

Repair Instruction Manual

DigiTemp[®] 2

Digital Water Tempering System[®]



Disclaimer

The information contained in this manual is subject to change without notice from PVI Industries, LLC. PVI makes no warranty of any kind with respect to this material, including, but not limited to, implied warranties of merchantability and fitness for a particular application. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply. PVI is not liable for errors appearing in this manual, not for incidental or consequential damages occurring in connection with the furnishing, performance, or use of these materials.

IMPORTANT

Read this Manual BEFORE using this equipment. Failure to read and follow all safety and use information can result in death, serious personal injury, property damage, or damage to the equipment.

Keep this Manual for future reference.

IMPORTANT!

This manual must be maintained in a safe place in legible condition and given to the user by the installer for future reference.

⚠ WARNING!

Do NOT use matches, candles, flames, or other sources of ignition to check for gas leaks. Failure to heed this warning may result in death or serious injury.

Fluids under pressure may cause injury to personnel or damage to equipment when released. Be sure to shut off all incoming and outgoing water shutoff valves. Carefully decrease all trapped pressures to zero before performing maintenance.

Shut off all gas and electrical inputs to unit before performing any maintenance.

The exhaust vent pipe of the unit operates under a positive pressure and therefore must be completely sealed to prevent leakage of combustion products into living spaces.

⚡ ELECTRICAL HAZARD WARNING ⚡

This equipment operates on high-voltage and is subject to special hazardous operation guidelines. The safety equipment outlined below is not supplied with this boiler and is the responsibility of the high voltage electrical safety department at the site of use.

CONTENTS

1. INTRODUCTION	4
2. ACTUATOR	5
3. ACTUATOR CABLE.....	7
4. CHECK VALVES.....	8
5. ENDCAPS AND SHUTTLE	9
6. TAILPIECE REPLACEMENT	12
7. TEMPERATURE SENSOR.....	15
8. CABLE EXTENSIONS	16
9. DIGITAL SENSOR PACKAGE	17
10. FLOW SENSOR.....	20
11. REPAIR KITS.....	30

1. INTRODUCTION

Repair kits and optional feature kits for DigiTemp 2 and 2S are available for all mixing valve sizes.

Use the repair kits to service the degraded or nonfunctional components of the mixing valve.

For enhancements and conveniences, add on one or more of these optional features kits:

- Cable Extension for flexibility to locate the DigiTemp 2 control in a more convenient location separate from the mixing valve
- Digital Sensor Package including three temperature-pressure sensors to monitor hot inlet, cold inlet, and mixed water outlet (a separate four-sensor cable is available for recirculation.)
- Flow Sensor to support water measurement application (two types of clamp-on units are available.)
- NPT Tailpieces to facilitate installation flexibility

⚠ WARNING!

Do NOT use matches, candles, flames, or other sources of ignition to check for gas leaks. Failure to heed this warning may result in death or serious injury.

Fluids under pressure may cause injury to personnel or damage to equipment when released. Be sure to shut off all incoming and outgoing water shutoff valves. Carefully decrease all trapped pressures to zero before performing maintenance.

Shut off all gas and electrical inputs to unit before performing any maintenance.

The exhaust vent pipe of the unit operates under a positive pressure and therefore must be completely sealed to prevent leakage of combustion products into living spaces.

⚡ ELECTRICAL HAZARD WARNING ⚡

This equipment operates on high-voltage and is subject to special hazardous operation guidelines. The safety equipment outlined below is not supplied with this boiler and is the responsibility of the high voltage electrical safety department at the site of use.

⚠ WARNING!

As with any electrical product, always guard against the risk of fire, electric shock, and injury.

DigiTemp 2 must be powered down when parts are replaced on the mixing valve or when kits are installed.

Before opening control cover, shut down system, depressurize valve, and drain water from the line.

Always power down control by disconnecting 120V source at nearest switch, connection, or breaker panel.

Power up control only after parts are properly installed and mixing valve control completely reassembled.

Refer to DigiTemp 2 Installation, Operation, and Maintenance Manual for all safety and compliance information.

IMPORTANT!

Installation of optional flow sensor kits MUST be performed by qualified technicians, including licensed electricians and plumbers, following all manufacturer's instructions, complying with all local, state, federal and other governmental requirements, and with all building and construction codes and standards.

2. ACTUATOR

NOTE: The procedures apply to all mixing valve sizes.

Wear on the motor requires replacement of the actuator from time to time. The following procedures cover how to service the actuator.

