 GPM	= **10GPM**
20 GPM	= **20GPM**
20 LPM	= **20LPM**
40 LPM	= **40LPM**
75 LPM	= **75LPM**

CONNECTIONS (Electrical)

CC = Conduit Connection
No Symbol = Pin Connection

CONTROL BOX

GTLI = Integral Transmitter w/LCD (with or without Manifold)
GPLR = Remote Transmitter w/LCD (with or without Manifold)
GP = No Transmitter (UT-PM-DTLCD)

FLUID CHARACTERISTICS

32V1.0 = 32 SUS and 1.0 Specific Gravity

PORT

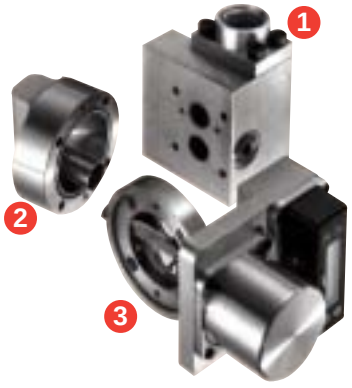
	Description	Inlet	Outlet
T =	SAE	J1926-16	J1926-1-8
B =	BSPP	ISO-1179-1	ISO-1179-1
I =	ISO6149	M33X2	M18X1.5

Available Accessories - How To Order

Remote 4-20mA two wire transmitter with LCD display and field adjustable open collector alarms = Model UT-PM-DTLCD

Single MSM Meter with remote LCD transmitter.

Three MSM Meters with integral LCD.



Exploded unit shows design simplicity. 1) Manifold. 2) Cover. 3) MSM Meter with integral LCD and transmitter.

UNIVERSAL UFM

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

CERTIFIED ISO 9001 PERRY JOHNSON

E Series Enclosure (Explosion Proof)

PI Series with EXL0X Enclosure

FEATURES

- Rated CE FM APPROVED
- Field programmable
- Available on MN-MM-MH and PI Series

GENERAL DESCRIPTION

Universal's E style control box provides proven industrial reliability, and long term service.
Material: Aluminum Alloy A413.1

SPECIFICATIONS

TRANSMITTER INPUT POWER:	4-20mA @ 30 Vdc Max.
OUTPUT:	4-20 mA proportional to flow or 4-20mA proportional to flow or HART (Blind Unit)
ALARMS:	2 independent open-collector outputs (high/low flow rate) with corresponding LEDs
OPEN COLLECTOR RATING:	30VDC@50mA
MIN AND MAX AMBIENT FLOWMETER TEMPERATURE:	35˚F (1.5˚C) to 150˚F (65˚C) for MN and PI.
RESPONSE TIME:	250 Milliseconds
TURNDOWN RATIO (MAX TO MIN FLOW):	10:1 standard.
DISPLAY:	LCD.
ACCURACY:	±2% full scale PI.
	±2% full scale MN, MM, MH.
REPEATABILITY:	.25% of indicated flow
PRESSURE DROP:	2-8 PSI
ENCLOSURE RATINGS	FM APPROVALS CLASS I, DIV1, GROUPS B, C AND D – T6 CLASS II/III, DIV 1, GROUPS E, F AND G – T6 CLASS I, ZONE 1, IIB+H2 – T6 — ZONE 21, GROUP IIIC – T85°C ZONE 1 per CEC 18-100 — ZONE 21 per CEC 18-200 TYPE 4X, IP66 — Ta = –40°C to +69°C (–40°F to 156°F)

MODEL CODE

EXAMPLE: MN-ASB30GMV-8-320V.9- EXL0X L

EX STYLE CONTROL BOX	
LCD readout, 4-20mA output and 2 open collectors	EXL0X
Blind readout, 4-20mA or HART	EXH0X

