



UM Ultrasonic Tee Flowmeter with Socket Fittings and Electronic Option QUDSBAN1 Shown.

UM Ultrasonic Tee Flowmeter

NSF Versions

1", 1-1/2", 2", 3", & 4" Socket
1", 1-1/2", 2", 3", & 4" FNPT
1", 1-1/2", & 2" FBSPT
3" & 4" ANSI Flange
3" & 4" DIN Flange



Please save these instructions for future reference. Read carefully before attempting to assemble, install, operate or maintain the product described.

Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage.

Please refer to back cover for information regarding this product's warranty and other important information.

SAVE FOR YOUR RECORDS

Model #: _____

Serial#: _____

Purch. Date: _____

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BEFORE YOU BEGIN

Usage Requirements

- This flowmeter is for use with water only.
- This flowmeter is not legal for trade applications.
- This flowmeter has a permanent factory setting for measuring water only.
- Flow must go uphill through the flowmeter, never downhill through the flowmeter to avoid air bubbles or air pockets captured in the Tee.



Power Source Requirements

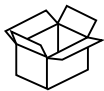
- All ultrasonic electronics are DC powered either by battery or external power. Power requirements are dependent on the version of ultrasonic electronics.
- Specific versions of electronics are powered by a 3.6V lithium battery.
- Other versions of electronics require DC power from a customer-provided power supply in order to provide flow information back to the external equipment.
- See the Specifications section of the Ultrasonic Electronics Owner's Manual for information specific to the version of electronics mounted on your meter.



Tools and Materials (As Needed)

- Wire strippers, wire cutters.
- PVC pipe/fittings, PVC pipe primer, PVC pipe cement.
- Flange gaskets, bolts.

UNPACKING



Contents

1	UM Ultrasonic Tee Flowmeter, completely assembled with mounted electronics.
2	Owner's Manuals • UM Ultrasonic Tee Flowmeter • UM Ultrasonic Electronics



Inspect

- After unpacking the unit, inspect carefully for any damage that may have occurred during transit. Check for loose, missing or damaged parts. Shipping damage claims must be filed with carrier.
- See General Safety Instructions, and all Cautions, Warnings, and Dangers as shown.



GENERAL SAFETY INSTRUCTIONS

IMPORTANT: It is your responsibility to:

- Ensure that all equipment operators have access to adequate instructions concerning safe operating and maintenance procedures.

▲ CAUTION

This product is not approved for use with petroleum products (diesel fuel, unleaded gasoline, jet fuel, kerosene, etc.), aromatic hydrocarbons or other incompatible chemicals.

▲ CAUTION

This product is not approved for use in hazardous locations.

▲ WARNING

When applying power, adhere to specifications listed in appropriate electronics manual.

▲ CAUTION

Disconnect external power before attaching or detaching input or output wires.

▲ WARNING

Compatibility of this product's material and the process fluid and/or environment should be considered prior to putting into service.

▲ WARNING

Product should never be operated outside its published specifications for temperature or pressure. See specifications for your model.

▲ WARNING

Make sure flow and pressure have been eliminated from process pipe prior to installing or removing product.

▲ CAUTION

Installation near high electromagnetic fields and high current fields is not recommended and may result in inaccurate readings.

▲ CAUTION

Do not allow water to freeze in flowmeter. Ice expansion may burst the plastic housing.

▲ CAUTION

Do not allow this meter to be used with steam.

- When working in hazardous environments, always exercise appropriate safety precautions.
- Be sure O-rings and seals are kept in good repair.

USING THE UM MANUALS (See Figure A)

A - Owner's Manual, UM Ultrasonic Tee Flowmeter

This manual contains operating information and specifications for all UM Tee flowmeters.

B - Owner's Manual, UM Ultrasonic Electronics

This manual contains operating information and specifications for the QUDSBAN1 and QUC1LPN1 electronic options. Each electronic option includes the ultrasonic insert, electronic module, and Q9 computer display.

A typical model number is shown below for a 2" UM Tee meter, socket ports, with display and NSF certification.

UM050SKPRUXXA20-QUDSBAN1-GMB

The (8) characters between the dashes denote the electronic option.

For clarity of manual references:

- Q9 refers to the computer display.
- QUDSBAN1 & QUC1LPN1 refers to the "NSF Certified" electronic options.

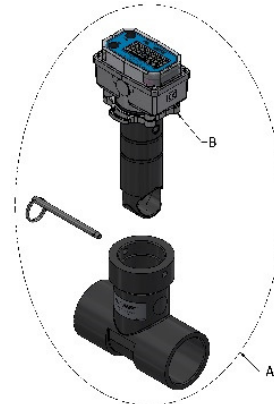


Figure A
(1-1/2" Tee Meter
w/Socket Fittings &
Option QUDSBAN1 Shown)

GENERAL

The FLOMEC® Ultrasonic Tee meter consists of a tee housing, specially designed to accept the FLOMEC Ultrasonic Electronics package. The electronics package consists of the ultrasonic insert, the electronics module, and the Q9 computer display.

Ultrasonic Insert: The ultrasonic insert locates inside the tee locked in place with the quick release pin. It is important that the flow arrow on the insert points in the direction of the piping flow.

Electronic Module: The electronic module is located atop the ultrasonic insert and connected to it by a 10-pin ribbon cable. The electronic module is retained to the ultrasonic insert by a backup plate with screws.

Computer Display: The Q9 computer display is located atop the electronic module and connected to it by a 10-pin flex cable. The computer display is retained to the electronic module with screws.

To Rotate Display: If the computer display is not oriented for your needs, loosen the screws of the backup plate (that secures the electronic module to the top of the insert) and rotate the electronic module with attached computer display as required. The electronic module and the computer display must rotate as a unit.

