QS200
Insertion Ultrasonic Flowmeter

U.S. Design Patent No. D845,804 - Ultrasonic Insert
U.S. Design Patent No. D845,805 - Tee Housing for Ultrasonic Insert

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STANDARD METERS:
QS200-10, QS200-15, QS200-20, QS200-30, QS200-40

NSF CERTIFIED METERS:
QS200-10PW, QS200-15PW, QS200-20PW, QS200-30PW, QS200-40PW

STANDARD RETROFIT INSERT:
QS200

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.

DO NOT RETURN THIS PRODUCT TO THE STORE!

Please contact Great Plains Industries, Inc.® before returning any product. If you are missing parts, or experience problems with your installation, contact our Customer Support Department. We will be happy to assist you.

Call: 888-996-3837 or 316-686-7361

Email: meters@gplains.com

SAVE FOR YOUR RECORDS

Model #: _____

Serial #: _____

Purch. Date: _____

GETTING STARTED

SAFETY / SPECIFICATIONS

ASSEMBLY / INSTALLATION

OPERATION

TROUBLESHOOTING

MAINTENANCE / REPAIR

BEFORE YOU BEGIN

Usage Requirements

• This meter is for use with water only.

• This meter is not legal for trade applications.

• This meter has a permanent factory setting for measuring water only.

Power Source Requirements

• This meter requires DC power from a customer-provided controller in order to provide flow information back to the controller.

Tools and Materials Needed

• Wire strippers, wire cutters, screwdriver, tape measure

• PVC pipe fittings (as needed), PVC pipe primer, PVC pipe cement

• Direct burial wire splices, valve box

• #18 AWG wire cable (Direct Burial) (Controller manufacturer may recommend thicker guage wire for longer distances)

UNPACKING

Contents: QS200-10, -15, -20, -30, -40 or QS200-10PW, -15PW, -20PW, -30PW, -40PW Meters
Note: The "PW" suffix denotes an NSF certified meter

(1) QS200 Ultrasonic insert assembly	(2) K-factor Decals
(1) PVC Pipe Tee (for 1 in., 1-1/2 in., 2 in., 3 in., or 4 in. diameter pipe)	(1) Owners Manual
(1) Quick Release Pin	

Contents: QS200 Retrofit Insert (Not available as NSF certified)

(1) QS200 Ultrasonic insert assembly	(1) Quick Release Pin
(1) Set of two O-rings (round profile)	(1) Owners Manual
(2) K-factor Decals	

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.

GETTING STARTED

SAFETY /
SPECIFICATIONS

ASSEMBLY /
INSTALLATION

OPERATION

TROUBLESHOOTING

MAINTENANCE /
REPAIR

FL MEC®

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.*

NOTE: Be sure O-rings and seals are kept in good repair.

⚠ **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 meter. Ice expansion may burst the plastic housing.*

⚠ **CAUTION** *Do not allow this meter to be used with steam.*

4

GETTING STARTED

SAFETY /
SPECIFICATIONS

ASSEMBLY /
INSTALLATION

OPERATION

TROUBLESHOOTING

MAINTENANCE /
REPAIR

SPECIFICATIONS

|	QS200-10	QS200-15	QS200-20	QS200-30	QS200-40
	QS200-10PW	QS200-15PW	QS200-20PW	QS200-30PW	QS200-40PW
Tee Housing Material	SCH 80 PVC (Polyvinyl chloride)				
Insert Housing Material	PPS (Polyphenylene sulfide) / ULTEM® (Polyetherimide)				
Type	Ultrasonic Flowmeter				
Powered by	DC power provided by customer controller 7.5V (dc) min to 36V (dc) max OFF State Current: 200µA (typical)				
Unit of Measure	Controller Dependant				
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
Accuracy	+/- 2% of Reading				
Uncertainty	0.04 GPM 0.018 ft/sec	0.10 GPM 0.018 ft/sec	0.17 GPM 0.018 ft/sec	0.37 GPM 0.018 ft/sec	0.65 GPM 0.018 ft/sec
Max. Working Pressure	150 PSI @ 70°F (10.3 bar @ 60°C)				
Operating Temperature	+32°F to +140°F (0°C to +60°C)				
Storage Temperature	+32°F to +140°F (0°C to +60°C)				
Field Calibration	No				
Inlet / Outlet Connections	1 in. Female Socket	1 1/2 in. Female Socket	2 in. Female Socket	3 in. Female Socket	4 in. Female Socket
Weight	0.95 lbs. (0.43kg)	1.12 lbs. (0.51kg)	1.39 lbs. (0.63kg)	2.52 lbs. (1.14kg)	3.21 lbs. (1.46kg)

INSERTS - ALL METER SIZES

Transducer Excitation	OFF State Current	200µA (typical)
	OFF State V-High	Supply Voltage - (OFF State Current * Supply impedance)
	ON State Current	(Supply Voltage / (Supply impedance + 50Ω))
	ON State V-Low	ON State Current * 50Ω
Output Frequency	0 to 100 Hz	
Output Pulse Width	4mSec (Approx.)	

5

GETTING STARTED

SAFETY / SPECIFICATIONS

ASSEMBLY / INSTALLATION

OPERATION

TROUBLESHOOTING

MAINTENANCE / REPAIR
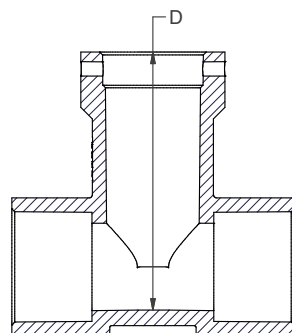
FLOMEC®

SPECIFICATIONS (CONTINUED)

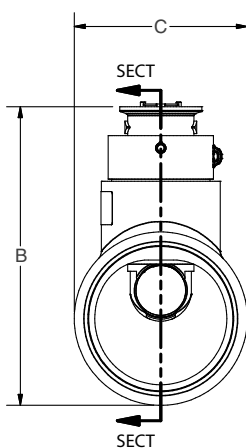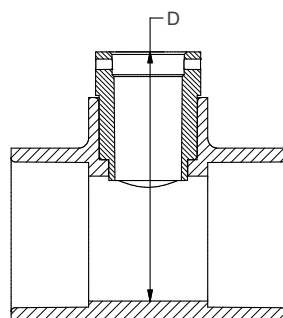|	QS200-10, QS200-10PW 1 INCH	QS200-15, QS200-15PW 1-1/2 INCH	QS200-20, QS200-20PW 2 INCH	QS200-30, QS200-30PW 3 INCH	QS200-40, QS200-40PW 4 INCH
Dimensions					
A. Length	4.25 in. (108mm)	4.90 in. (124mm)	5.56 in. (141mm)	6.63 in. (168mm)	7.38 in. (187mm)
B. Height	5.38 in. (137mm)	5.63 in. (143mm)	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. Depth	4.47 in. (114mm)	4.47 in. (114mm)	4.94 in. (125mm)	4.91 in. (124mm)	6.17 in. (156mm)
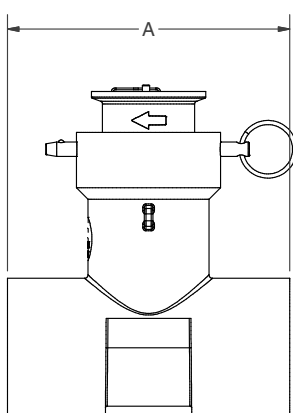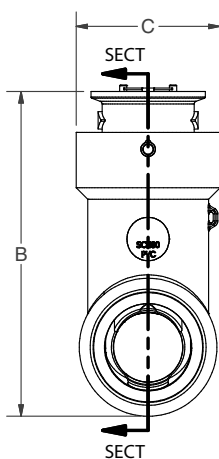
For 1 in., 1-1/2 in., & 2 in. Meters

SECT VIEW (TEE ONLY)
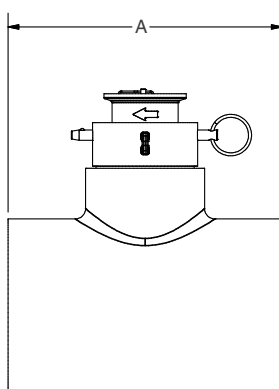
For 3 in. & 4 in. Meters

SECT VIEW (TEE ONLY)

6   **Figure 1**

GETTING STARTED

SAFETY / SPECIFICATIONS

ASSEMBLY / INSTALLATION

OPERATION

TROUBLESHOOTING

MAINTENANCE / REPAIR

SPECIFICATIONS (CONTINUED)

K-Factor Information

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

FLOMEC ultrasonic meters use K-factor plus offset numbers for greater accuracy during calibration. These values are derived by calibrating the meters using NIST traceable instrumentation. Using both sets of values to calibrate the meters provides greater accuracy than using only a K-factor value. The K-factor and offset values for each meter are listed below.

