

FLOMEC® QS200

INSTALLATION GUIDE

The FLOMEC QS200 provides a robust ultrasonic flowmeter for irrigation applications. The QS200 uses *Percentage of Reading (RD) Accuracy* which is superior to an impeller flow sensor/flowmeter that uses *Percentage of Full Scale (FS) Accuracy* ([download the FLOWMETER ACCURACY WHITE PAPER for more information on RD and FS information @ http://bit.ly/flomec-accuracy-wp](http://bit.ly/flomec-accuracy-wp)). Also, the QS200 does not have any moving wetted parts, so there is no need to replace damaged parts.

This meter uses a two-wire system that is connected to an irrigation controller's flow sensor input (or decoder's flow sensor port) and meets the cable distance recommended by Irrigation controller/decoder manufacturers. The two-wire system communicates via a square wave pulse that is converted to flow rate at the controller (identical to an impeller flow sensor communicating to irrigation controller/decoder). The QS200's power is supplied through these same two wires by the controller's/decoder's flow sensor input/port (voltage range of 7.5 V_{DC} to 36 V_{DC}).

IMPORTANT:

Read the General Safety Instructions for this flowmeter (see last page) before beginning any installation procedures.

GENERAL INSTALLATION PROCEDURE

The following lengths of straight pipe should be connected to the QS200 FLOMEC Tee (or NON-FLOMEC Tee):

- 10 times the pipe's inner diameter upstream of the meter
- 5 times the pipe's inner diameter downstream of the meter

The pipe needs to be full of irrigation water with no air inside. Built-up sediment on the QS200's transducers or large debris can greatly hinder the meter's performance. Keep the following in mind when installing:

- Install QS200 at an angle as shown in Figure 1a.
- 1 inch pipe installations will need a larger angle of 45 degrees.
- Flow direction arrows on the QS200 insert must match flow direction of water through the pipe (see Figure 1a).
- FLOMEC Tee is bidirectional for flow (the QS200 insert **IS NOT** bidirectional - the flow direction matters).
- Flow direction of the QS200 should be horizontal or upward. **DO NOT** install flowmeter in a downward flow direction, to avoid partially filled pipes (see Figure 1b).
- When installing below ground, install meter in a valve box with a thick layer of gravel below the meter.
- **DO NOT** direct bury QS200 flowmeter.
- If using a Non-FLOMEC Tee, verify the QS200 insert physically fits into the Non-FLOMEC Tee.
- **DO NOT** pull on the QS200 wires under any circumstances.
- Confirm that the Controller/Decoder flow sensor input (or port) will supply the QS200 two-wire meter with the appropriate power (7.5 V_{DC} to 36 V_{DC}).



GENERAL INSTALLATION PROCEDURE (continued)