Inlet/Outlet Fittings: There are (5) types of inlet/outlet fittings available for the FLOMEC Ultrasonic Tee meter:

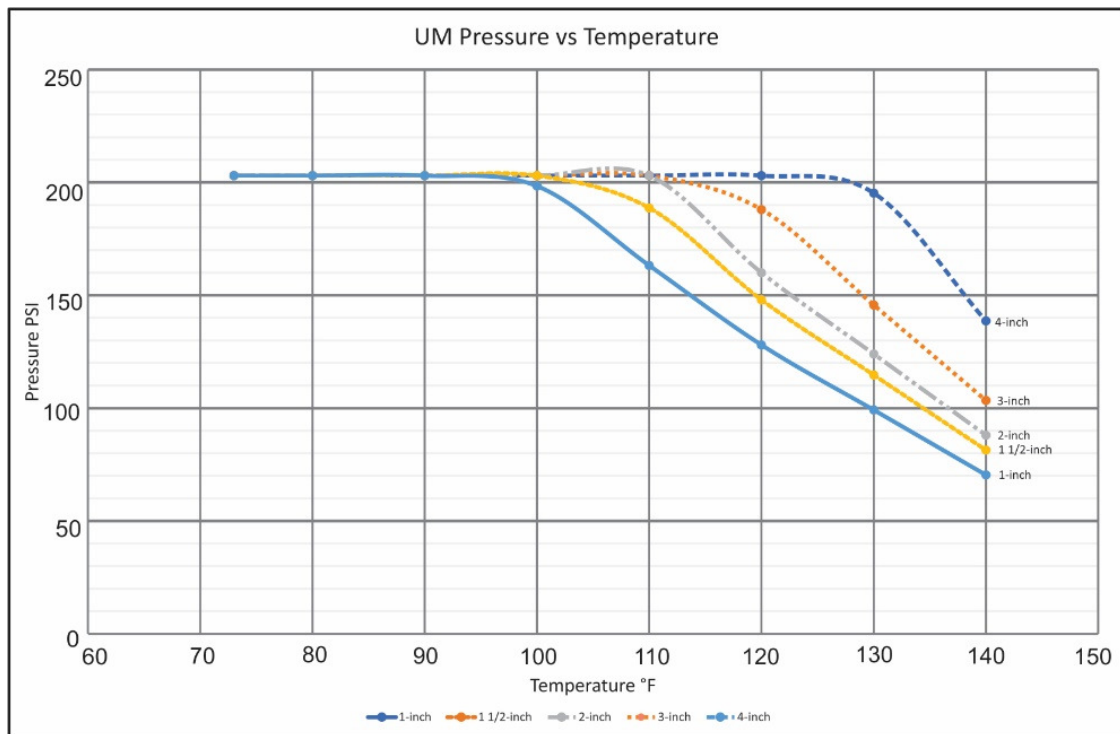
- Socket (Available in all sizes)
- FNPT (Available in all sizes)
- FBSPT (Available in 1", 1-1/2" & 2" only)
- ANSI Flange (Available in 3" & 4" only)
- DIN Flange: (Available in 3" & 4" only)

SPECIFICATIONS - Common

	UM025 1 Inch	UM040 1-1/2 Inch	UM050 2 Inch	UM080 3 Inch	UM100 4 Inch
Type	Ultrasonic Flowmeter				
Tee Housing Material (With Integrated Socket Fitting)	SCH 80 PVC (Polyvinyl chloride)				
Fitting Material (NPT, BSPT, ANSI Flange, DIN Flange, Spacer)	SCH 80 PVC (Polyvinyl chloride)				
Flow Rate	0.22-33 GPM 0.83-124.92 L/min 0.1-15 ft/sec	0.55-82 GPM 2.08-310.41 L/min 0.1-15 ft/sec	0.92-138 GPM 3.48-522.39 L/min 0.1-15 ft/sec	2.06-309 GPM 7.80-1169.70 L/min 0.1-15 ft/sec	3.58-537 GPM 13.55-2032.78 L/min 0.1-15 ft/sec
Max. Working Pressure	203 PSI @ 70°F (14.0 bar @ 21°C) Tees are marked with hallmark of size, part number, SCH80 and PVC. NOTE: See UM Pressure vs Temperature derating chart below.				
Operating Temperature Process Fluid	+32°F to +140°F (0°C to +60°C)				
Operating Temperature Ambient Air	+0°F to +130°F (-18°C to +55°C)				
Storage Temperature Ambient Air	-40°F to +158°F (-40°C to +70°C)				

SPECIFICATIONS – Common (Continued)