IMPORTANT: The K-factors provided are for reference. Accuracy can be affected by plumbing configuration, fluid condition, adjoining pipe schedule, type of meter tee (if using QS200 insert in non-FLOMEC tee), and entrapped air. Customers should always validate accuracy and adjust K-factor as needed.

Meter Model	Size	FLOMEC TEE K-Factor (frequency)	Offset	NON-FLOMEC TEE K-Factor (frequency)
QS200-10	1 in.	0.5386	0	N/A
QS200-15	1-1/2 in.	0.7926	0	0.7947
QS200-20	2 in.	1.3765	0	1.3583
QS200-30	3 in.	3.8444	0	4.2505
QS200-40	4 in.	7.1676	0	7.2229

NSF CERTIFICATION INFORMATION

NOTE: QS200 meter are available as a standard meter, or as an NSF certified meter. Only QS200 meters ordered as a complete unit (ultrasonic insert installed in FLOMEC tee) qualify to be NSF certified.

Standard meter: The identification plate on the top of the ultrasonic insert is marked "QS200".

NSF certified meter: The identification plate on the top of the ultrasonic insert is marked "QS200PW", and the tee body is marked with an NSF certification decal for additional identification.

NOTE: NSF certified meters use the same part number structure as non-NSF models, except for the addition of the "PW" suffix on the end. The "PW" suffix indicates an NSF certified meter. e.g., QS200-15PW.
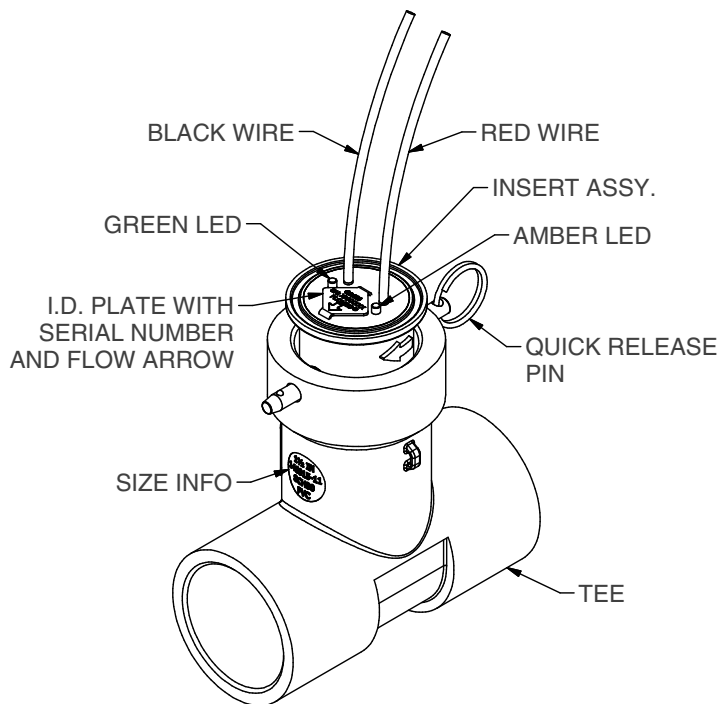
NSF certification is valid only when product is marked per above information.

Certified to
NSF/ANSI 61-G & 372

GETTING STARTED

SAFETY /
SPECIFICATIONS

ASSEMBLY /
INSTALLATION

OPERATION

TROUBLESHOOTING

MAINTENANCE /
REPAIR

INSTALLATION

Below is a typical QS200 meter with labeled components. Familiarize yourself with the meter before installation.

BLACK WIRE

RED WIRE

INSERT ASSY.

GREEN LED

AMBER LED

I.D. PLATE WITH
SERIAL NUMBER
AND FLOW ARROW

QUICK RELEASE
PIN

SIZE INFO

TEE

TYPICAL QS200 METER

Figure 2

GETTING STARTED

SAFETY /
SPECIFICATIONS

ASSEMBLY /
INSTALLATION

OPERATION

TROUBLESHOOTING

MAINTENANCE /
REPAIR

INSTALLATION (CONTINUED)

Provide a straight pipe run of at least 10Xs the pipe's diameter upstream of the meter, and at least 5Xs the pipe's diameter downstream of the meter. The arrow embossed on the insert body denotes the flow direction.
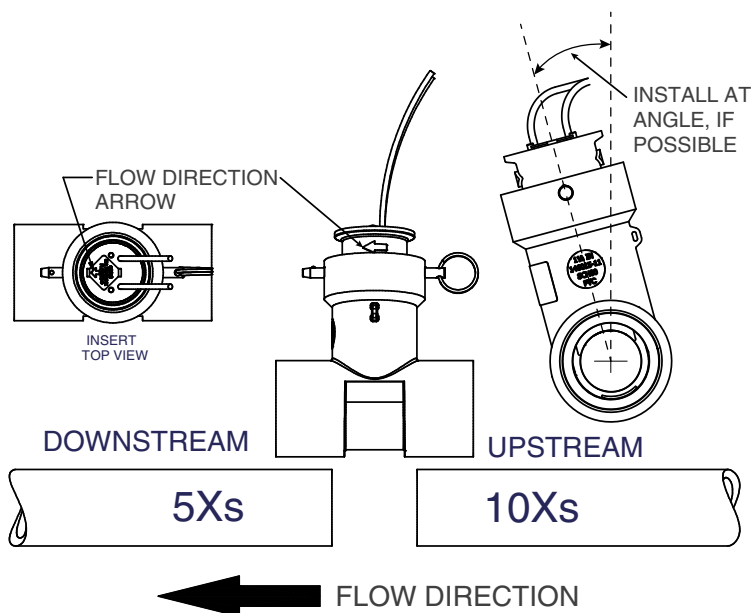

INSTALL AT ANGLE, IF POSSIBLE

FLOW DIRECTION ARROW

INSERT TOP VIEW

DOWNSTREAM

UPSTREAM

5Xs

10Xs

FLOW DIRECTION

Figure 3

Install 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 bidirectional, 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 an angle rather than pointing up (see Figure 3).

NOTE: For 1 inch pipe installations, this angle is especially important and should be set at 45 degrees for most accurate meter operation.

GETTING STARTED

SAFETY / SPECIFICATIONS

ASSEMBLY / INSTALLATION

OPERATION

TROUBLESHOOTING

MAINTENANCE / REPAIR

INSTALLATION (CONTINUED)

1. Remove all burrs from the pipe ends I.D. and O.D. edges and the Tee sockets I.D. edges (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. Follow the cement manufacturer's instructions (see Figure 6).

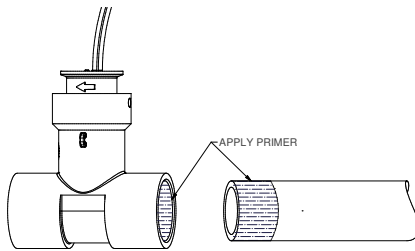4. Hold the cemented parts together for at least 30 seconds.

REMOVE BURRS

APPLY PRIMER

Figure 4

Figure 5

APPLY CEMENT
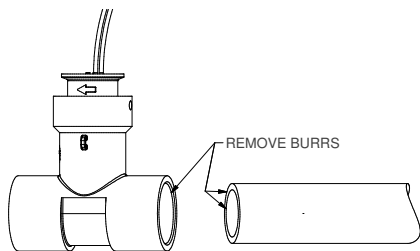
Figure 6

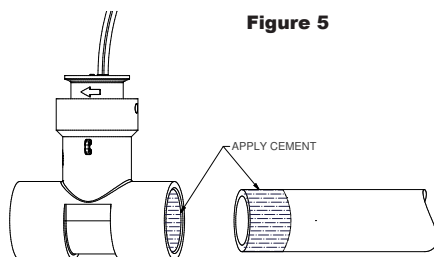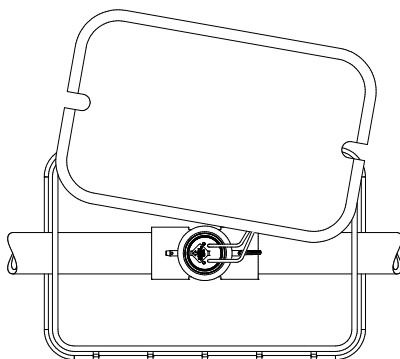### For Below Ground Installation

1. Install a valve box around the insert. Valve box extensions may be needed depending on depth (see Figure 7).

NOTE: A minimum of 10 in. thick layer of gravel should be installed immediately below the meter and valve box.

10 **Figure 7**

GETTING STARTED

SAFETY / SPECIFICATIONS

ASSEMBLY / INSTALLATION

OPERATION

TROUBLESHOOTING

MAINTENANCE / REPAIR

INSTALLATION (CONTINUED)

Wiring Connections

NOTE: Wiring diagram is shown in next section.

