



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

MAX LIQUID PRESSURE 300 PSI (20.69 BAR)  
MAX LIQUID PRESSURE 500 PSI (34.48 BAR)  
MAX LIQUID PRESSURE 1500 PSI (103.45 BAR)

**LL SERIES**  
**LP SERIES**  
**LH SERIES**

# UNIVERSAL® Flow Meters

A piston design for  
low flows of liquids



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

CSA Certified NRTL/C  
 CE Marked (as noted)

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 and remote signaling devices.

Internal parts are assembled into a cartridge consisting of a metal piston assembly affixed to the lower end cap.

## CALIBRATION

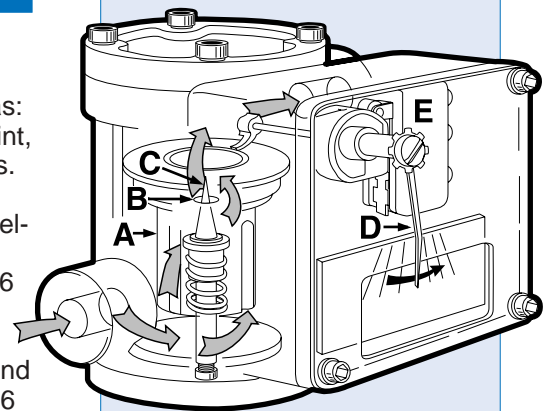
All flow meters are individually calibrated for fluids with the viscosity you specify (up to 3000 SSU/650 centipoise). We also compensate for your fluid's specific gravity. For NIST Traceability please consult factory.

## CONSTRUCTION MATERIALS

Housings and seals are offered in a variety of materials to suit a wide range of applications, such as: water, oil, gases, air, coolants, paint, solvents and some corrosive fluids. Meter bodies are available in aluminum, brass, cast-iron or nickel-plated cast-iron, carbon steel or nickel-plated carbon steel, and 316 stainless steel. We offer internal moving parts in the following materials: a combination of 300 and 400 series stainless steel or all 316 stainless. Choices of materials for seals are: Buna N, EPR, Viton, Kalrez™, and Teflon™ (Kalrez™ can be combined with the others). Please consult the factory for compatibility of materials with your application.

## LINE CONNECTION

Ports can be threaded or flanged. Threaded ports can be NPT or SAE straight-threads from 1/8 to 3/4". Metric threads such as BSPP, BSPT and JIS are also available. ANSI flanges are standard with DIN flanges limited to a maximum flow of 2 GPM. The lower (offset) port is standard for other flow rates.



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 pot driven transmitter (not shown).

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

**EXAMPLE:** **LL - B B M S B 15 GH - 3 U -**

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

**HOUSING MATERIAL (Series LL & LP)**  
 Aluminum = **A**  
 Brass = **B**  
 Cast iron = **C**  
 Cast iron, nickel plated = **N**  
 Carbon steel = **M**  
 Carbon steel, nickel plated = **J**  
 Stainless steel (316) = **Z**

**HOUSING MATERIAL (Series LH)**  
 Carbon steel = **M**  
 Carbon steel, nickel plated = **J**  
 Stainless steel (316) = **Z**

**PISTON MATERIAL**  
 Brass = **B**  
 Stainless steel (316) = **Z**

**CAP MATERIAL**  
 Metal (same as housing) = **M**  
 Polysulfone (150 PSI max) = **P**

**INTERNAL MOVING PARTS**  
 300 and 400 series stainless steel = **S**  
 316 Stainless steel = **Z**

**SEAL MATERIAL**  
 Buna N = **B**  
 EPR = **E**  
 Viton = **F**  
 Kalrez = **J**  
 Kalrez (dynamic) and Teflon (static) (metal end caps only) = **T**  
 Kalrez (dynamic) and Buna N (static) = **A**  
 Kalrez (dynamic) and EPR (static) = **H**  
 Kalrez (dynamic) and Viton (static) = **K**  
*(Piston seal is always Teflon)*