Pressure vs Temperature Graph



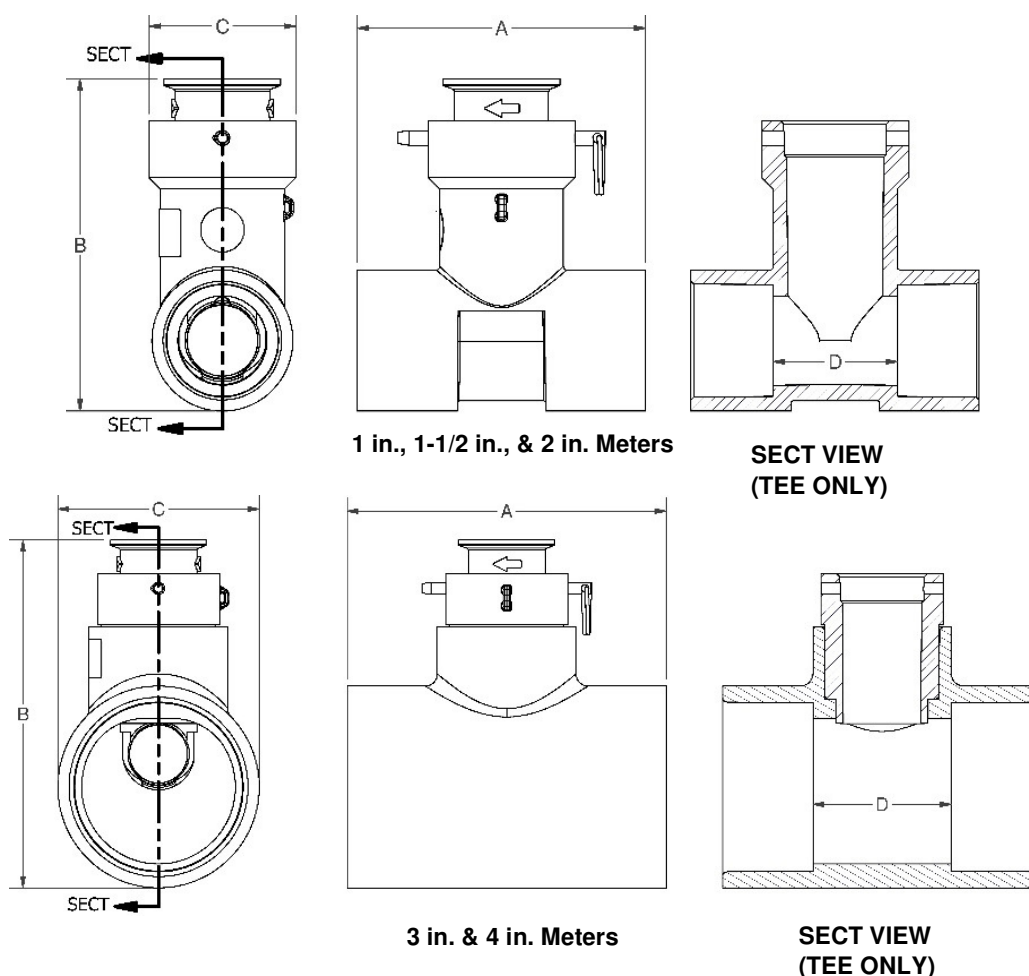
SPECIFICATIONS - Socket Fitting Meters

Model	UM025SK	UM040SK	UM050SK	UM080SK	UM100SK
Size	1 Inch	1-1/2 Inch	2 Inch	3 Inch	4 Inch
Inlet / Outlet Connections	1 in. Socket	1 1/2 in. Socket	2 in. Socket	3 in. Socket	4 in. Socket
Tee Housing Weight	1.45 lbs. (0.66kg)	1.62 lbs. (0.73kg)	1.89 lbs. (0.86kg)	3.02 lbs. (1.37kg)	3.71 lbs. (1.68kg)

Dimensions

Model	UM025SK	UM040SK	UM050SK	UM080SK	UM100SK
Size	1 Inch	1-1/2 Inch	2 Inch	3 Inch	4 Inch
A. Length	4.25 in. (108mm)	4.90 in. (124mm)	5.56 in. (141mm)	6.63 in. (168mm)	7.38 in. (187mm)
B. Height ²	5.38 in. (137mm)	5.63 in. (143mm)	6.12 in. (156mm)	7.20 in. (183mm)	8.41 in. (213mm)
C. Width (at widest point)	2.50 in. (64mm)	2.50 in. (64mm)	2.88 in. (73mm)	4.18 in. (106mm)	5.23 in. (133mm)
D. Pipe end stop gap	1.97 in. (50mm)	2.12 in. (54mm)	2.53 in. (64mm)	2.88 in. (73mm)	2.88 in. (73mm)

² Electronic options QUDSBAN1 and QUC1LPN1 adds 2.25 in. (57mm) to overall height.



(10-pin ribbon cable not shown in views for clarity)

Figure 1

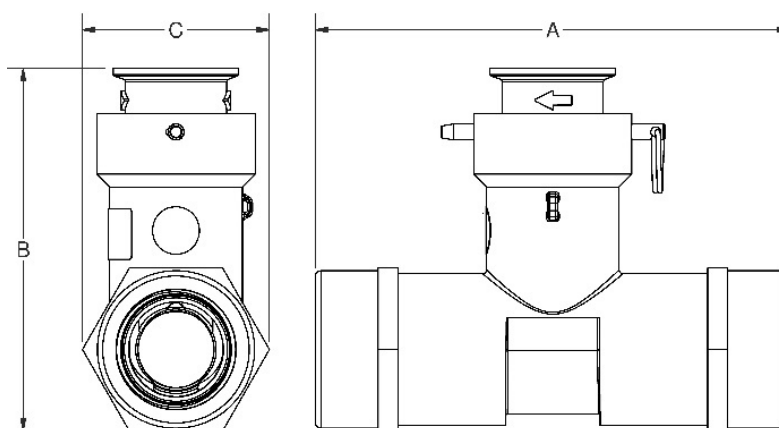
SPECIFICATIONS – NPT Fitting Meters

Model	UM025NF	UM040NF	UM050NF	UM080NF	UM100NF
Size	1 Inch	1-1/2 Inch	2 Inch	3 Inch	4 Inch
Inlet / Outlet Connections	1 in. NPT Female	1 1/2 in. NPT Female	2 in. NPT Female	3 in. NPT Female	4 in. NPT Female
Tee Housing Weight	1.67 lbs. (0.76kg)	2.12 lbs. (0.96kg)	2.63 lbs. (1.19kg)	5.81 lbs. (2.63kg)	7.96 lbs. (3.61kg)