1.   When using 18 AWG cable, cut off the unused wires so that they are even with the sheath of the cable.

NOTE: For 18 AWG connections, remember the color of the twisted pair of wires you use so that you can make an identical connection with the same wires later.
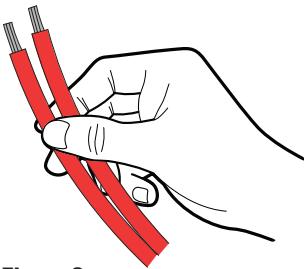
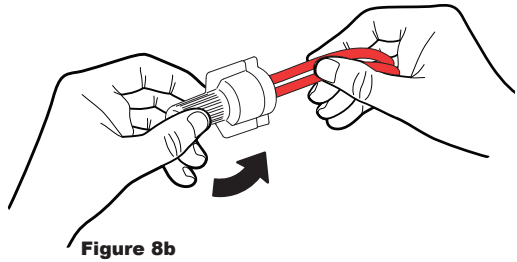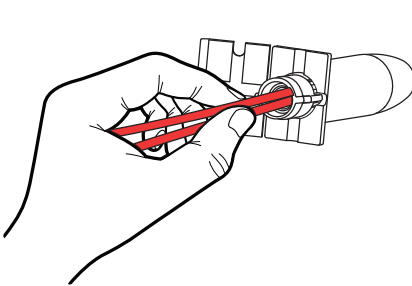2.   3M DBR/Y-6 Splice Kit Instructions:

Figure 8a

Figure 8b

Figure 8c

Figure 8d & 8e

GETTING STARTED

SAFETY /
SPECIFICATIONS

ASSEMBLY /
INSTALLATION

OPERATION

TROUBLESHOOTING

MAINTENANCE /
REPAIR
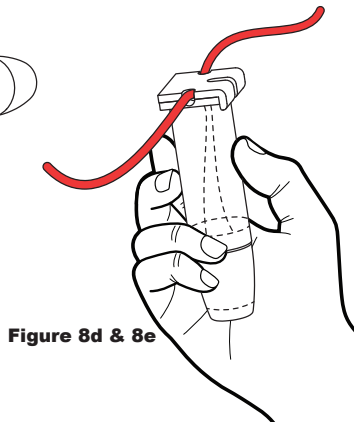
INSTALLATION (CONTINUED)

a.   Strip insulation ¾ in. (19 mm).

b.   With wire ends even, insert wires into the connector and tighten until secure.

c.   Insert the connector all the way into the tube until the connector rests on the bottom of the tube.

NOTE: If having difficulty getting the twist-on connector down into the tube when using small gauge wires, use a thin, non-conductive object to push the connector to the bottom of the tube. Upon removal of the object, ensure that no voids or water paths remain in the grease.

d.   Fold the wires into the channels.

e.   Close the cap.

Wiring Diagram

This diagram shows connection to a RAINBIRD® Flow Smart Module. Connections to other flow controllers may vary.

TO FLOW " + "
ON FLOW SMART
MODULE

18 AWG CABLE
to CONTROLLER

RED

TO FLOW " - "
ON FLOW SMART
MODULE

BLACK

DBR/Y-6
SPLICE KIT

FLOW INSERT

Figure 9

NOTES

GETTING STARTED

SAFETY / SPECIFICATIONS

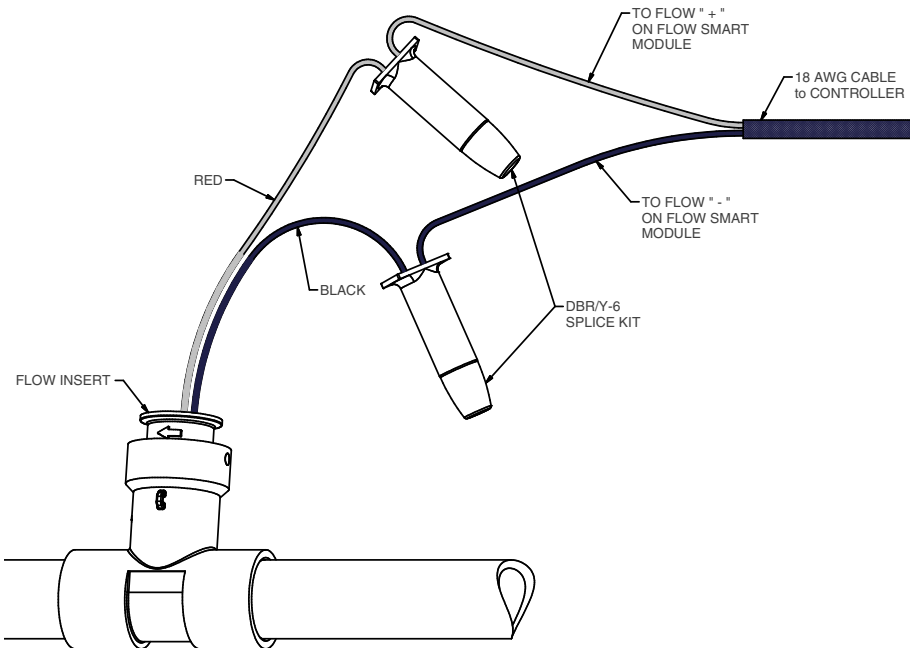ASSEMBLY / INSTALLATION

OPERATION

TROUBLESHOOTING

MAINTENANCE / REPAIR

OPERATION

Each QS200 meter is shipped with two K-factor decals (placed loose inside the owner's manual packet). One is to affix on or near the installed meter for on-site use if desired. The other decal is to affix to a convenient spot on or near the controller for immediate reference if desired.

LEDs Functionality

There are two LEDs on the QS200 product. The GREEN LED is used to indicate basic power and functionality of the meter. The AMBER LED is used to indicate that there is a flow of water through the QS200 meter insert. The LEDs will behave in the following manner to indicate different modes of operation:

MODE	LED BEHAVIOR
Power Disconnected or Meter Failure:	Both GREEN and AMBER LEDs are OFF.
No Flow Low Power Mode:	GREEN LED flashes ON/OFF at a rate of approximately 2 blinks per second.
No Flow or Reverse Flow Active Mode:	GREEN LED flashes ON/OFF at a rate of approximately 8 blinks per second.
Low Flow Active Mode:	GREEN LED flashes ON/OFF at a rate of approximately 8 blinks per second and the AMBER LED flashes ON/OFF at a rate that is proportional to the rate of water flow thru the meter.
**High Flow Active Mode:	GREEN LED flashes ON/OFF at a rate of approximately 8 blinks per second and the AMBER LED will appear to be constantly ON, but will be dim.

**NOTE: To save power it is normal for the LEDs to be dim when flashing at higher flow rates. At very high flow rates, the AMBER LED will appear to be constantly ON but dim.

GETTING STARTED

SAFETY / SPECIFICATIONS

ASSEMBLY / INSTALLATION

OPERATION

TROUBLESHOOTING

MAINTENANCE / REPAIR

TROUBLESHOOTING

1. The LEDs are the primary indicators of meter performance. Refer to the Operations Section for LED indicating functionality.

2. 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.

3. 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 10).

4. Ensure the flow direction arrow is pointing in the direction of flow for correct LED functionality.

5. Ensure the quick release pin is installed in the tee to maintain pressure and alignment of the insert in the tee.
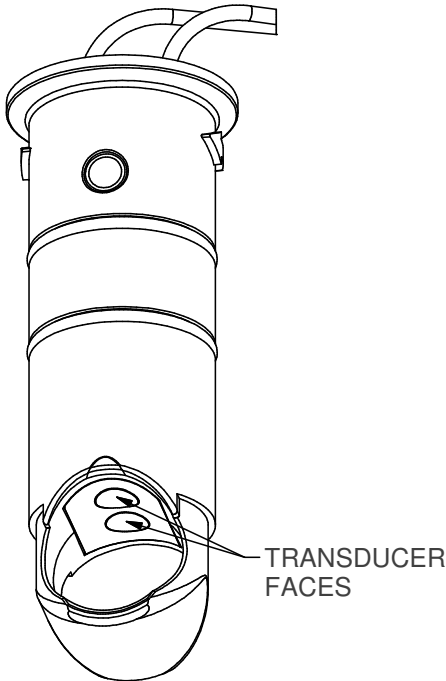

TRANSDUCER FACES

Figure 10

REPAIR

QS200 Insert Replacement and QS200 Retrofit Insert Installation Instructions

NOTE: These instructions are intended to assist in replacing the insert in an existing FLOMEC® QS200 ultrasonic Meter.

These instructions also apply when a FLOMEC QS200 insert is used as a replacement insert in other brands of Tee type meters, that have an obsolete or unreliable insert.

The FLOMEC QS200 is a direct replacement for a paddle wheel type insert in most meters that have a Tee type housing.