Kit contents

- Actuator • Tube support • 4 Bolts
- Coupling • Power-encoder cable

Tools required

- Adjustable wrench • Allen wrench, size M5



Preparation

Always power down control by disconnecting 120V source at nearest switch, connection, or breaker panel.

Removing the Actuator

1. Disconnect larger ACTR connector from port underneath the actuator by depressing connector tab.
2. Disconnect smaller ENCD connector from recessed port on the actuator by depressing connector tab.
3. Disconnect cables from ACTR and ENCD ports on control unit by spinning connector collars counterclockwise.



Step 1



Step 2



Step 3

4. Use an adjustable wrench to turn brass nut on actuator clockwise as far as it can go then back off 5 full turns.
5. Use an Allen wrench to unscrew four bolts joining actuator to mixing valve; two on one side, two on the other.
6. Shift the actuator assembly to unhook the coupling.
7. Remove the actuator and properly discard it later.



Step 4



Step 5



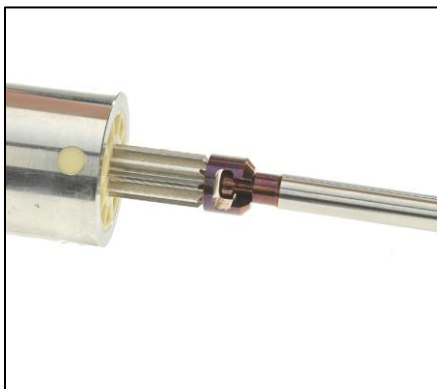
Step 6

Installing the Replacement Actuator:

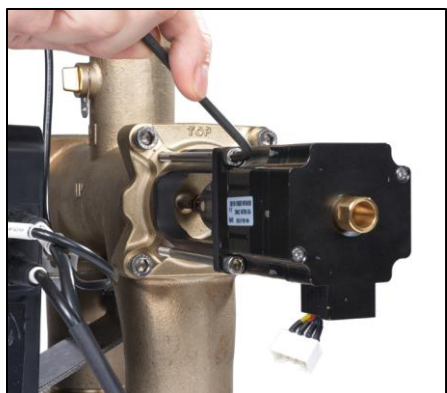
1. Slide the replacement actuator into the tube support.
2. When installing the actuator on the valve body, align the notch in the coupling with the groove on the shaft and swivel the actuator so that the groove slides into the coupling.
3. Make sure the cable connectors on the actuator are facing down so cables runs underneath the actuator. Insert each of the new four bolts through the tube support and into the valve body.
4. Tighten the bolts so the actuator is seated firmly in the tube support and valve body. Then attach the actuator cable to the motor and the control unit to finish. (See steps 1, 2, and 3 for visual aid.)



Step 1



Step 2



Step 3



Step 4

NOTE: During initial power-up, the actuator makes noise as the valve recalibrates. This noise is normal and stops once the DigiTemp 2 user interface has finished loading.

3. ACTUATOR CABLE

NOTE: The procedures apply to all mixing valve sizes.

The power-encoder cable connects the control to the actuator. Replace immediately when damaged.

Kit contents: Power-encoder cable

Tools required: None

Preparation

Always power down control by disconnecting 120V source at nearest switch, connection, or breaker panel.

Remove existing cable from control unit and actuator. Remove each circular connector by spinning connector collar counterclockwise until loose and pulling the plug out. The connections on the actuator side of the cable are removed by depressing locking tabs and pulling connectors free. Discard cable properly as electronic waste.



Unque Connectors

The control ports and cable connectors (TEMP, ACTR, and ENCD cables shown) are keyed to ensure proper connection of each cable to the designated port.

Replacing the Actuator Cable

1. Attach the smaller ENCD connector to the recessed port on the actuator.
2. Attach the larger ACTR connector to the port that hangs underneath the actuator.
3. Connect the cables to the ACTR and ENCD ports on the control unit. The cables are labeled MOTOR and ENCODER and the connectors are keyed to fit only the designated ports.



Step 1



Step 2



Step 3

4. CHECK VALVES



¾" - 1"



1½"



2"

NOTE: The procedures apply to all mixing valve sizes.

Both the hot inlet and the cold inlet contain a check that must be replaced periodically to maintain the elimination of in-valve cross connections. Each inlet tailpiece has a union connection to the valve body. If the installer placed a second union on the piping to the inlet, then only the tailpieces need to be removed to service the checks. The mixing valve can remain mounted. Otherwise, the mixing valve must be dismantled to service to checks.