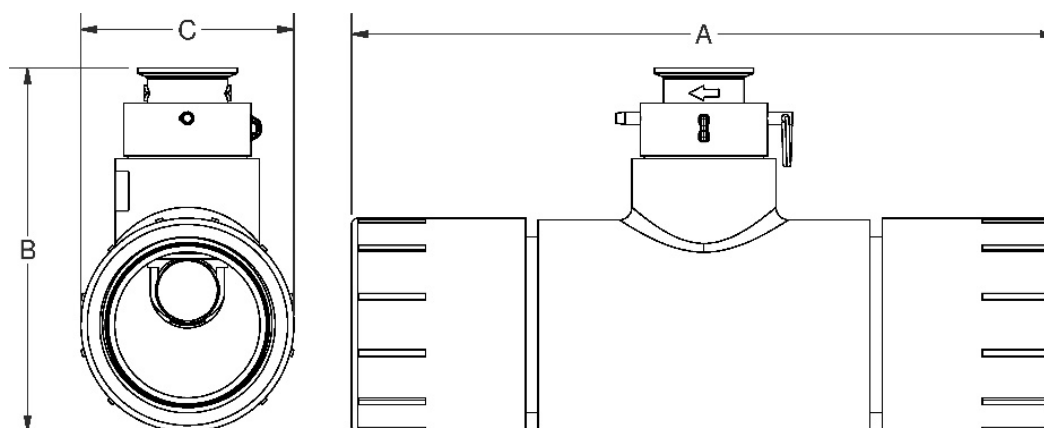
Dimensions

Model	UM025NF	UM040NF	UM050NF	UM080NF	UM100NF
Size	1 Inch	1-1/2 Inch	2 Inch	3 Inch	4 Inch
A. Length	6.50 in. (165mm)	7.44 in. (189mm)	8.22 in. (209mm)	14.06 in. (357mm)	16.31 in. (414mm)
B. Height ²	5.37 in. (136mm)	5.71 in. (145mm)	6.24 in. (158mm)	7.24 in. (184mm)	8.41 in. (213mm)
C. Width (at widest point)	2.50 in. (64mm)	2.96 in. (75mm)	3.61 in. (92mm)	4.25 in. (108mm)	5.87 in. (149mm)

² Electronic options QUDSBAN1 and QUC1LPN1 adds 2.25 in. (57mm) to overall height.



1 in., 1-1/2 in., & 2 in. Meters



3 in. & 4 in. Meters

(10-pin ribbon cable not shown in views for clarity)

Figure 1A

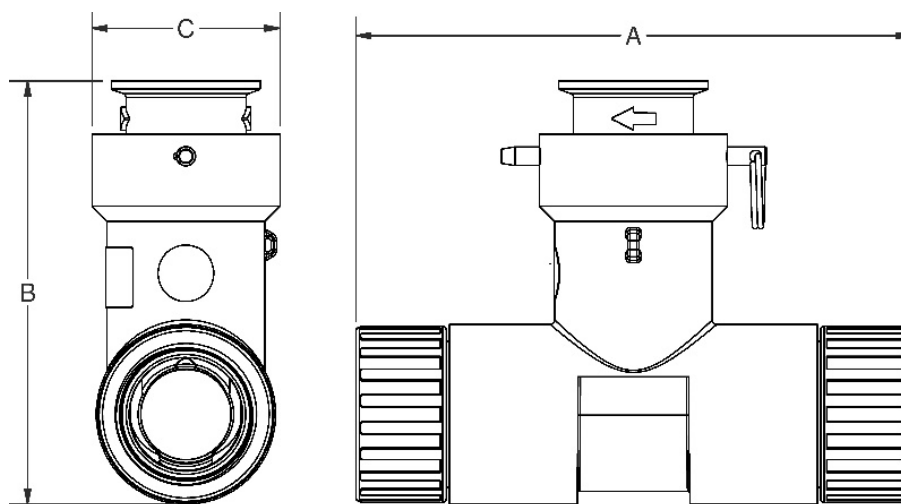
SPECIFICATIONS – BSPT Fitting Meters

Model	UM025TF	UM040TF	UM050TF
Size	1 Inch	1-1/2 Inch	2 Inch
Inlet / Outlet Connections	1 in. BSPT Female	1 1/2 in. BSPT Female	2 in. BSPT Female
Tee Housing Weight	1.65 lbs. (0.75kg)	1.96 lbs. (0.89kg)	2.13 lbs. (0.97kg)

Dimensions

Model	UM025TF	UM040TF	UM050TF
Size	1 Inch	1-1/2 Inch	2 Inch
A. Length	6.78 in. (172mm)	7.40 in. (188mm)	8.09 in. (205mm)
B. Height ²	5.38 in. (137mm)	5.63 in. (143mm)	6.12 in. (155mm)
C. Width (at widest point)	2.50 in. (64mm)	2.50 in. (64mm)	2.88 in. (73mm)

² Electronic options QUDSBAN1 and QUC1LPN1 adds 2.25 in. (57mm) to overall height.



1 in., 1-1/2 in., & 2 in. Meters
(10-pin ribbon cable not shown in views for clarity)

Figure 1B

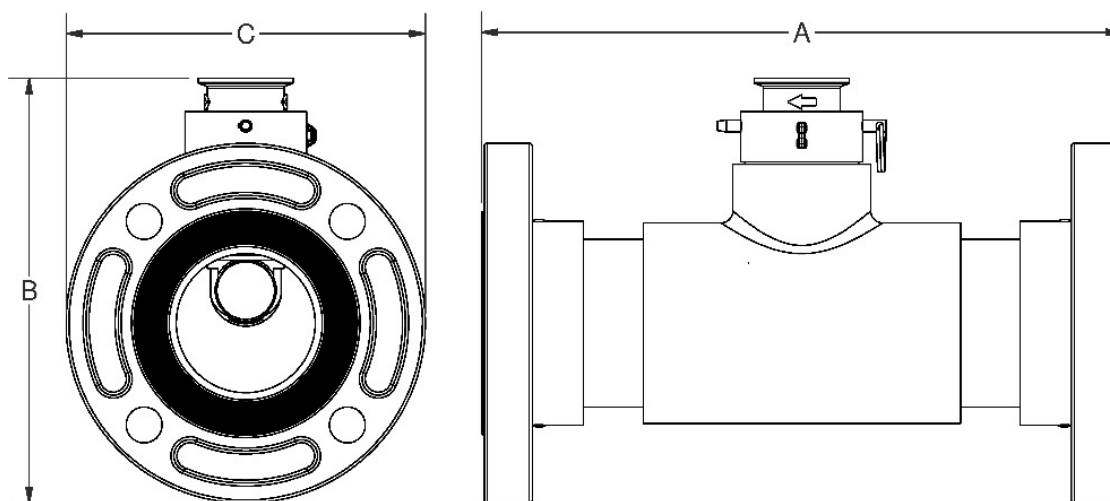
SPECIFICATIONS – ANSI Flange meters

Model	UM080FA	UM100FA
Size	3 Inch	4 Inch
Inlet / Outlet Connections	3 in. ANSI Flange	4 in. ANSI Flange
Tee Housing Weight	7.77 lbs. (3.52kg)	11.08 lbs. (5.03kg)

Dimensions

Model	UM080FA	UM100FA
Size	3 Inch	4 Inch
A. Length	13.38 in. (340mm)	13.38 in. (340mm)
B. Height ²	8.86 in. (225mm)	10.30 in. (262mm)
C. Width (at widest point)	7.50 in. (191mm)	9.00 in. (229mm)

² Electronic options QUDSBAN1 and QUC1LPN1 adds 2.25 in. (57mm) to overall height.