⚠ CAUTION *Keep the new insert free of dirt and debris during installation.*

Check Meter Size

If your flow controller requires a meter K-factor, use the K-factor for your size meter (see SPECIFICATIONS section). If the meter size is unknown, it is easily determined using one of the following methods (for FLOMEC and other brands):

1. Dipstick Method (For 2 in., 3 in. and 4 in. meters only):The interior depth of the meter body indicates its size. To check, remove the old insert from the meter body and insert the end of a stiff tape measure down into the insert bore until it touches the bottom of the meter body bore. Read the depth shown on the tape measure at the top of the Tee housing (see Figure 11) and compare with dimension "D" in the specifications section (see Figure 1).

2. Line Pipe Size Method: Normally, the line pipe size is the same as the meter size. Figure 12 shows line pipe sizes.

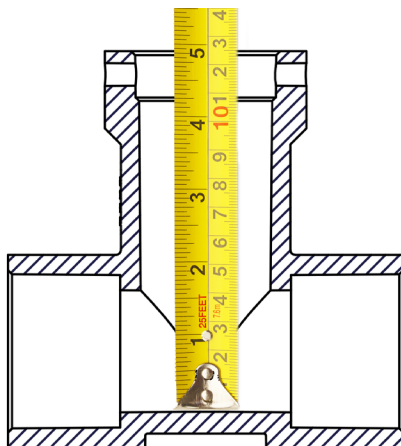NOTE: FLOMEC Tees are marked with hallmark of size, part number, SCH80 and pressure.

Figure 11

16

GETTING STARTED

SAFETY /
SPECIFICATIONS

ASSEMBLY /
INSTALLATION

OPERATION

TROUBLESHOOTING

MAINTENANCE /
REPAIR

REPAIR (CONTINUED)

Ø 1.315
[1 5/16]

1" PIPE

Ø 1.900
[1 29/32]

1 1/2" PIPE

Ø 2.375
[2 3/8]

2" PIPE

Ø 3.500
[3 1/2]

3" PIPE

Ø 4.500
[4 1/2]

4" PIPE

Figure 12

GETTING STARTED

SAFETY / SPECIFICATIONS

ASSEMBLY / INSTALLATION
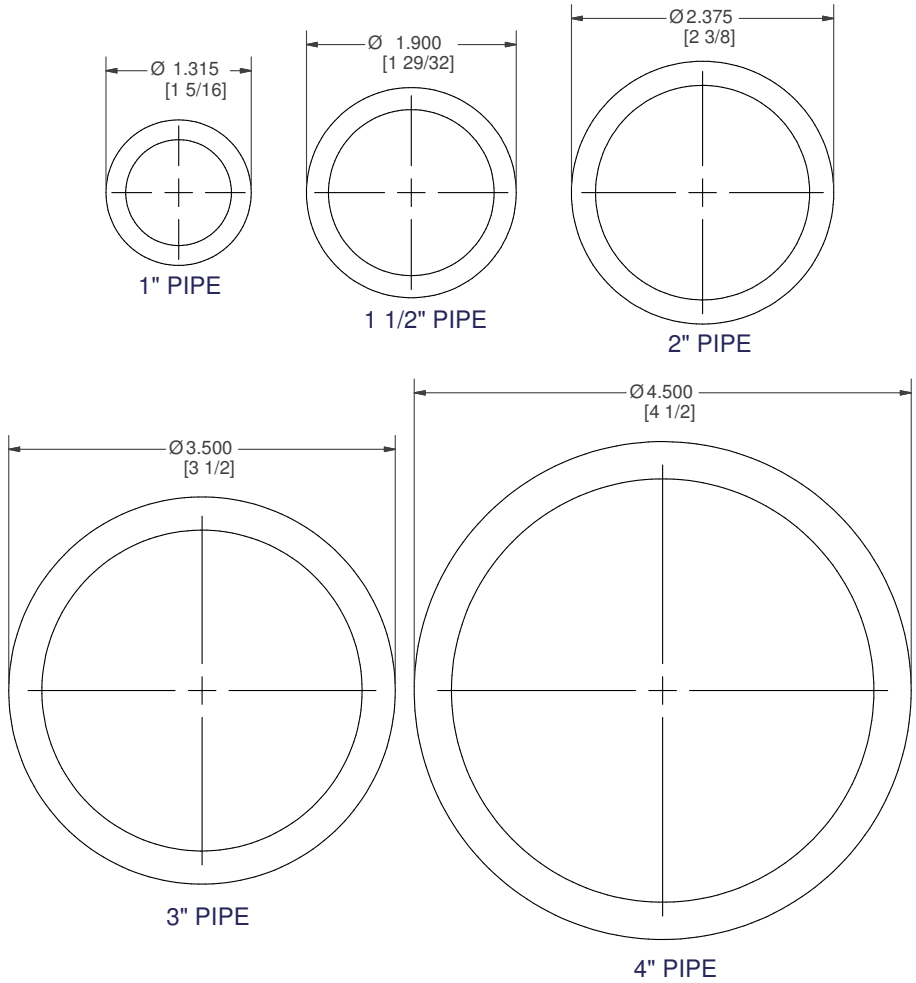
OPERATION

TROUBLESHOOTING

MAINTENANCE / REPAIR

REPAIR (CONTINUED)

Remove Old Insert From Tee

1. Clean all dirt and debris away from the immediate area of the old insert and the top of the meter, then pull out the quick release pin from the meter (see Figure 13).

2. Remove the old insert. Grasp the insert flange with your hand and pull straight up and out of the Tee, making sure no dirt or other particles fall into the insert bore of the meter (see Figure 14).

NOTE: The FLOMEC Multi-Tool (p/n 146055-501) can be used to make removal of old insert easier (see Figure 17).

NOTE: When replacing another manufacturer's insert with the QS200 Retrofit Insert, the old insert could have a sediment or mineral buildup and need to be leveraged out of the tee.
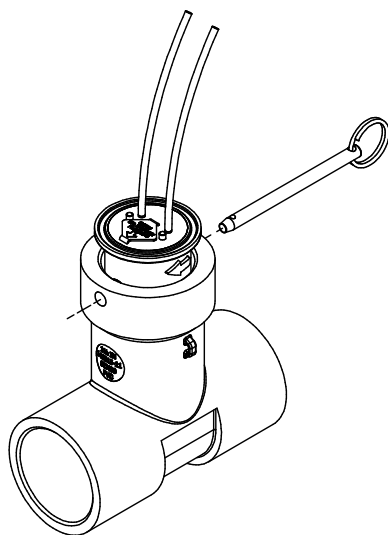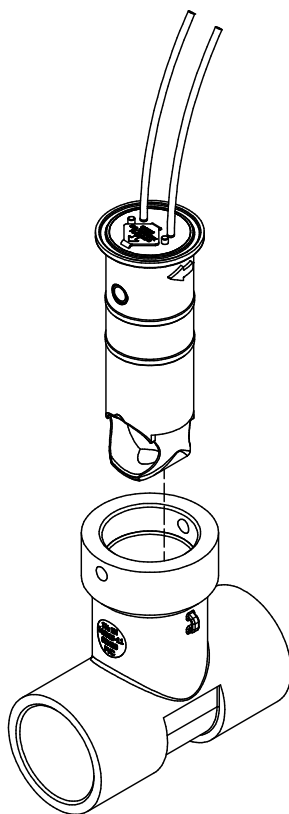

Figure 13

Figure 14

GETTING STARTED

SAFETY /
SPECIFICATIONS

ASSEMBLY /
INSTALLATION

OPERATION

TROUBLESHOOTING

MAINTENANCE /
REPAIR

REPAIR (CONTINUED)

Install New or Replacement Insert Into Tee

1. The Tee insert bore must be clean before installing the insert and the (2) black O-rings on the insert should be <u>fully lubricated</u>.

2. Orient the insert over the insert bore so that the arrow on the insert is pointing in the direction of flow.

3. Insert the insert straight down into the Tee.

4. Push down on the insert flange and twist slightly to install, and to align the retaining pin holes in the insert with the holes in the Tee (see Figure 15).

<u>NOTE:</u> The FLOMEC Multi-Tool (p/n 146055-501) can be used to make installing new insert easier (see Figure 18).

<u>NOTE:</u> The O-rings on the outside of the QS200 Retrofit Insert are square profile O-rings. When installing in another brand of Tee, if the insert fits too tight into the Tee, replace the square profile O-rings with the round profile O-rings included with the QS200 Retrofit Insert. Their installation could make installation easier in tight fitting Tees. The O-rings must be fully lubricated before insert installation.

5. Next, replace the quick release pin (see Figure 16).

6. Using the splicing and wiring information (see WIRING CONNECTIONS and WIRING DIAGRAM in the INSTALLATION section), connect the wiring from the new insert to the wiring cable of the controller.