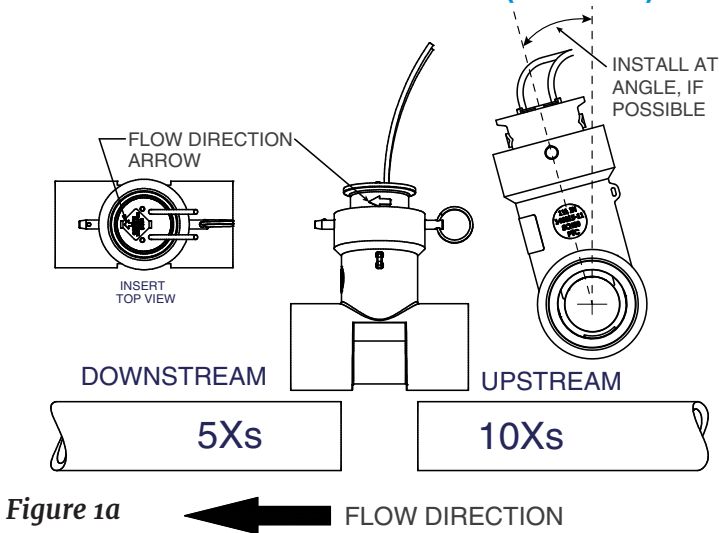


Figure 1a

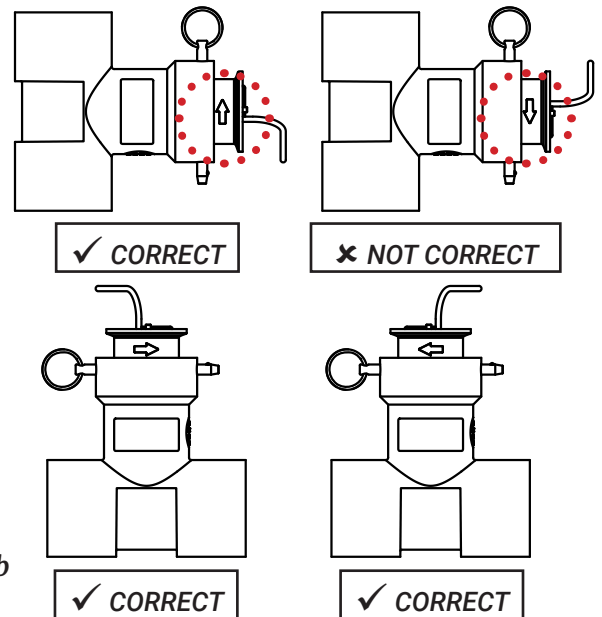


Figure 1b

NOTE: It is recommended to install Tee at an angle. The water lines are not supposed to have air in them, however, sometimes very minute pockets of air can get trapped in the QS200. Installing at an angle helps reduce the consequences of this issue. **IMPORTANT:** The 1 inch line size FLOMEC® Tee should be installed at a 45 degree angle.

TEE INSTALLATION (FLOMEC TEE ONLY)

1. Remove all burrs from inner and outer diameter of PVC pipe that will be connected to the FLOMEC Tee. Also, remove inner diameter burrs from FLOMEC Tee (See Figure 2).
 - **NOTE:** Installation drawings show the QS200 insert in the Tee, but it is recommended to install the Tee first without the QS200 insert inside. This will keep excess PVC cement off of the QS200 insert.
2. Clean and apply Primer to pipe ends and tee sockets (See Figure 3).

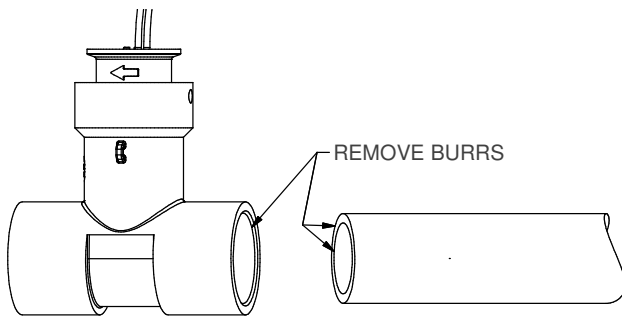


Figure 2

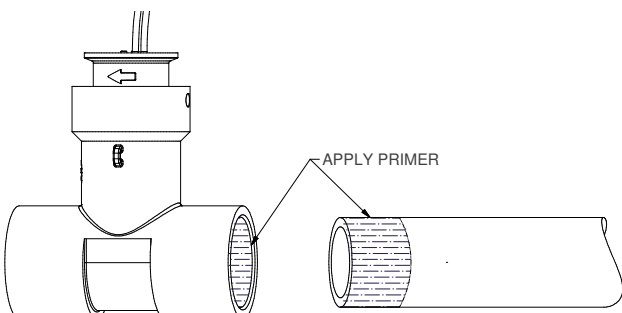


Figure 3

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 4).
 - **NOTE:** Only use PVC cement – Do not try other PVC alternatives.
 - **NOTE:** Make sure Tee is tilted at required angle for QS200 (1 inch pipe installations will need a larger 45 degree angle tilt).
4. Hold the cemented parts together for a minimum of 30 seconds.

Below ground installations should be installed with a valve box with a minimum of 10 inches thick (deep) layer of gravel directly underneath the QS200. The gravel shall be through the entire length and width of the valve box. Valve box extensions may be needed depending on depth.