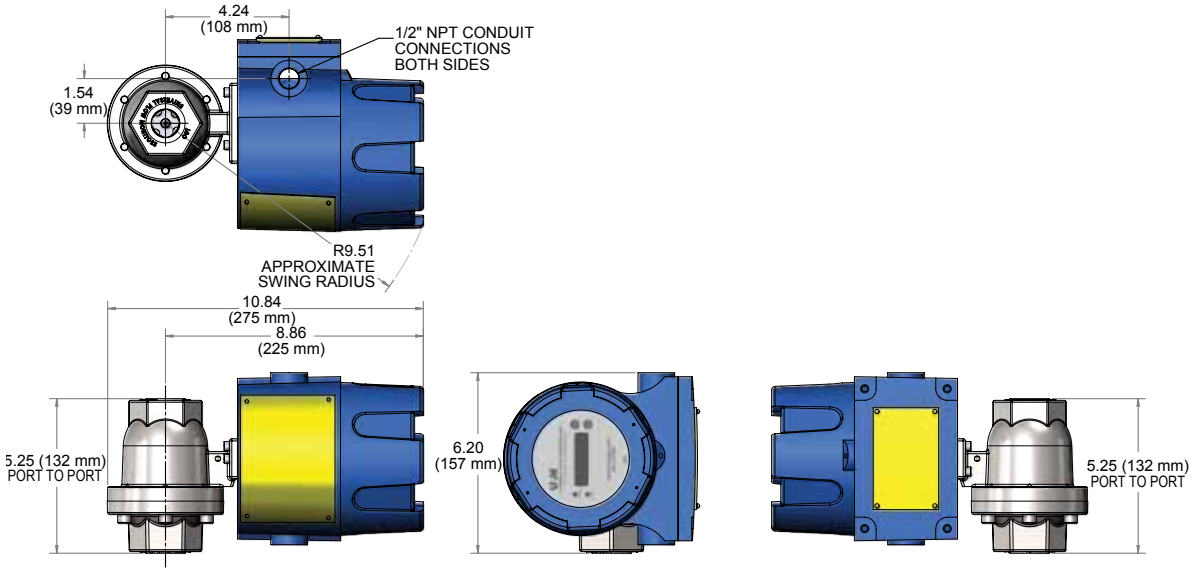
FLOW DIRECTION		
Left to right	=	R
Right to left	=	L
Up	=	U
Down	=	D

Compile the UFM Model Code for your application by referencing the appropriate meter series literature/data sheets. Documents: PI09252020, MN080115

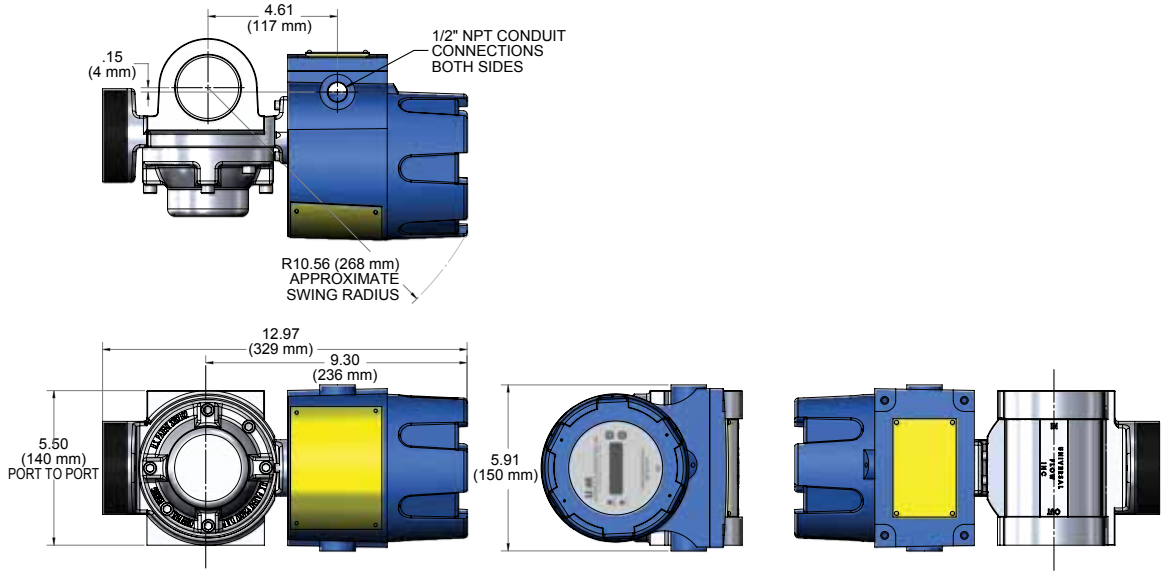
MAXIMUM DIMENSIONS

Approximate in inches (mm) For other units and configurations, consult factory

SERIES PI (PISTON IN-LINE)



SERIES MN, MM and MH (MEDIUM)



UNIVERSAL UFM
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