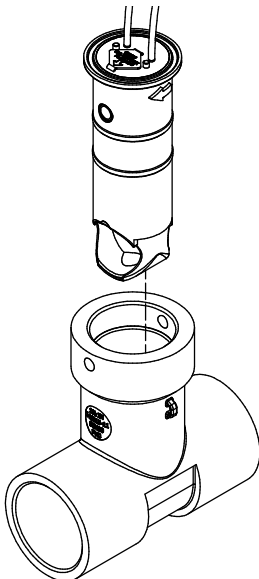7. Energize the insert and verify that it is operating properly (see Troubleshooting section if required).
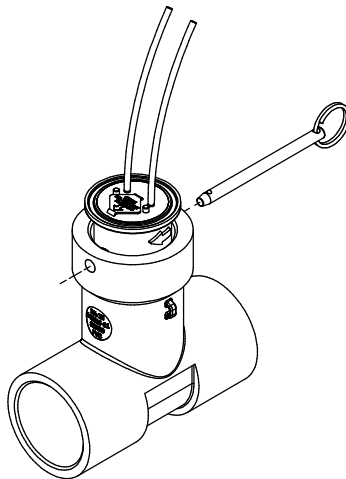

Figure 15   **Figure 16**

19

GETTING STARTED

SAFETY /
SPECIFICATIONS

ASSEMBLY /
INSTALLATION

OPERATION

TROUBLESHOOTING

MAINTENANCE /
REPAIR

FLOMEC®

REPAIR (CONTINUED)

Using the FLOMEC Multi-Tool

The multi-tool was designed exclusively for tee type meters that use an insertion type insert. It facilitates easier removal of the insert, whether from a QS200 meter or other brands of tee type insertion meters.

 It is especially useful when attempting to remove an old, inoperative, or inaccurate insert from another brand of tee type insertion meter for replacement with a QS200 insert.

The multi-tool is versatile, compact and fits easily into the valve box for close quarters use.

The pointed end is designed for use as:

1.   A versatile pry bar and driving wedge. On other brands of tee type insertion meters, when the insert lip may be too close to the top of the tee to use the U-formed end of the multi-tool, use the pointed end (as pry bar or driving wedge) between the insert lip and top of the tee to break the insert loose and gain room between the insert lip and tee to use the U-formed end to lever the insert up and out.

2.   An alignment tool to align the pin holes of the new insert with the pin holes in the tee.

3.   A cleaning tool for clearing debris from the valve box lid groove or other crevices.
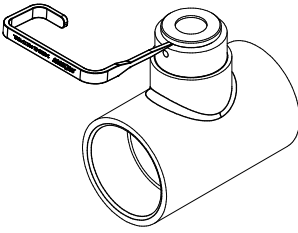
The U-formed end is designed for use as:

4.   A handle for leverage when using the pointed end.

5.   A levering tool by slipping the U-formed end around the insert between the insert lip and the top of the tee. This positions the tool for use as a lever for levering inserts up and out of the tee for replacement. It can be levered up or down, and can be rotated to any quadrant around the insert in order to give the best position for leverage.
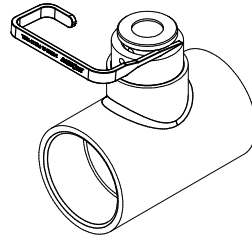
The multi-tool (P/N 146055-501) is a separate item available to the customer, and is listed in the repair parts list near the back of the manual.

GETTING STARTED

SAFETY /
SPECIFICATIONS

ASSEMBLY /
INSTALLATION

OPERATION

TROUBLESHOOTING

MAINTENANCE /
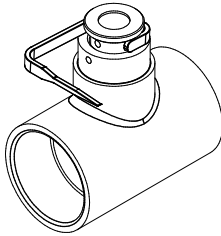REPAIR

REPAIR (CONTINUED)

Remove Old Insert From Tee with FLOMEC Multi-Tool

PRY UP - To break a stuck insert loose

DRIVING WEDGE - To lift insert more

LEVERAGE - To Lift insert up and out

Figure 17

Install New QS200 Insert FLOMEC Multi-Tool
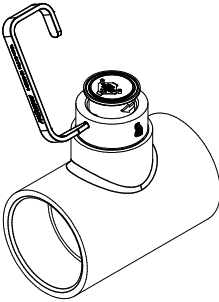
PIN HOLE ALIGNMENT -
For easy pin install
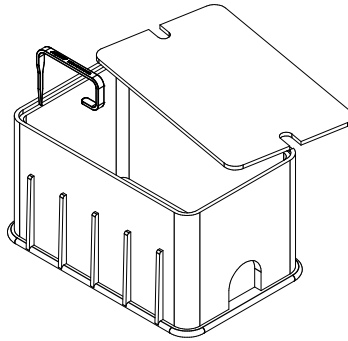
CLEAN LID GROOVE -
Remove dirt, roots, debris

Figure 18

GETTING STARTED

SAFETY /
SPECIFICATIONS

ASSEMBLY /
INSTALLATION

OPERATION

TROUBLESHOOTING

MAINTENANCE /
REPAIR

REPAIR PARTS ILLUSTRATION FOR QS200

⚠ **CAUTION** *Do not return this product without prior approval from the GPI Customer Service Department. Due to strict government regulations, GPI cannot accept parts unless they have been drained and cleaned.*

GETTING STARTED

SAFETY / SPECIFICATIONS

ASSEMBLY / INSTALLATION

OPERATION

TROUBLESHOOTING

MAINTENANCE / REPAIR
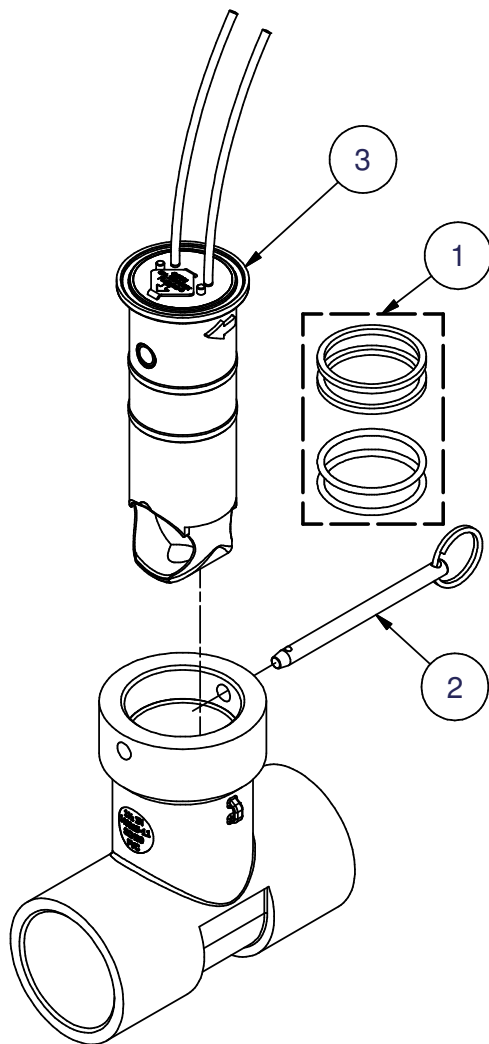
REPAIR PARTS LIST FOR QS200

Ref. No.	Description	Part Number
1	O-Ring Seal Kit	146500-01
	Includes (2) square profile O-rings & (2) round profile O-rings	
2	Hardware Kit	146500-2
	Includes (1) quick release pin	
3	Ultrasonic Insert	QS200
	Includes (1) insert assembly w/square profile O-rings, (2) round profile O-rings, (1) quick release pin, (2) K-factor decals & (1 owner's manual)	
3	Ultrasonic Insert, Potable Water	QS200PW
	Includes (1) insert assembly w/square profile O-rings, (2) round profile O-rings, (1) quick release pin, (2) K-factor decals & (1 owner's manual)	
-	Housing, 1 inch tee, PVC, Spare	146010-511
-	Housing, 1-1/2 inch tee, PVC, Spare	146015-511
-	Housing, 2 inch tee, PVC, Spare	146020-511
-	Housing Assembly, 3 inch tee, PVC, Spare	146030-512
-	Housing Assembly, 4 inch tee, PVC, Spare	146040-512
-	Multi-Tool, Spare	146055-501

PARTS & SERVICE

For warranty consideration, parts, or other service information, please contact your local distributor. If you need further assistance, contact the GPI Customer Service Department in Wichita, Kansas, during normal business hours.

A toll free number is provided for your convenience.

1-888-996-3837

To obtain prompt, efficient service, always be prepared with the following information:

• The model number of your meter.

• The serial number or manufacturing date code of your meter.

• Part descriptions and numbers.

For warranty work, always be prepared with your original sales slip or other evidence of purchase date.

IMPORTANT: Please contact GPI before returning any parts. It may be possible to diagnose the trouble and identify needed parts in a telephone call.