3 in. & 4 in. Meters

(10-pin ribbon cable not shown in views for clarity)

Figure 1C

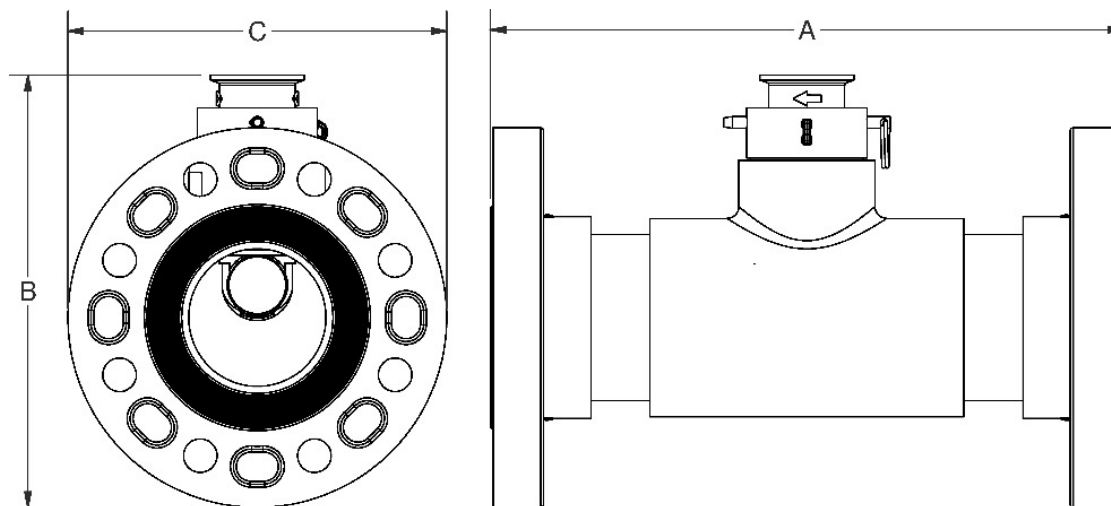
SPECIFICATIONS – DIN Flange Meters

Model	UM080FD	UM100FD
Size	3 Inch	4 Inch
Inlet / Outlet Connections	3 in. DIN Flange	4 in. DIN Flange
Tee Housing Weight	8.19 lbs. (3.71kg)	10.24 lbs. (4.64kg)

Dimensions

Model	UM080FD	UM100FD
Size	3 Inch	4 Inch
A. Length	13.38 in. (340mm)	13.38 in. (340mm)
B. Height ²	9.11 in. (231mm)	10.05 in. (255mm)
C. Width (at widest point)	8.00 in. (203mm)	8.50 in. (216mm)

² Electronic options QUDSBAN1 and QUC1LPN1 adds 2.25 in. (57mm) to overall height.



3 in. & 4 in. Meters

(10-pin ribbon cable not shown in views for clarity)

Figure 1D

SPECIFICATIONS (Continued)

K-Factor Chart

Meter Model	Size	Adjoining Pipe	Typical K-Factor	
			Pulses/Gal	Pulses/Litre
UM025	1 in.	Class 200	102.96	27.20
		Sch 40	107.62	28.43
		Sch 80	112.06	29.60
UM040	1-1/2 in.	Class 200	74.74	19.74
		Sch 40	75.73	20.00
		Sch 80	76.34	20.17
UM050	2 in.	Class 200	39.82	10.52
		Sch 40	41.07	10.85
		Sch 80	41.19	10.88
UM080	3 in.	Class 200	13.66	3.61
		Sch 40	14.48	3.83
		Sch 80	15.17	4.01
UM100	4 in.	Class 200	7.87	2.08
		Sch 40	7.97	2.10
		Sch 80	8.18	2.16

If using a UM with an irrigation controller, please see the following K-factor Calculator link for more detailed information: <https://greatplainsindustries.com/pages/qs200-k-factor-calculator>.

K-Factor Information

NOTE: The meter size is molded on the vertical stem of the Tee.

FLOMEC ultrasonic flowmeters use typical K-Factor values specific to the adjoining pipe used in the application for greatest accuracy during calibration. These values are derived by calibrating the meters using NIST traceable instrumentation. The typical K-factor values for each meter are listed above.

IMPORTANT: The K-factors provided are for reference. Accuracy can be affected by plumbing configuration, fluid condition, adjoining pipe schedule, and entrapped air.