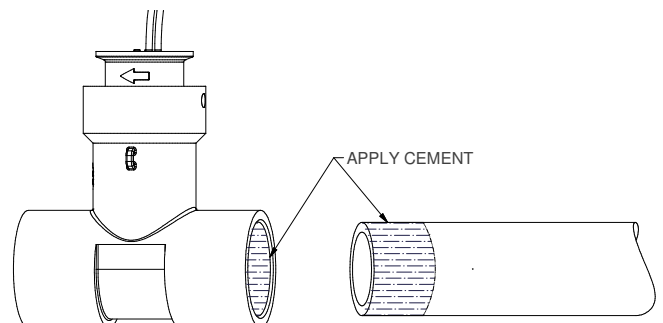


Figure 4

INSTALLING QS200 METER INTO AN EXISTING TEE INSTALLATION

Remove old insert from tee (Retrofit instructions only – Verify tee is compatible before installation)

1. Turn off water, and alleviate pressure in the system.
2. Clean all dirt and debris away from the immediate area and the top of the old insert, then pull out the quick release pin from the meter (see Figure 5).

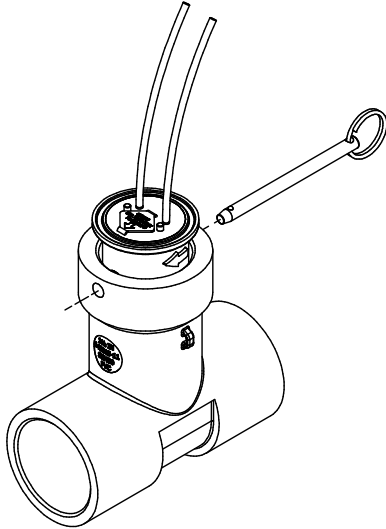


Figure 5

3. 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 6).

NOTE: The FLOMEC® Multi-Tool (p/n 146055-501) can be used to make removal of old insert easier (see Figure 10).

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

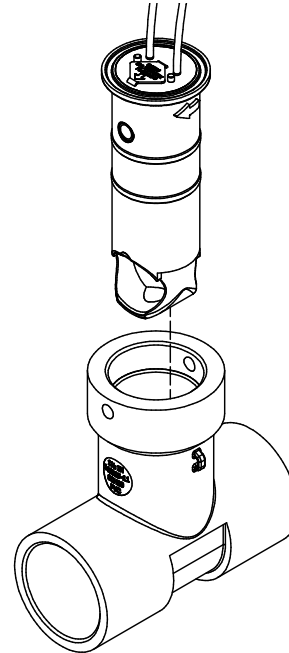


Figure 6

Install new or replacement insert into tee (Both for new installation and retrofits)

1. The Tee insert bore must be clean before installing the insert and the (2) black O-rings on the insert should be fully lubricated.
 - a. 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.
2. Orient the insert over the insert bore so the arrow on the insert is pointing in the direction of flow.

3. Insert the QS200 straight down into the Tee.
4. Push down on the insert flange and twist slightly to install. Then align the retaining pin holes in the insert with the holes in the Tee (see Figure 7).

NOTE: The FLOMEC Multi-Tool (p/n 146055-501) can be used to make installing new insert easier (see Figure 11).

5. Replace the quick release pin (see Figure 8).
6. Using the splicing and wiring information (see **QS200 Wiring Installation** section), connect the wiring from the new insert to the wiring cable of the controller.

INSTALLING QS200 METER INTO AN EXISTING TEE INSTALLATION (continued)

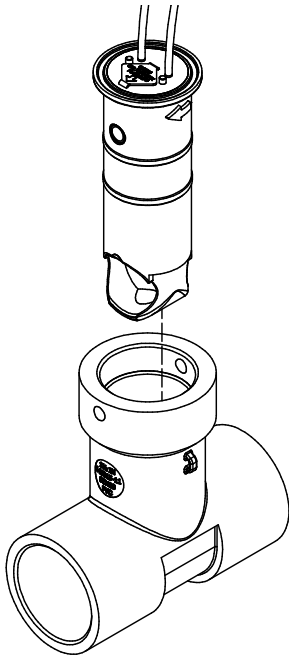


Figure 7

Using the FLOMEC® Multi-Tool

The multi-tool (see Figure 9) 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.