FLOMEC® TWO-YEAR LIMITED WARRANTY

Great Plains Industries, Inc. 5252 E. 36th Street North, Wichita, KS USA 67220-3205, hereby provides a limited warranty against defects in material and workmanship on all products manufactured by Great Plains Industries, Inc. This product includes a 2 year warranty. Manufacturer's sole obligation under the foregoing warranties will be limited to either, at Manufacturer's option, replacing or repairing defective Goods (subject to limitations hereinafter provided) or refunding the purchase price for such Goods theretofore paid by the Buyer, and Buyer's exclusive remedy for breach of any such warranties will be enforcement of such obligations of Manufacturer. The warranty shall extend to the purchaser of this product and to any person to whom such product is transferred during the warranty period.

The warranty period shall begin on the date of manufacture or on the date of purchase with an original sales receipt. This warranty shall not apply if:

A. the product has been altered or modified outside the warrantor's duly appointed representative;

B. the product has been subjected to neglect, misuse, abuse or damage or has been installed or operated other than in accordance with the manufacturer's operating instructions.

To make a claim against this warranty, contact the GPI Customer Service Department at

316-686-7361 or 888-996-3837.
Or by mail at:
Great Plains Industries, Inc.
5252 E. 36th St. North
Wichita, KS, USA 67220-3205

The company will step you through a product troubleshooting process to determine appropriate corrective actions.

GREAT PLAINS INDUSTRIES, INC., EXCLUDES LIABILITY UNDER THIS WARRANTY FOR DIRECT, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGES INCURRED IN THE USE OR LOSS OF USE OF THE PRODUCT WARRANTED HEREUNDER.

The company herewith expressly disclaims any warranty of merchantability or fitness for any particular purpose other than for which it was designed.

This warranty gives you specific rights and you may also have other rights which vary from U.S. state to U.S. state.

Note: In compliance with MAGNUSON MOSS CONSUMER WARRANTY ACT – Part 702 (governs the resale availability of the warranty terms).

IP68   CE   NSF
Certified to
NSF/ANSI 61-G & 372

Wichita / Sydney   GREAT PLAINS INDUSTRIES GPI

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QS200 INSERTION ULTRASONIC FLOWMETER

The QS200 Insertion Ultrasonic Flowmeter provides an accurate reading of liquid flow rate and accumulated flow. Designed to support commercial irrigation applications, the QS200 is available in five pipe sizes, 1 to 4 in.

The QS200 ultrasonic insert is available with a PVC tee or as an "insert retrofit" for replacement of existing paddlewheel flow sensors.

FEATURES / BENEFITS

- Low-cost, effective and easy installation
- No moving mechanical parts (low-maintenance)
- Simple two-wire connector (for power and pulse)
- Compatible with irrigation controllers (common name brands)
- High accuracy: ± 2.0% of reading (compared to full scale accuracy)
- Provides extended leak detection down to 0.1 fps (0.03 m/s)
- LED light indicators: (green for power and amber for pulse)
- Patented design
- Ideal for clean water flow measurement
- External wiring: (direct burial wire)

INSERT DESCRIPTION

Designed for above and below grade applications, such as irrigation, municipal and underground monitoring where the flow rates are between 0.1 to 15 fps (0.03 to 4.57 m/s) and temperatures are below 140° F (60° C). QS200 inserts are supplied with two single conductors, 18 AWG solid copper wire leads that are 36 inches (914.4 mm) in length with UL Style 116666 direct burial insulation.

SPECIFICATIONS

Tee Housing Material:	Schedule 80 PVC
Insert Wetted Materials:	**Body:** PPS (Ryton R-4)
	Sensor: PEI (Ultem 1000)
	O-Ring: EPDM
Temperature Rating:	
Operating:	32° F to 140° F (0° C to 60° C)
Storage:	-20° F to +160° F (-29° C to +71° C)
Flow Range:	0.1 to 15 fps (0.03 to 4.57 m/s)
Accuracy:	Typically ±2% of reading
Operating Pressure:	150 psi @ 73° F (10 bar @ 23° C) 100 psi @ 140° F (7 bar @ 60° C)
Transducer Excitation:	Supply Voltage: 7.5V (dc) min. to 36V (dc) max
	Quiescent Current: 200 µA (typical)
Output Frequency:	0 to 100 Hz
Output Pulse Width:	4 ms
Electrical Cable for Insert Electronics:	36 inches (914.4 mm) of 18 AWG, solid copper, "Direct Burial" (UL 493 & 83)

APPLICATIONS

- Agriculture Irrigation
- Turf / Landscape Irrigation Systems
- Micro Irrigation Systems
- Groundwater Monitoring

- Sub-Metering Applications:
  » High Rise Tenant Buildings
  » Apartment Complex
  » Universities
  » Commercial Businesses
  » Processing Facilities

APPROVALS

IP68 C E NSF
Certified to
NSF/ANSI 61-G & 372

FLOW INSERT SELECTION CHART

| Flowmeter Model	Pipe Size	Operating Range (Min.)	Operating Range (Max.)	Maximum Water Pressure***	FLOMEC Tee K-Factor (Freq)*	Non-FLOMEC Tee K-Factor (Freq)*	Offset Value**	Meter Material	Adapter Material	Tee Material	Process Port
QS200-10	1 in.	0.22 GPM (0.83 L/min) 0.1 ft/sec	33 GPM (124.92 L/min) 15 ft/sec	150 psi @ 73°F (10 bar @ 23°C)	0.5386	N/A	0	Ryton	-	PVC	Slip
QS200-15	1.5 in.	0.55 GPM (2.08 L/min) 0.1 ft/sec	82 GPM (310.41 L/min) 15 ft/sec	150 psi @ 73°F (10 bar @ 23°C)	0.7926	0.7947	0	Ryton	-	PVC	Slip
QS200-20	2 in.	0.92 GPM (3.48 L/min) 0.1 ft/sec	138 GPM (522.39 L/min) 15 ft/sec	150 psi @ 73°F (10 bar @ 23°C)	1.3765	1.3583	0	Ryton	-	PVC	Slip
QS200-30	3 in.	2.06 GPM (7.80 L/min) 0.1 ft/sec	309 GPM (1169.70 L/min) 15 ft/sec	150 psi @ 73°F (10 bar @ 23°C)	3.8444	4.2505	0	Ryton	PVC	PVC	Slip
QS200-40	4 in.	3.58 GPM (13.55 L/min) 0.1 ft/sec	537 GPM (2032.78 L/min) 15 ft/sec	150 psi @ 73°F (10 bar @ 23°C)	7.1676	7.2229	0	Ryton	PVC	PVC	Slip
QS200		*Insert only*		150 psi @ 73°F (10 bar @ 23°C)	use pipe size to determine value	use pipe size to determine value	0	Ryton	PVC	N/A	N/A

*K and offset values are used to calculate the frequency of the pulses from the QS200 electronics
The formula for frequency is Freq = (GPM/K) - offset
** Offsets listed in this table are expected to be calibrated at the factory and therefore no additional correction should be required.
*** Maximum water pressure for larger line sizes would be based on the material of the sensor, adapter, and pipe. Pressure is also derated due to temperature (1.20 psi / °F).

DIMENSIONS
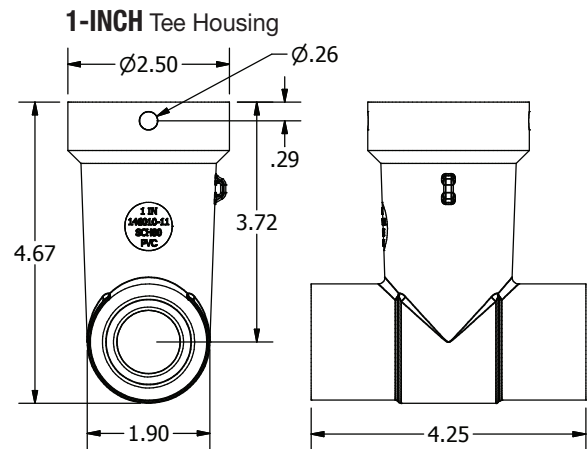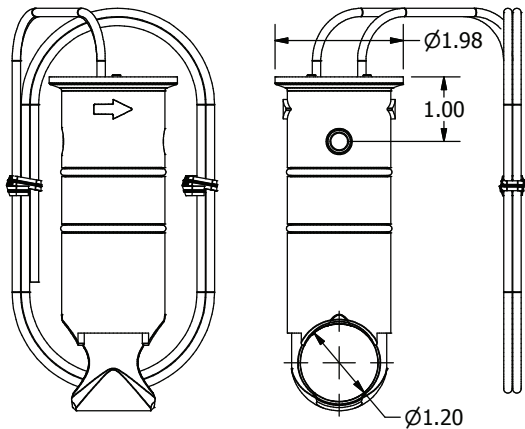
1-INCH Tee Housing