INSTALLATION

Typical UM Tee meter (Tee with ultrasonic electronics) shown below

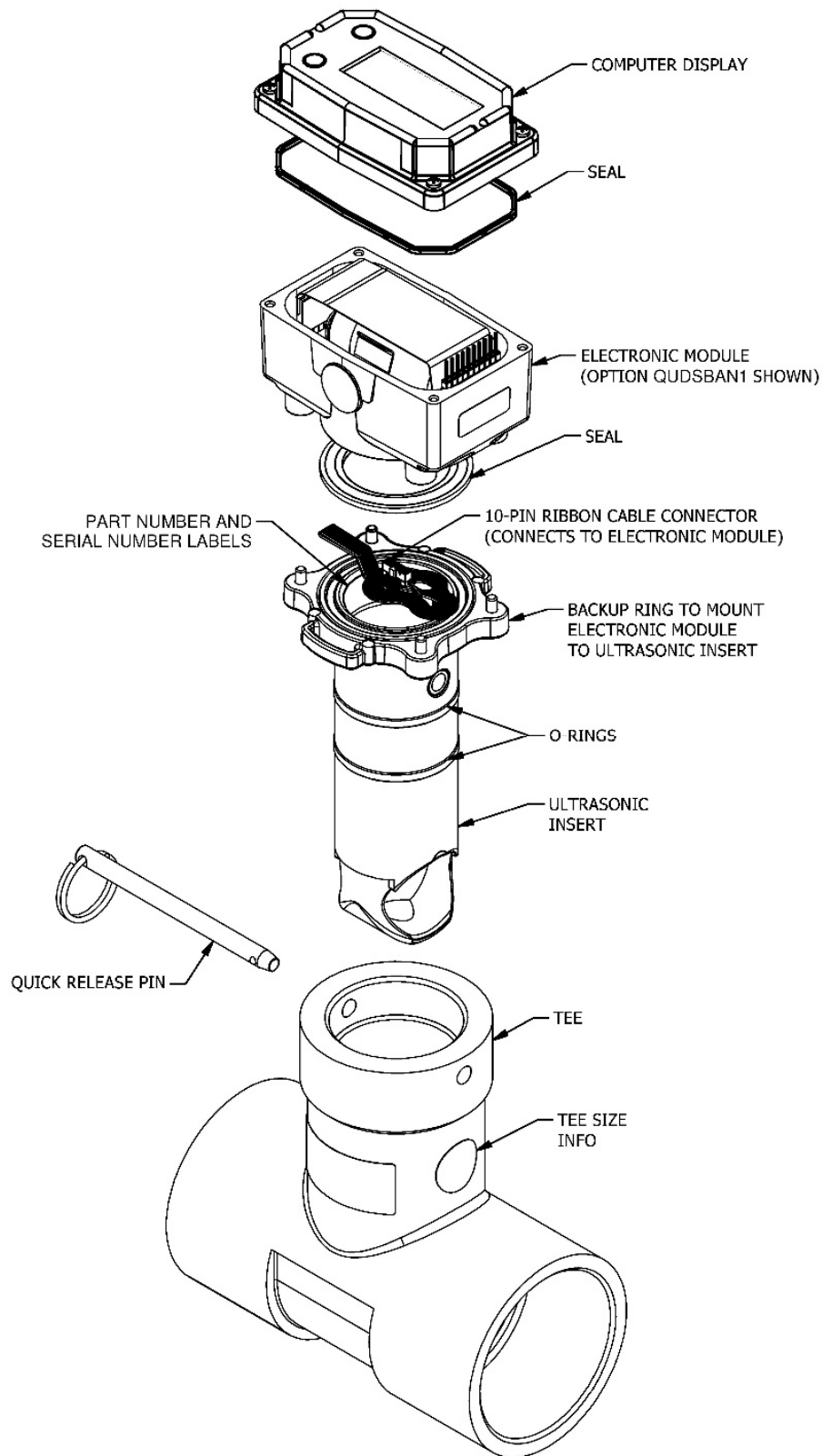


Figure 2
(UM050SK shown)

INSTALLATION (Continued)

NOTE: Allow room above the insert for the electronic module and computer display (see Specifications for dimensions).

UM ultrasonic meters should be installed with straight runs of pipe equal to 10 pipe diameters upstream, and 5 times the pipe diameter downstream to prevent turbulence that can decrease the meter's accuracy. Without these straight runs, UM meters will still detect higher and lower than expected flows and unscheduled flows. The arrow embossed on the insert housing denotes the flow direction.

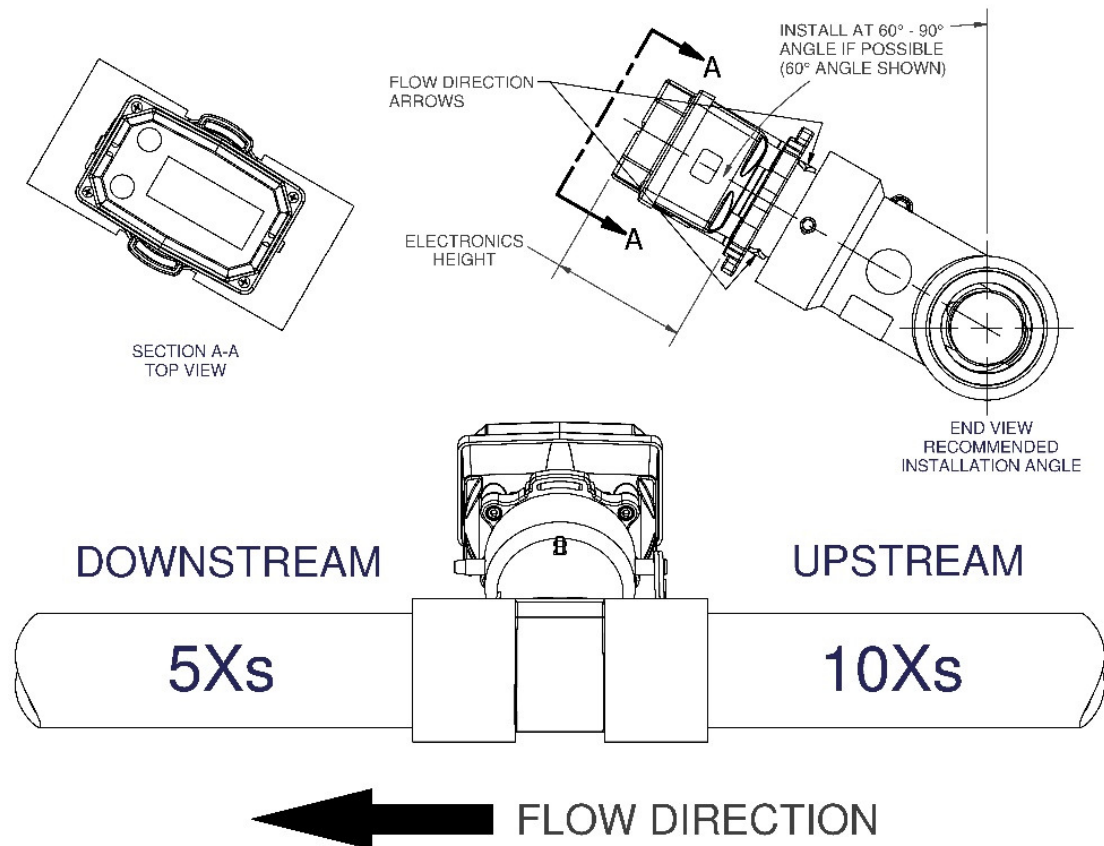


Figure 3
(UM040SK with Option QUDSBAN1 electronics shown)