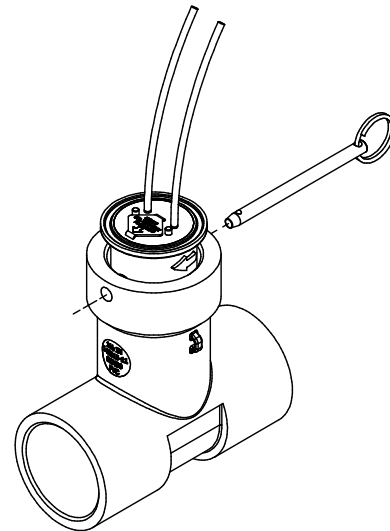


Figure 8

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.

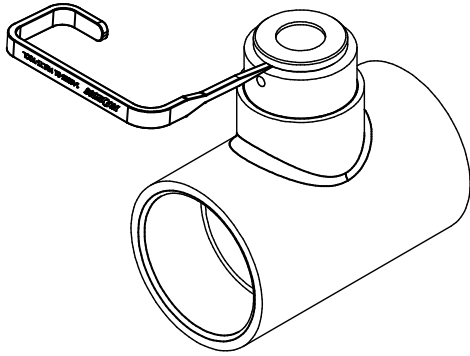
The multi-tool (P/N 146055-501) is available for purchase separately.



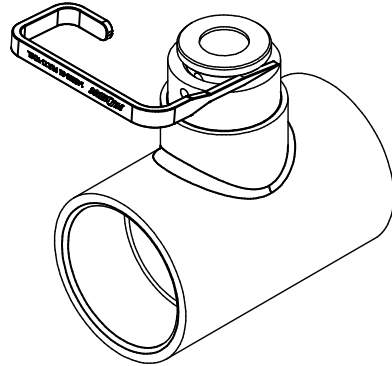
Figure 9

INSTALLING QS200 METER INTO AN EXISTING TEE INSTALLATION (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

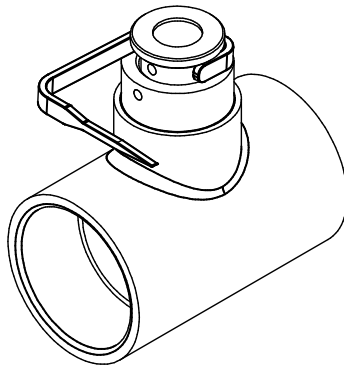
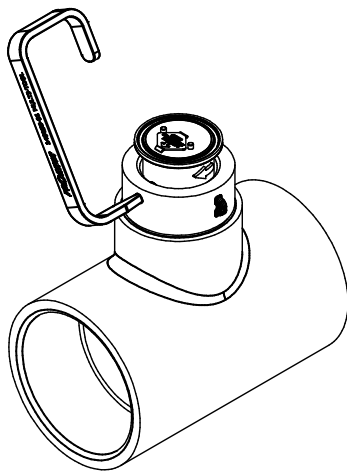
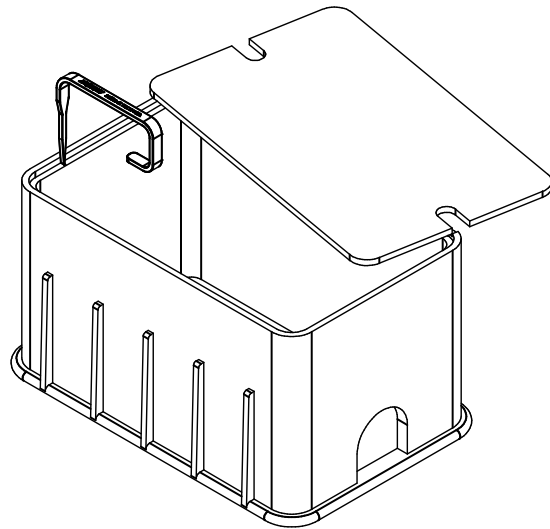


Figure 10

Install New QS200 Insert FLOMEC Multi-Tool



PIN HOLE ALIGNMENT
- For easy pin install



CLEAN LID GROOVE -
Remove dirt, roots, debris

Figure 11

QS200 WIRING INSTALLATION (Tee and Meter should be installed before splice connections)

Make sure wiring is only done on low DC voltage (7.5 V_{DC} to 36 V_{DC}). Make sure to follow all of the Controller/Decoder manufacturer's directions for electrical safety. Also, refer to the **General Safety Instruction** section provided in this document. **NOTE:** Please read this entire section before any physical wiring installation is started.