Before starting, make sure the replacement check valve kit matches the size of the mixing valve. The kit is available in sizes ¾" to 1", 1½", and 2".

Kit contents: 2 Check valves with check O-rings attached; 2 Inlet O-rings

Tools required: Pipe Wrench

Installation Tip: For each check, there are two O-rings: one is part of the check; the other is to seal the inlet union joint.

IMPORTANT: Use O-rings from kit to complete parts replacement. Never reuse O-rings even if there is no visible wear.

Replacing the inlet check valve

1. Using a pipe wrench, loosen the tailpiece union nuts to remove the inlet tailpieces.
2. Stick a finger into check plunger and grab side of the check to pull it out. Discard the check and both O-rings.
3. Align the replacement check with the ridges in the inlet and push the check in. The inlet O-ring must sit against the check and the valve body, as shown in steps 1 and 2.
4. Reinstall the tailpiece by placing the union surface of the inlet against the inlet O-ring and sliding the union nut into place. Tighten the nut enough to seal the joint. Repeat the procedure on the other inlet.

5. ENDCAPS AND SHUTTLE

NOTE: This procedure applies to all mixing valve sizes. Use it to replace either the endcaps or the shuttle or to replace both endcaps and shuttle at the same time.

Periodically, new endcaps are needed to replace a leaking cap or internal seal. In this kit, the two endcaps come preassembled but are not identical. The endcap with the side openings is designed to fit the actuator. Replace the endcap on the actuator side first, then replace the endcap on the other side.

Before starting, make sure the replacement endcap kit matches the size of the mixing valve. The kit is available in sizes ¾" to 1½" and 2".

Kit Contents

- 2 Endcaps
- 2 Seats (one with cutout to fit the actuator)
- 2 O-rings
- 8 Screws



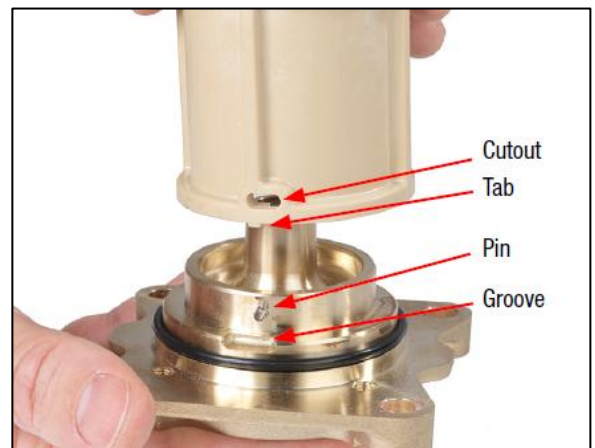
Shuttle Kit



The shuttle kit is available in sizes ¾" to 1½" and 2".

Kit contents: Shuttle only

Tools required: ¼" Allen key

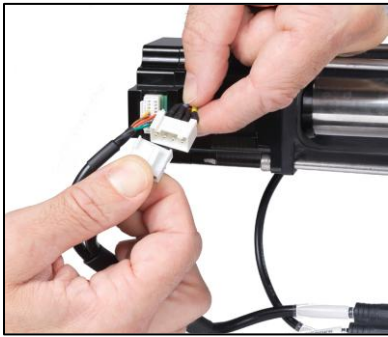


Endcap assembly

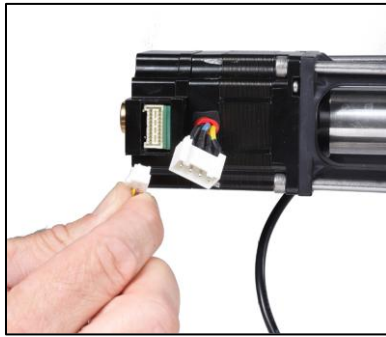
If endcap and seat have separated, rejoin pieces by fitting tab on seat into groove on the endcap. Insert two endcap pins into the cutouts on the seat, then rotate seat to lock it onto the endcap.

Detaching the Actuator and the Endcap

1. Disconnect larger ACTR connector from port underneath the actuator by depressing connector tab.
2. Disconnect smaller ENCD connector from the recessed port on actuator by depressing connector tab.
3. Disconnect cables from ACTR and ENCD ports on control unit by spinning connector collars counterclockwise.
4. Use an adjustable wrench to turn brass nut on the actuator clockwise as far as it can go then back off 5 full turns.
5. Use an Allen wrench to unscrew four bolts joining the actuator to the mixing valve.
6. Shift the actuator assembly to unhook the coupling.
7. Remove the actuator and set it aside.
8. Loosen the four bolts on the endcap and remove it from the valve body.
9. Pull the endcap and shuttle out of the valve body and separate them. NOTE: Discard all parts of the used endcap assembly and/or the shuttle, if also being replaced.