**INLET PORT POSITION**

**U** = Upper inline (max. 2 GPM)  
**L** = Lower offset

**THREADED ATTACHMENT**

Pipe Size In Inches	NPT	SAE	BSPP	BSPT
1/8	1	2T	2BP	4BT
1/4	2	4T	4BP	4BT
3/8	3	6T	6BP	6BT
1/2	4	8T	8BP	8BT
5/8		10T	10BP	10BT
3/4	6	12T	12BP	12BT

**FLANGED** Ex: **2 FW CS 150 RF**

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

**SCALE CALIBRATIONS**

**GH** = Calibrated in gallons per hour  
**GM** = Calibrated in gallons per minute  
**LH** = Calibrated in liters per hour  
**LM** = Calibrated in liters per minute  
**IGM** = Calibrated in imperial gallons per minute  
**CMH** = Cubic meters per hour  
**GLM** = Dual scales (GPM and LPM) (consult factory)  
**DGM** = Dual viscosity on GPM scale (consult factory)  
**DLM** = Dual viscosity on LPM scale (consult factory)  
 For specific calibrated increments and other scales consult factory.

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

**MAX FLOW RATING FOR LIQUIDS**

These may be expressed in various engineering units as shown. Here we are selecting the maximum flow that the meter will see. The minimum reading is about 1/5th of the maximum. There are generally 5 to 7 major increments displayed on the analog scales "A" box with that number roughly doubled for the high resolution "R" box which allows more accurate reading. Ultimate resolution is provided by the LCD digital display, standard with some transmitter selections. The following are the most commonly selected options for maximum flow rates for each engineering unit. More are available if you consult with the factory.

GPH: 5, 10, **15**, 20, 25, 30, 40, 50, 60, 75, 80, 90, 100, 120, 150, 200, 250 & 300  
 GPM: 0.25, 0.5, 0.75, 1, 1.5, 2, 2.5, 3, 4, 5, 6, 7, 8, 9, 10, 15 & 20  
 LPH: 20, 30, 40, 50, 60, 70, 80, 90, 100, 200, 300, 400, 500, 600, 700, 800, 900 & 1000  
 LPM: 5, 10, 15, 20, 25, 30, 35, 40, 50, 60, 70 & 75  
 CMH: 1, 2, 3 & 4

32V1.0 - A 1 N R - 2D

**FLOW DIRECTION**

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

**SERVICE**

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

**SWITCH SETTING**

No symbol = Lowest possible  
 Or, give setting(s) in selected engineering units (e.g., GPM, LPM etc.). Also a symbol to indicate that accuracy is desired during increasing flow (U) or decreasing flow (D).  
 (2D) would mean that switch should actuate when flow rate decreases to 2 GPH.)  
 Settings are field adjustable.

**SPECIAL OPTIONS**

- HT = High-temp, 400°F for A & R Box (300°F for transmitter options GT, RT & TT Boxes)
- ST = Stainless steel ID tag
- PC\* = Pin connector with 3-6 pins, mini and micro style available
- FL\* = Fault light(s)
- C = CSA enclosure / PVC window
- TG = Tempered glass window
- W = Wall mounting bracket
- F = Foot mounting bracket