During this procedure DO NOT pull on the QS200 wires under any circumstances.

1. Locate wires on QS200. Red wire (+) and Black wire (-) are the only two wires on QS200.
2. 1 Pair - #18 AWG wire cable (Direct Burial) cable is recommended. Controller manufacturer may recommend thicker gauge wire for longer distance (which is fine since the recommended splice kit accepts thicker gauge wire sizes).
3. Document the specific cable wire colors that are being spliced to the QS200 Red (+) and Black (-) wires. This will help when connecting the other end of the cable to the controller (as described in Step 7 of this section).
4. 3M DBR/Y-6 splice kit (or equivalent) is recommended to splice connect the QS200 to the cable. Follow instructions (See Below 3M DBR/Y-6 Splice Instructions for QS200) on splice kit to ensure a good, solid, and waterproof connection is obtained.
5. Ensure that a service loop is provided at the flow meter in case future maintenance is needed.
6. Make sure not to puncture or splice the cable that goes from the meter to the controller/decoder (to prevent ground interference). Make sure cable length is within controller/decoder manufacturer's recommendation.
7. Connect the (+) and (-) ends (as described in Step 3 of this section) of the direct burial cable to the controller's/decoder's flow sensor input (or port) per controller/decoder manufacturer's direction. Keep in mind that the flow sensor input (typical designation for irrigation controller's flow meter/flow sensor input) or the port (typical designation for decoder's flow meter/flow sensor input) must be an input that can accept a flow sensor and provides power to the QS200 (7.5 V_{DC} to 36 V_{DC}).

3M DBR/Y-6 Splice Instructions for QS200

NOTE: Wiring diagram is shown in Figure 13.

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

NOTE: 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:

- a. Strip insulation $\frac{3}{4}$ in. (19 mm) (see Fig. 12a).

- b. With wire ends even, insert wires into the connector and tighten until secure (see Fig. 12b).

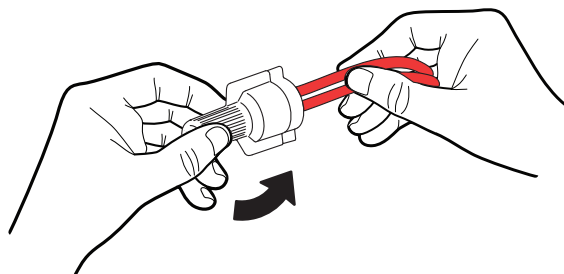


Figure 12b

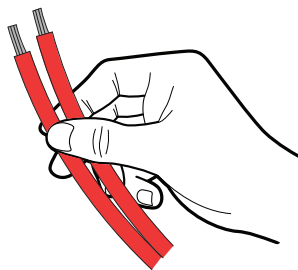


Figure 12a

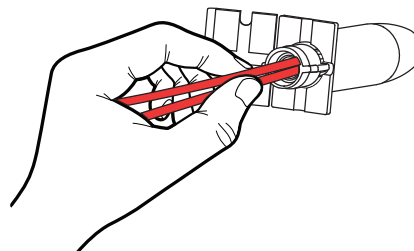


Figure 12c

- c. Insert the connector all the way into the tube until the connector rests on the bottom of the tube (see Fig. 12c).

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 (see Fig. 12d).

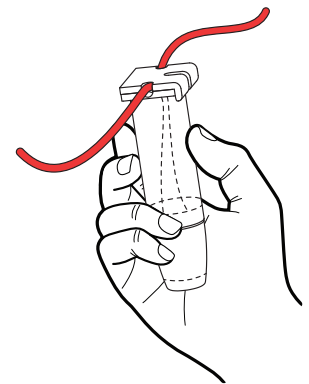


Figure 12d

QS200 WIRING INSTALLATION (continued)