Step 1



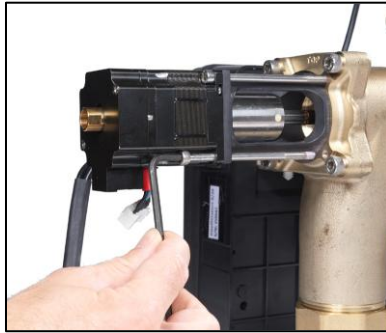
Step 2



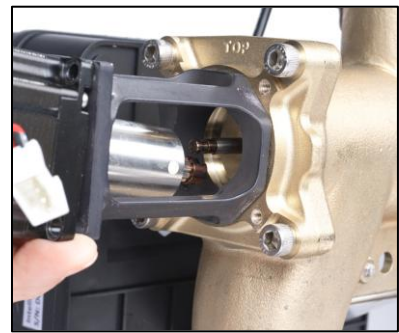
Step 3



Step 4



Step 5



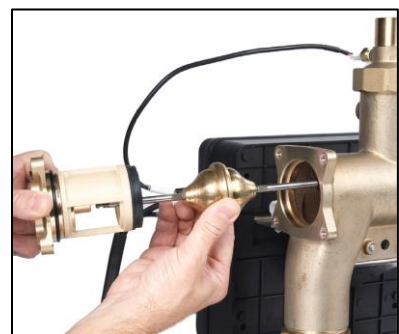
Step 6



Step 7



Step 8

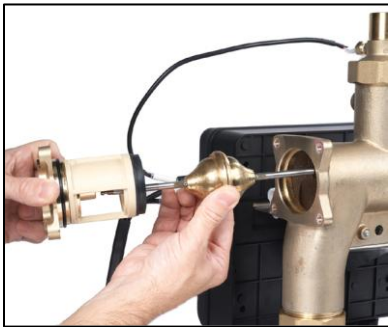


Step 9

Installing the Endcap Replacement and Shuttle

NOTE: This procedure applies to endcap replacement on the actuator side of the mixing valve. Replacing the endcap on the other side of the valve is simpler. Follow the relevant steps of this procedure and the preceding one for aid.

1. Insert the new shuttle into the preassembled endcap, making sure the grooved end of the rod is located outside the valve body.
2. Install the endcap into the mixing valve while carefully aligning the shuttle rod so that it mates and inserts into the far side endcap. (Make sure the TOP marking on the endcap is located on the mixing outlet side of the valve.) Reinstall and tighten the four bolts to seat the endcap in place. Then pull the shuttle rod out through the endcap far enough to connect to the actuator. **NOTE:** Insert endcap-seat unit at one o'clock angle then rotate unit counterclockwise to 12 o'clock to line up bolt holes. This helps hold the unit together during installation.
3. Slide the actuator into the tube support.
4. When installing the actuator on the valve body, align the notch in the coupling with the groove on the shaft and swivel the actuator so that the groove slides into the coupling.
5. Make sure the cable connectors on the actuator are facing down so cables run underneath the actuator. Then insert each of the new four bolts through the tube support and into the valve body.
6. Tighten the bolts so the actuator is seated firmly in the tube support and valve body. Then attach the actuator cable to the motor and the control unit to finish. (See steps 1, 2, and 3 for visual aid.)



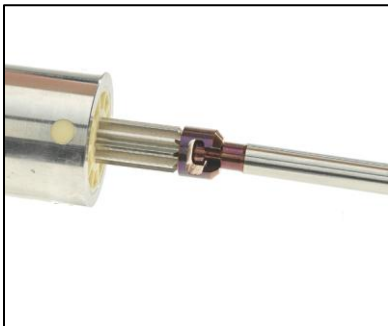
Step 1



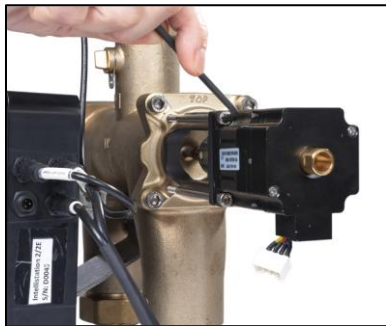
Step 2



Step 3



Step 4



Step 5



Step 6

6. TAILPIECE REPLACEMENT



NOTE: This procedure applies to all mixing valve sizes.