**Note:** These options are described more fully in "Options for Vane and Piston style flowmeters."

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

**A Box**

**Simple indication with or without switches**

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

**X Box**

**Hazardous location indication and switches**

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

**G Box**

**Transmitter with digital display or remote display (standard), open collector alarms (optional)**

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

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

**SPECIAL OFFERINGS**

**R Box**

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

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

**RT Box**

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

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

**TT Box**

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

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

**TTL Box**

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

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

**FLUID CHARACTERISTICS**

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

## ENGINEERING DATA

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

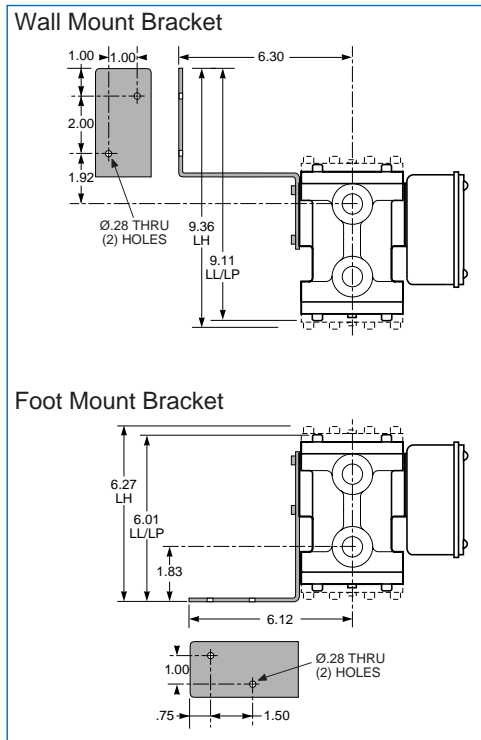
**Series LH max. operating pressures:** (2:1 safety factor): 1500 PSI (103.45 BAR)

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

**Readout accuracy, full scale:** ±5%

## 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.



## 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.

**Multi-pin connector:** (option **PC**) the male half of a mini or micro pin connector with enough pins to carry all signals, make all switches and to ground all AC switches. PC3 is a mini with 3 pins, PC3M is a micro pin. Up to 6 pins available.

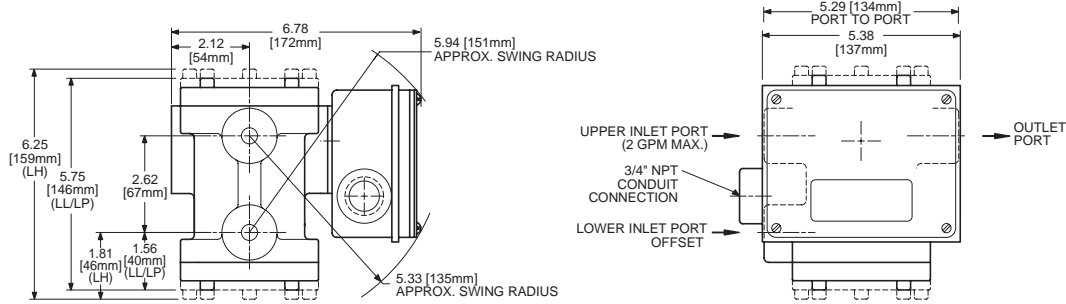
**Fault light:** (option **FL**) a red LED in nameplate indicates when a flow limit has been reached by internal switch contact. Helpful with multiple meters. Add to end of symbol: **1** (1 light), **2** (2 lights), **A** (AC), **D** (DC), i.e. **FL2D**. Only available

with service option "W" weatherproof enclosures or "X" corrosive service. Requires switch option and switch setpoint. For optional LED colors consult factory.