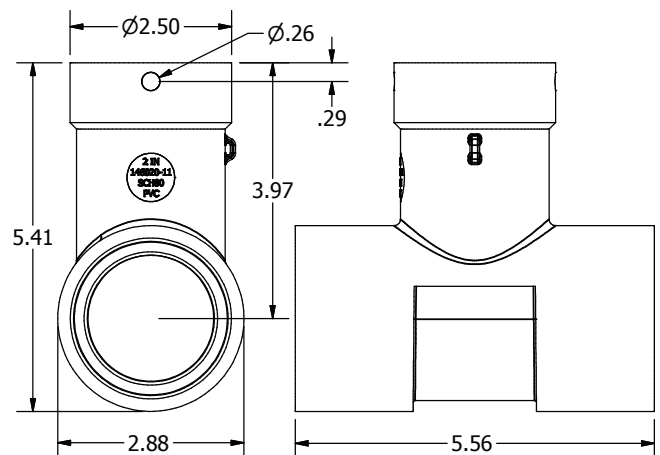**1.5-INCH** Tee Housing
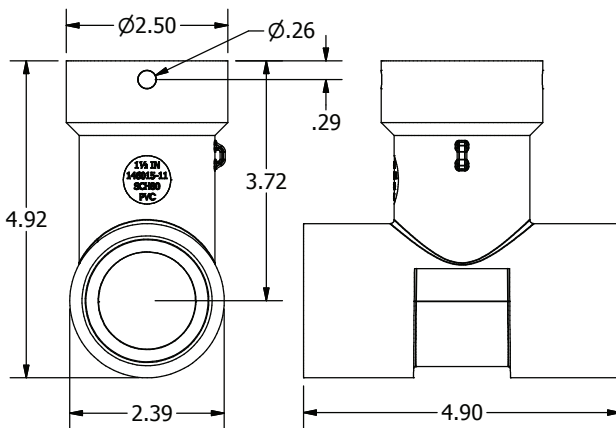
2-INCH Tee Housing

Service & Warranty: For technical assistance, warranty replacement or repair contact your
FLOMEC® or **GPI®** distributor: In North or South America: **888-996-3837 / FLOMEC.net**
Outside North or South America: **+61 2 9540 4433 / FLOMEC.net**

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IND-1102 - QS200

QS200 INSERTION ULTRASONIC FLOWMETER
SADDLE FOR LARGE PIPE SIZES

The 6, 8, 10, and 12 inch saddles are designed exclusively for the QS200 Insertion Ultrasonic Flowmeter. Supporting commercial and agricultural irrigation applications on large size pipes, the QS200 will accurately provide the information your controller needs to display the flow rate and accumulated total.

FEATURES / BENEFITS

- Low-cost, effective and easy installation
- No moving mechanical parts (low-maintenance)
- Simple two-wire connector (for power and pulse)
- Compatible with irrigation controllers (common name brands)
- High accuracy: ± 2.0% of reading (compared to full scale accuracy)
- Provides extended leak detection down to 0.1 fps (0.03 m/s)
- LED light indicators: (green for power and amber for pulse)
- Patented design
- Ideal for clean water flow measurement
- External wiring: (direct burial wire)

INSERT DESCRIPTION

Designed for above and below grade applications, such as irrigation, municipal and underground monitoring where the flow rates are between 0.1 to 15 fps (0.03 to 4.6 m/s) and temperatures are below 140° F (60° C). QS200 inserts are supplied with two single conductors, 18 AWG solid copper wire leads that are 36 inches (914.4 mm) in length with UL Style 116666 direct burial insulation.

SPECIFICATIONS

Insert Wetted Materials:	**Body:** PPS (Ryton R-4)
	Sensor: PEI (Ultem 1000)
	O-Ring: EPDM
Temperature Rating:	
Operating:	32° F to 140° F (0° C to 60° C)
Storage:	-20° F to +160° F (-29° C to +71° C)
Flow Range:	0.1 to 15 fps (0.03 to 4.6 m/s)
Accuracy:	Typically ±2% of reading
Operating Pressure:	150 psi @ 73° F (10 bar @ 23° C) 100 psi @ 140° F (7 bar @ 60° C)
Transducer Excitation:	Supply Voltage: 7.5V (dc) min. to 36V (dc) max
	Quiescent Current: 200 µA (typical)
Output Frequency:	0 to 100 Hz
Output Pulse Width:	4 ms
Electrical Cable for Insert Electronics:	36 inches (914.4 mm) of 18 AWG, solid copper, "Direct Burial" (UL 493 & 83)

APPLICATIONS

- Agriculture Irrigation
- Turf / Landscape Irrigation Systems
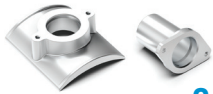- Micro Irrigation Systems
- Groundwater Monitoring

- Sub-Metering Applications:
  » High Rise Tenant Buildings
  » Apartment Complex
  » Universities
  » Commercial Businesses
  » Processing Facilities

APPROVALS

IP68   C E

SADDLE ONLY SELECTION CHART

Model Part Number	Description	Pipe Outside Diameter (in.)	Operating Flow Range	Maximum Water Pressure**	Meter Material	Gasket Material	Saddle Material	Clamp Material
146080-01	6 in. Pipe (NPS/IPS)	6.625	.1 to 15 ft/sec (9 to 1350 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	N/A	Silicone	Aluminum	Stainless Steel
146080-02	8 in. Pipe (NPS/IPS)	8.625	.1 to 15 ft/sec (15 to 2300 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	N/A	Silicone	Aluminum	Stainless Steel
146080-03	10 in. Pipe (NPS/IPS)	10.750	.1 to 15 ft/sec (24 to 3650 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	N/A	Silicone	Aluminum	Stainless Steel
146080-04	12 in. Pipe (NPS/IPS)	12.750	.1 to 15 ft/sec (35 to 5300 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	N/A	Silicone	Aluminum	Stainless Steel
146080-05	6 in. Tube	6.000	.1 to 15 ft/sec (8 to 1230 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	N/A	Silicone	Aluminum	Stainless Steel
146080-06	8 in. Tube	8.000	.1 to 15 ft/sec (15 to 2200 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	N/A	Silicone	Aluminum	Stainless Steel
146080-07	10 in. Tube	10.000	.1 to 15 ft/sec (23 to 3500 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	N/A	Silicone	Aluminum	Stainless Steel
146080-08	12 in. Tube	12.000	.1 to 15 ft/sec (34 to 5100 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	N/A	Silicone	Aluminum	Stainless Steel
146080-09	6 in. PIP	6.140	.1 to 15 ft/sec (8 to 1230 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	N/A	Silicone	Aluminum	Stainless Steel
146080-10	8 in. PIP	8.160	.1 to 15 ft/sec (15 to 2200 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	N/A	Silicone	Aluminum	Stainless Steel
146080-11	10 in. PIP	10.200	.1 to 15 ft/sec (23 to 3500 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	N/A	Silicone	Aluminum	Stainless Steel
146080-12	12 in. PIP	12.240	.1 to 15 ft/sec (34 to 5100 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	N/A	Silicone	Aluminum	Stainless Steel

*Nominal flow rate shown. Actual flow is dependent on pipe schedule (wall thickness).
** Maximum water pressure for larger line sizes would be based on the material of the sensor, adapter, and pipe. Pressure is also derated due to temperature (1.20 psi / °F).