The standard mixing valve tailpieces (two inlets and one outlet) can be changed from standard press/sweat fittings to NPT threaded fittings. The kit includes all three replacement tailpieces and is available in these four pairings of inlet-outlet connection sizes:

- ¾" inlet, 1" outlet
- 1" inlet, 1¼" outlet
- 1½" inlet, 2" outlet
- 2" inlet, 2½" outlet

Three tailpiece NPT kit contents

- 2 Inlets, each with attached port plug, O-ring, and retaining clip
- 1 Outlet
- 2 Inlet O-rings
- 1 Outlet O-ring

Individual tailpiece press/sweat kit contents

- Inlet: 1 inlet tailpiece with attached port plug, O-ring, and retaining clip, plus 1 inlet tailpiece O-ring
- Outlet: 1 outlet tailpiece and 1 outlet tailpiece O-ring

Tools required

- Crescent® wrench
- Screwdriver

Installation tips

- Be sure the replacement tailpieces are the correct size for the mixing valve.
- Check that each assembled inlet tailpiece has been assembled with a plug, clip, and plug O-ring. At the tailpiece-valve connection points, inspect O-rings for damage. Use the O-rings size. Inlet and outlet O-ring sizes are different.
- When removing the original fittings from the mixing valve, keep temperature sensors and mounting nuts nearby. These parts must be reattached when the replacement tailpieces are installed.
- When changing tailpieces, ensure that the temperature sensor ports on the outlet and inlet tailpieces are facing forward in the same direction as the control display.

Attaching the Outlet Tailpiece

1. Disconnect the sensor cable then unscrew the temperature sensor from the outlet tailpiece with the Crescent wrench and set the sensor aside.(For more information, see the Temperature Sensor procedure.)
2. Remove the outlet tailpiece and set the mounting nut aside for reuse.
3. Examine the O-ring at the valve-tailpiece connection point and replace it if necessary.
4. Insert replacement tailpiece through mounting nut. Position replacement outlet tailpiece onto valve and O-ring then tighten mounting nut. Make sure port on the tailpiece is facing same direction as control display.
5. Reinstall the temperature sensor and tighten the connection with the Crescent wrench.
6. Reattach the cable to the sensor.

NOTE: For additional instructional and visual aid, see **Temperature Sensor** procedure.



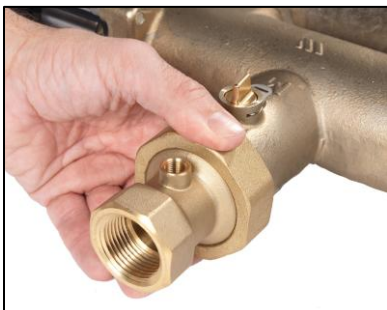
Step 1



Step 2



Step 3



Step 4



Step 5



Step 6

Attaching the Inlet Tailpiece

1. Start with either inlet tailpiece and remove the retaining clip and the plug.(For instructions on plug removal, see the Digital Sensor Package procedure.
2. Dig out the O-ring with a screwdriver or another tool.
3. Loosen the inlet tailpiece nut and remove the tailpiece from the valve and set the mounting nut aside.
4. Examine the O-ring at the valve-tailpiece connection point and replace it if necessary, then reinsert the parts making sure the inlet O-ring sits against the check and the valve body.
5. Insert the replacement tailpiece through the mounting nut. Position the replacement outlet tailpiece onto the valve and O-ring then tighten the mounting nut. Make sure the port on the tailpiece is facing in the same direction as the control display.
6. Reassemble the plug and the mounting clip.(For instructions on installing the plug and clip, see the Digital Sensor Package procedure.

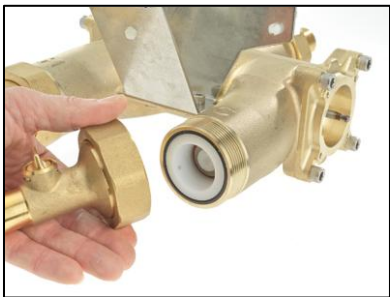
7. Push in the retaining clip with a screwdriver until it snaps into place. Repeat the on the other inlet tailpiece.