Installing Tee Meter onto Pipe

NOTE: There is no need to remove the insert to install the meter. The meter must be installed with the arrow on the insert pointing in the flow direction.

If the meter is accidentally installed backwards, simply remove the insert, rotate 180 degrees so the arrow points in the flow direction, and reinstall the insert.

The Tee is bi-directional; the insert is not. The insert operates correctly as long as the insert arrow is pointed in the direction of flow. The insert can be rotated 180 degrees, so its arrow can always be pointed in the direction of flow regardless of Tee installation.

If space allows, install Tee/insert at a 60° to 90° angle from vertical (see Figure 3).

NOTE: For 1-inch pipe installations, this 60° to 90° angle is especially important for the most accurate meter operation.

Note: Flow must go uphill through the meter, never downhill through the meter to avoid air bubbles or air pockets captured in the Tee.

INSTALLATION (Continued)

Socket Fitting Meters - Connections

1. Remove all burrs from the O.D. and I.D. edges of the pipe ends, and the I.D. edges of the Tee sockets (see Figure 4).
2. Clean and apply primer to the pipe ends and Tee sockets (see Figure 5)
3. Apply PVC cement to pipe ends and Tee sockets and quickly assemble the parts while the cement is fluid, following the cement manufacturer's instructions (see Figure 6).
4. Hold the cemented parts together for at least 30 seconds.

NOTE: The graphics below show the Tee meter as it comes from the factory (completely assembled). For convenience during the installation process, the ultrasonic insert with attached electronics can be removed from the Tee by removing the quick release pin and lifting the insert out of the Tee.

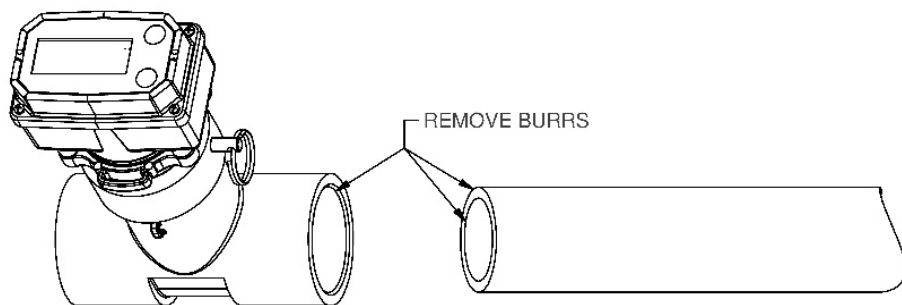


Figure 4
(UM040SK with Option QUDSBAN1 electronics shown)

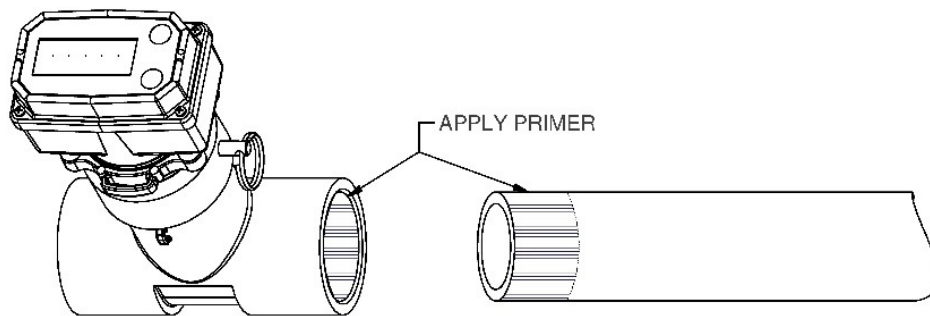


Figure 5
(UM040SK with Option QUDSBAN1 electronics shown)

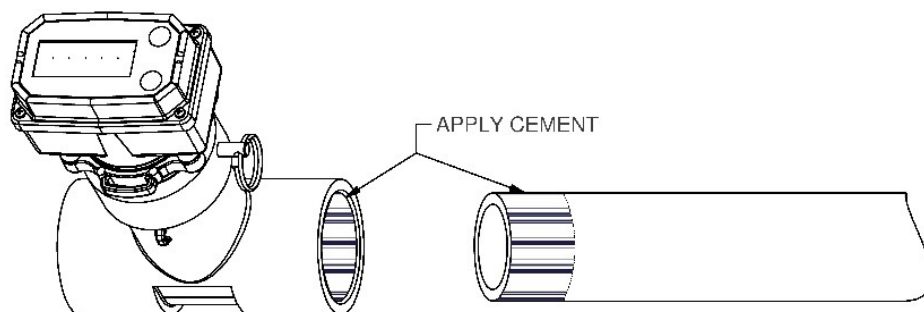


Figure 6
(UM040SK with Option QUDSBAN1 electronics shown)

INSTALLATION (Continued)

NPT and BSPT Fitting Meters - Connections

Installation to metal connections is not recommended.

1. Seal all pipe threads with an appropriate non-lubricated thread sealant (such as Loctite® No More Leaks™ Plastic Pipe Thread Sealant or NSF equivalent for NSF applications). Make sure the thread sealant does not intrude into the flow path.
2. Attach meter with arrow pointed in the direction of fluid flow.
3. Hand tighten the meter at the housing ends. DO NOT use a wrench or similar tool to tighten. This can damage the housing.