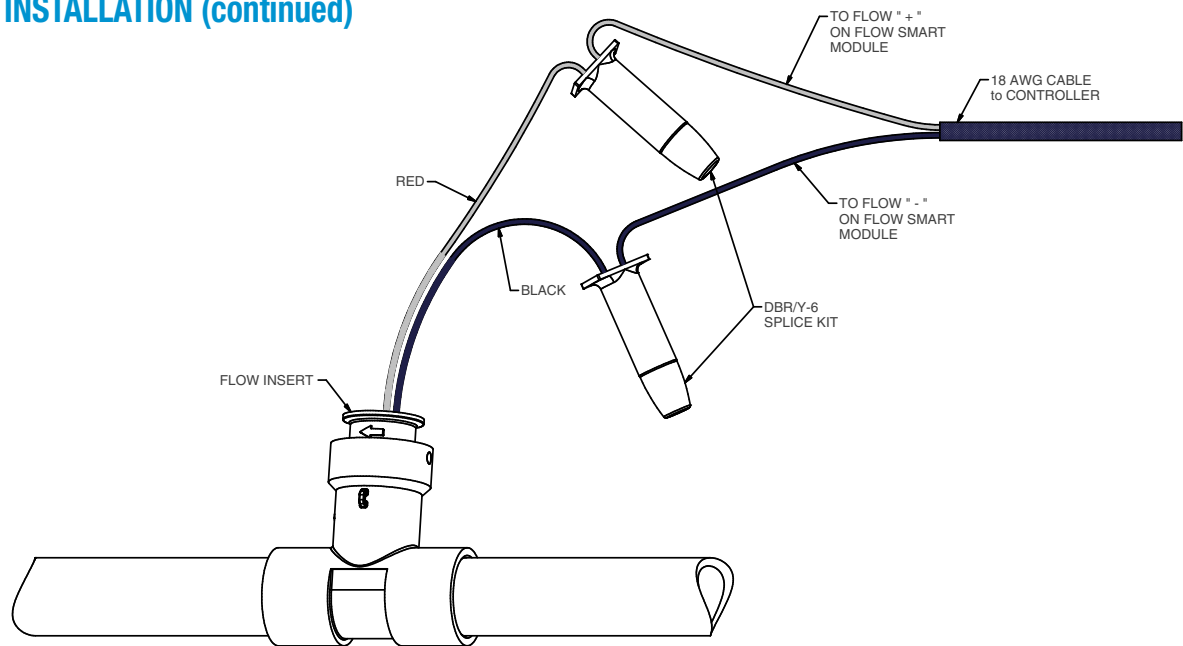


Figure 13

Calibration

Set K-factor and Offset per QS200 **FLOW INSERT SELECTION CHART** below (reference QS200 Data Sheet - FLOW INSERT SELECTION CHART - Download at: <http://flomec.net/downloads/qs200-data-sheet.pdf>). These calibrations will be configured in the irrigation controller.

NOTE: Most irrigation controllers will refer to devices as "flow sensor" instead of flowmeter.

Operation

1. Make sure line is full of water with no trapped air.
2. Flow meter may take a few minutes to start averaging out flow per irrigation controller displays.
3. It is recommended to monitor and observe stabilized flow rates before setting control limits.

INFORMATION RESOURCES

1. QS200 Owners Manual - Download at:
<http://flomec.net/qs200/downloads/qs200-owners-manual.pdf>

The QS200 Owner's Manual provides additional information:

- General Safety Instructions
- Specifications
- Assembly Drawing
- Operation/Trouble Shooting
- In-Depth Tee Retrofit Information
- Parts & Service
- Warranty (see last page)

2. QS200 Data Sheet - Download at:
<http://flomec.net/downloads/qs200-data-sheet.pdf>
3. QS200 Installation Detail (.pdf) - Download at:
<http://flomec.net/downloads/cad-models/qs200/qs200-installation-detail.pdf>
4. QS200 Installation Detail (.dwg) - Download at:
<http://flomec.net/downloads/cad-models/qs200/qs200-installation-detail.dwg>

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.

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

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

▲ 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.*

▲ CAUTION *Disconnect external power before attaching or detaching input or output wires.*

▲ 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.*

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

Wichita · Sydney

GREAT PLAINS INDUSTRIES



Great Plains Industries, Inc. / 888-996-3837

Great Plains Industries, Inc. Australia / +61 2 9540 4433

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