SADDLE WITH SENSOR SELECTION CHART

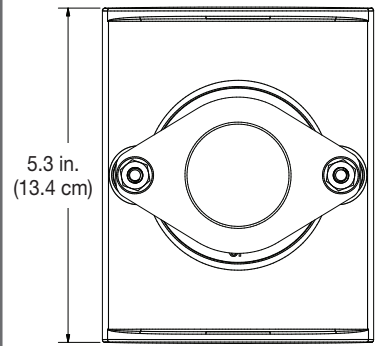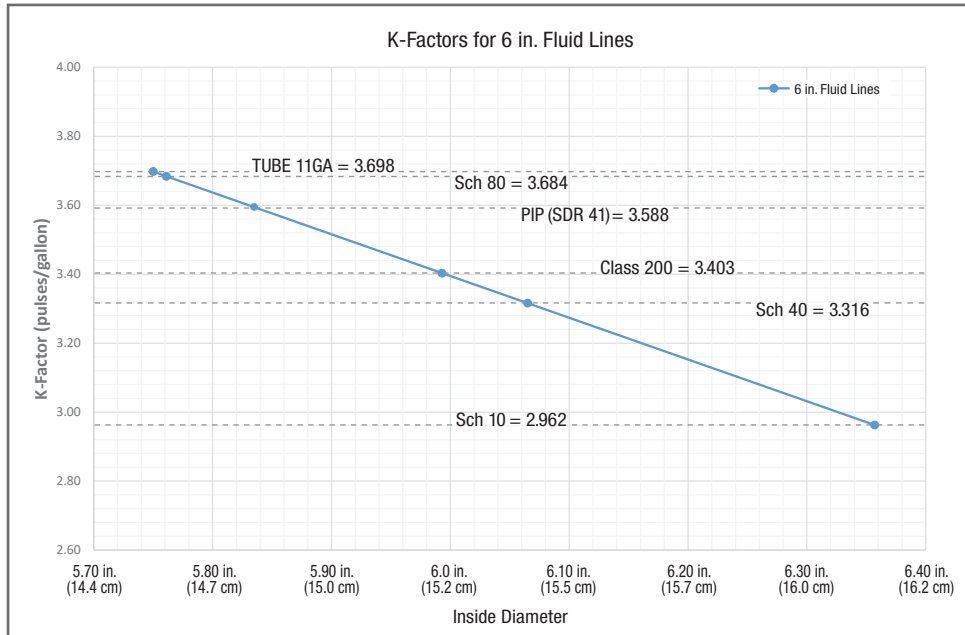| Model Part Number	Description	Pipe Outside Diameter (in.)	Operating Flow Range	Maximum Water Pressure**	Meter Material	Gasket Material	Saddle Material	Clamp Material
146090-01	6 in. Pipe (NPS/IPS)	6.625	.1 to 15 ft/sec (9 to 1350 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	Ryton	Silicone	Aluminum	Stainless Steel
146090-02	8 in. Pipe (NPS/IPS)	8.625	.1 to 15 ft/sec (15 to 2300 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	Ryton	Silicone	Aluminum	Stainless Steel
146090-03	10 in. Pipe (NPS/IPS)	10.750	.1 to 15 ft/sec (24 to 3650 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	Ryton	Silicone	Aluminum	Stainless Steel
146090-04	12 in. Pipe (NPS/IPS)	12.750	.1 to 15 ft/sec (35 to 5300 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	Ryton	Silicone	Aluminum	Stainless Steel
146090-05	6 in. Tube	6.000	.1 to 15 ft/sec (8 to 1230 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	Ryton	Silicone	Aluminum	Stainless Steel
146090-06	8 in. Tube	8.000	.1 to 15 ft/sec (15 to 2200 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	Ryton	Silicone	Aluminum	Stainless Steel
146090-07	10 in. Tube	10.000	.1 to 15 ft/sec (23 to 3500 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	Ryton	Silicone	Aluminum	Stainless Steel
146090-08	12 in. Tube	12.000	.1 to 15 ft/sec (34 to 5100 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	Ryton	Silicone	Aluminum	Stainless Steel
146090-09	6 in. PIP	6.140	.1 to 15 ft/sec (8 to 1230 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	Ryton	Silicone	Aluminum	Stainless Steel
146090-10	8 in. PIP	8.160	.1 to 15 ft/sec (15 to 2200 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	Ryton	Silicone	Aluminum	Stainless Steel
146090-11	10 in. PIP	10.200	.1 to 15 ft/sec (23 to 3500 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	Ryton	Silicone	Aluminum	Stainless Steel
146090-12	12 in. PIP	12.240	.1 to 15 ft/sec (34 to 5100 GPM)*	150 PSI @ 73°F (10 bar @ 23°C)	Ryton	Silicone	Aluminum	Stainless Steel

*Nominal flow rate shown. Actual flow is dependent on pipe schedule (wall thickness).
** Maximum water pressure for larger line sizes would be based on the material of the sensor, adapter, and pipe. Pressure is also derated due to temperature (1.20 psi / °F).
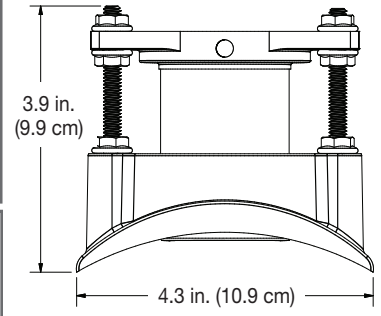
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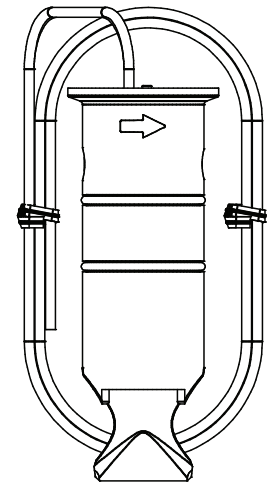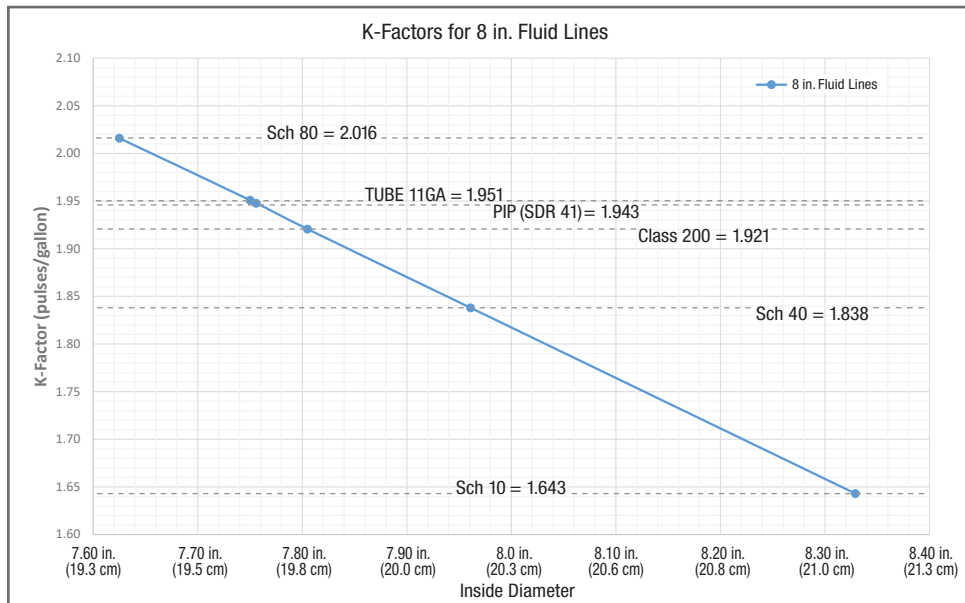
K-FACTORS K-Value Formula (Turf Controller) = 60 / K-Factor

K-Factors for 6 in. Fluid Lines

Y-axis: K-Factor (pulses/gallon) — 2.60 to 4.00
X-axis: Inside Diameter — 5.70 in. (14.4 cm) to 6.40 in. (16.2 cm)

Legend: 6 in. Fluid Lines

- TUBE 11GA = 3.698
- Sch 80 = 3.684
- PIP (SDR 41) = 3.588
- Class 200 = 3.403
- Sch 40 = 3.316
- Sch 10 = 2.962

K-Factors for 8 in. Fluid Lines

Y-axis: K-Factor (pulses/gallon) — 1.60 to 2.10
X-axis: Inside Diameter — 7.60 in. (19.3 cm) to 8.40 in. (21.3 cm)

Legend: 8 in. Fluid Lines

- Sch 80 = 2.016
- TUBE 11GA = 1.951
- PIP (SDR 41) = 1.943
- Class 200 = 1.921
- Sch 40 = 1.838
- Sch 10 = 1.643

K-Factors for 10 in. Fluid Lines

Y-axis: K-Factor (pulses/gallon) — 0.80 to 1.25
X-axis: Inside Diameter — 9.50 in. (24.1 cm) to 10.50 in. (26.6 cm)

Legend: 10 in. Fluid Lines

- Sch 80 = 1.217
- PIP (SDR 41) = 1.156
- TUBE 11GA / Class 200 = 1.135
- Sch 40 = 1.016
- Sch 10 = 0.840

DIMENSIONS

5.3 in. (13.4 cm)

SADDLE - TOP VIEW

3.9 in. (9.9 cm)

4.3 in. (10.9 cm)

SADDLE - FRONT VIEW

Ø 1.98 in. (5.0 cm)

1.0 in. (2.5 cm)

Ø 1.20 in. (3.0 cm)

QS200 INSERT

K-Factors for 12 in. Fluid Lines

K-Factor (pulses/gallon)

- Sch 80 = 0.929
- Class 200 = 0.880
- PIP (SDR 41) = 0.849
- TUBE 11GA = 0.816
- Sch 40 = 0.760
- Sch 10 = 0.622

12 in. Fluid Lines

Inside Diameter

| 11.25 in. (28.6 cm) | 11.45 in. (29.0 cm) | 11.65 in. (29.6 cm) | 11.85 in. (30.0 cm) | 12.05 in. (30.6 cm) | 12.25 in. (31.1 cm) | 12.45 in. (31.6 cm) |

SADDLE FAMILY LINE-UP *(Shown on pipe. Pipe not included.)*