ANSI and DIN Flange Fitting Meters - Connections

Installation to metal connections is not recommended. Customer to provide the following:

- Ring Gaskets or Full-Face Gaskets approved for use with type flange installed (ANSI or DIN), application (NSF or non-NSF), and the fluid being monitored. (2 gaskets required).
- 5/8-inch bolts and nuts for ANSI flanges. Four per side for 3-inch meters; eight per side for 4-inch meters.
- 16 mm bolts and nuts for DIN flanges. Eight per side for 3-inch and 4-inch meters.
- Torque bolts using a star pattern to 25 ft-lbs (33.8 Nm). Supplied flanges are two-piece Van Stone style and allow the meter to be oriented regardless of the mating flanges position.

Wiring Connections

The ultrasonic Tee meter comes from the factory completely assembled. Electronic option QUDSBAN1 (battery powered) can be used immediately.

See UM Ultrasonic Electronics owner's manual for wiring information on electronic option QUC1LPN1 (loop powered). It must be connected to a customer provided power supply.

OPERATION

There are no user adjustments or actions required for the Tee. User adjustments of electronic operations are explained in **920901-05 UM Ultrasonic Electronics** owner's manual received with this meter. The table below highlights some of the special features that a customer may want to adjust to fine tune their meter to the process.

Special Feature	Description	Manual Location
Built in flow meter diagnostics	Diagnostic features that allow the user to troubleshoot application issues	Q9 Display: Operation: Diagnostic Mode
Selectable volume and time-base units	User configurable accumulated volume units and flow rate time-base	Q9 Display: Operation: Configuration Mode: Volume Unit
Adjustable scaled pulse output K-factor	User configurable pulse output K-factor (pulses/volume) value can be adjusted for interoperability with various customer equipment	Q9 Display: Operation: Configuration Mode: Electronic Module Options
Adjustable 4-20ma output	User configurable zero and span settings to adjust product for specific application flow rates	Q9 Display: Operation: Configuration Mode: Electronic Module Options
Field calibration	User calibration of the flow meter using one of three available methods (Dispense/Display, Percentage Adjustment, or K-factor Entry)	Q9 Display: Operation: Field Calibration Mode

TROUBLE SHOOTING

1. Entrained air is air bubbles suspended in the water flow. Entrained air creates errors in accuracy of ultrasonic technology meters. Recommend a maximum of 10% entrained air in the water flow.
2. Flow must go uphill through the meter, never downhill through the meter to avoid air bubbles or air pockets captured in the Tee.
3. Do not install within 20 pipe diameters downstream of pressure regulation equipment. These devices cause any entrained air in the line to expand, and could cause your FLOMEC Ultrasonic Meter to become inaccurate.
4. The faces of the transducers need to be clean and free of oily substances for accurate operation. Do not touch transducers with fingers, oily rags, etc.

DO NOT use wire brushes or abrasives to clean the faces of the transducers (see Figure 7).

5. Ensure the flow direction arrow is pointing in the direction of flow for correct functionality.
6. Ensure the quick release pin is installed in the tee to maintain pressure and alignment of the insert in the tee.

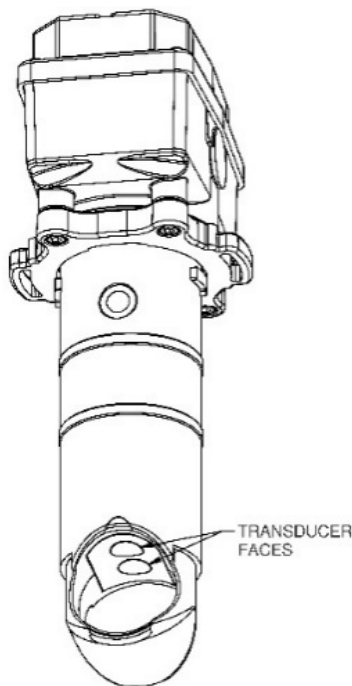


Figure 7
(Option QUDSBAN1 electronics shown)

REPAIR

There are no repairs that can be made to the Tee housing. Replacement Tee housings are available as replacement parts.

See the specific section of the Ultrasonic Electronics Manual for available repair parts for the ultrasonic insert, electronic module, and computer display.

REPAIR PARTS LIST

Model No.	Description	Part Number
UM025SK	HOUSING, 1 INCH TEE, PVC, SPARE	146010-511
UM040SK	HOUSING, 1-1/2 INCH TEE, PVC, SPARE	146015-511
UM050SK	HOUSING, 2 INCH TEE, PVC, SPARE	146020-511
UM080SK	HOUSING ASSEMBLY, 3 INCH TEE, PVC, SPARE	146030-512
UM100SK	HOUSING ASSEMBLY, 4 INCH TEE, PVC, SPARE	146040-512
UM025NF	HSG ASSY, UM, 1" FNPT, SPARE	146023-501
UM040NF	HSG ASSY, UM, 1-1/2" FNPT, SPARE	146023-502
UM050NF	HSG ASSY, UM, 2" FNPT, SPARE	146023-503
UM080NF	HSG ASSY, UM, 3" FNPT, SPARE	146023-504
UM100NF	HSG ASSY, UM, 4" FNPT, SPARE	146023-505
UM025TF	HSG ASSY, UM, 1" FBSPT, SPARE	146023-506
UM040TF	HSG ASSY, UM, 1-1/2" FBSPT, SPARE	146023-507
UM050TF	HSG ASSY, UM, 2" FBSPT, SPARE	146023-508
UM080FA	HSG ASSY, UM, 3" ANSI FLNG, SPARE	146023-509
UM100FA	HSG ASSY, UM, 4" ANSI FLNG, SPARE	146023-510
UM080FD	HSG ASSY, UM, 3" DIN FLNG, SPARE	146023-511
UM100FD	HSG ASSY, UM, 4" DIN FLNG, SPARE	146023-512



NOTES:

[illegible]



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