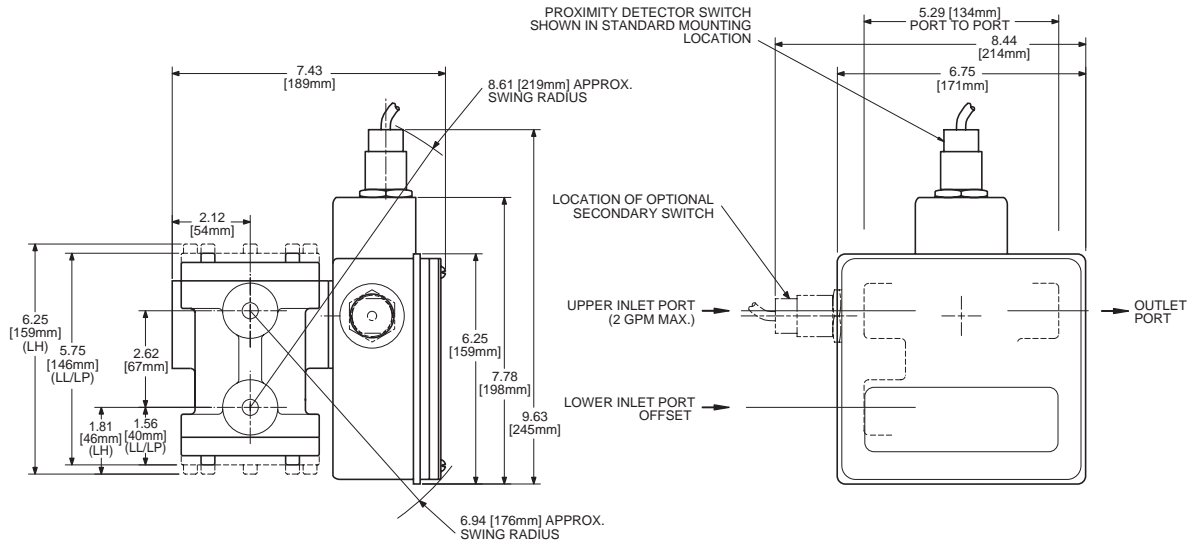
**Tempered-glass window:** (option **TG**) replaces the standard window. A tempered-glass window is employed where airborne solvents or high-ambient temperatures are common.

# LL, LP and LH SERIES DIMENSIONS (approximate) in inches

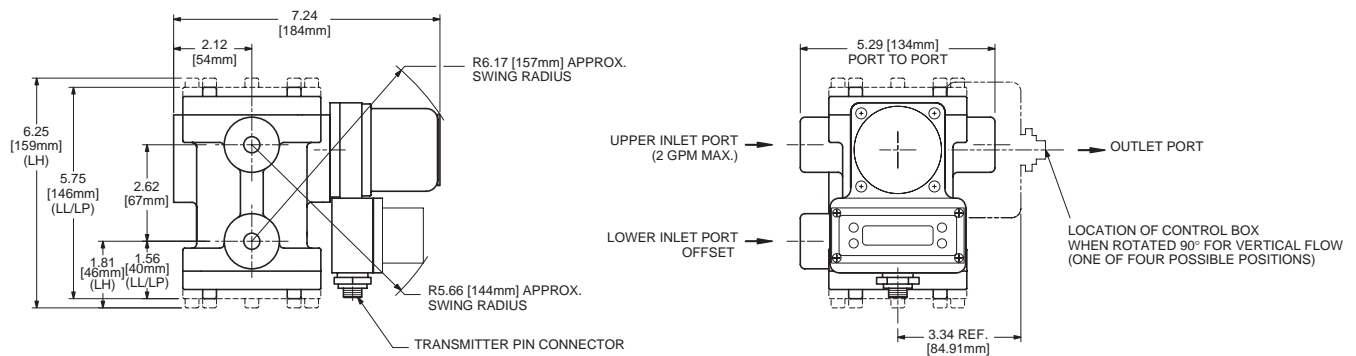
## STANDARD OFFERING: Control Box "A"



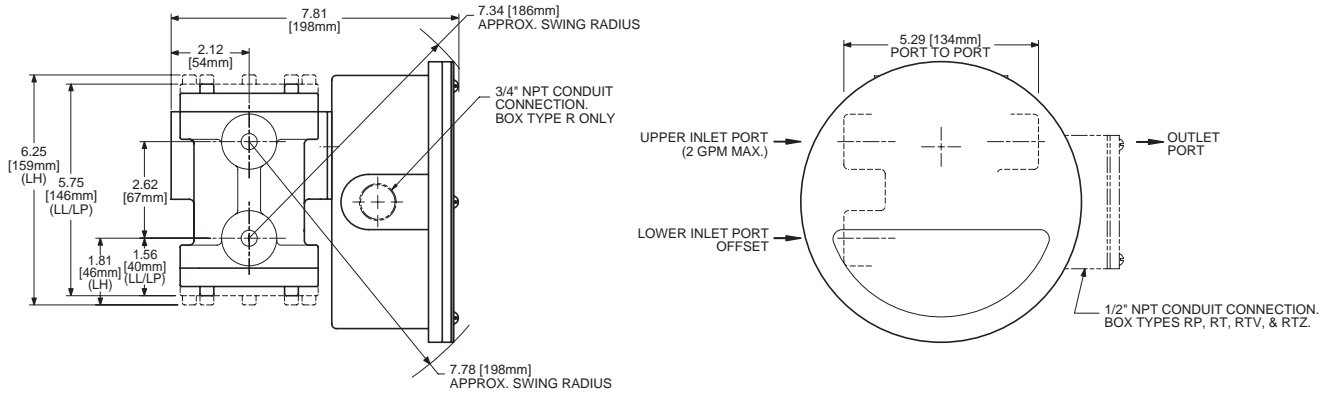
## STANDARD OFFERING: Control Box "X"



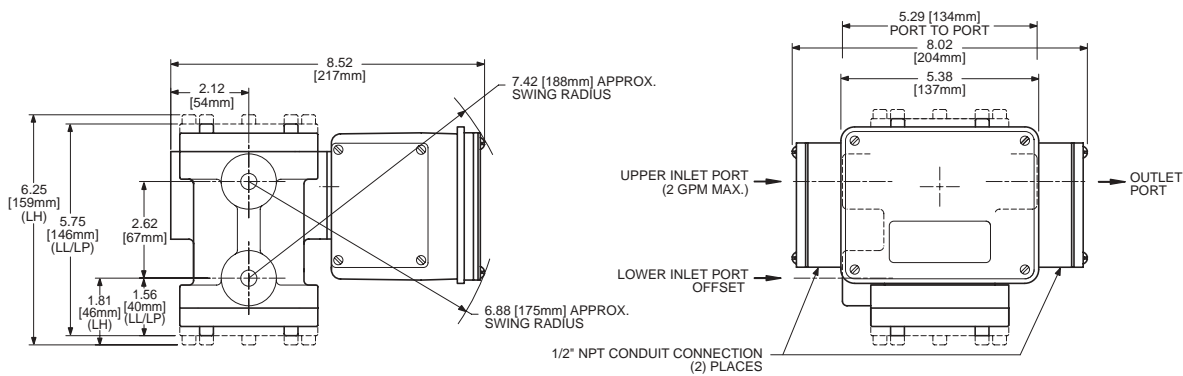
## STANDARD OFFERING: Control Box "G"



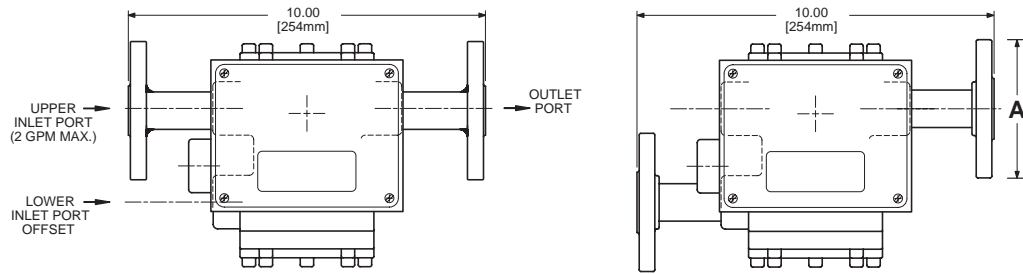
**SPECIAL OFFERING: Control Box "R"**



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



**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



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