Step 1



Step 2



Step 3



Step 4



Step 5



Step 6



Step 7

7. TEMPERATURE SENSOR

NOTE: This procedure applies to all mixing valve sizes.

The main temperature sensor is an analog device. The NPT threaded sensor fits the port on the outlet tailpiece. The keyed connector on the sensor cable ensures proper connection to the control unit.

Kit contents

- Analog temperature sensor
- Sensor cable

Tools required

- Adjustable wrench
- Thread sealant or tape

Installation tips

- Always power down control before replacing sensor and sensor cable. Power up only after both parts have been properly installed.
- Properly discard all used parts.

Removing the Sensor Cable and Sensor

1. Detach the sensor cable from the TEMP port on the control unit.
2. Disconnect the cable from the analog temperature sensor by depressing the connector tab.
3. Use an adjustable wrench to unscrew the sensor from the port.



Step 1



Step 2

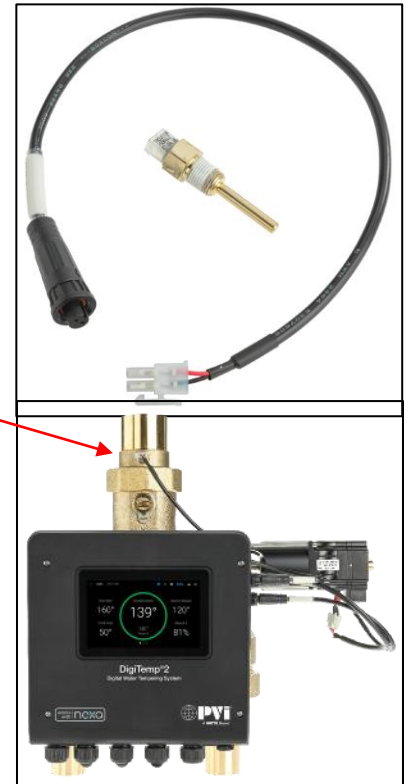


Step 3

Replacing the Sensor and Sensor Cable

1. Apply any required sealant or tape to the new sensor threads only.
2. Insert new sensor stem into sensor port on outlet tailpiece and tighten with adjustable wrench.
3. Attach the sensor cable to the sensor.
4. Connect the other end of the cable to the TEMP port on the control unit and tighten by spinning the connector collar clockwise.

Quick Response
Temp Sensor



8. CABLE EXTENSIONS

NOTE: This procedure applies to all mixing valve sizes.

The cable extensions kit allows the control unit to be mounted separately from the mixing valve. With the cable extensions, the distance between the control unit and the mixing valve can be increased by 6 feet. The four extensions lengthen the standard cables for the Digital Sensor Package, bundled actuator power and encoder cords, and analog temperature sensor. Each cable extension is labeled and the connectors are keyed for mistake-proof installation.

Kit contents

- DSP cable extension
- Actuator power-encoder cable extensions
- Analog temperature sensor cable extension

Tools required: None

Preparation

Always power down the control before connecting the cable extensions.

Installation tip

For remote control mounting, remove the silver bracket from the mixing valve body and attach the bracket to another surface in a different location.

Installing the Cable Extensions

NOTE: The cable extensions can be installed in any order.

- Connect one end of the cable extension labeled MOTOR to the actuator cable then attach the other end of the extension to the ACTR port on the control unit.
- Connect one end of the cable extension labeled OUTLET TEMP to the standard analog temperature cable then attach the other end of the extension to the TEMP port.
- Connect one end of the cable extension labeled ENCODER to the encoder cable then attach the other end of the extension to the ENCD port.
- If the Digital Sensor Package is in use, connect one end of the cable extension labeled SENSORS to the standard DSP cable then attach the other end of the extension to the SENS port.



9. DIGITAL SENSOR PACKAGE

NOTE: This procedure applies to all mixing valve sizes.

The optional Digital Sensor Package includes three sensors attached to a connection cable for measuring temperature and pressure at the mixed outlet, the cold inlet, and the hot inlet. The four-sensor cable, if purchased, includes the capability to monitor recirculation.

Each sensor must be installed at a specific location on the valve so that it can be properly recognized by the control. The control unit includes a keyed 3-pin quick-connect port for the sensor cable labeled SENS. The illustration below shows the connection of 3 and 4 sensor cables.

Kit contents

- Factory tested cable with 3 or 4 sensors attached
- 2 Plastic clamps
- 3 or 4 O-rings
- 3 or 4 Retaining clips

Tools required

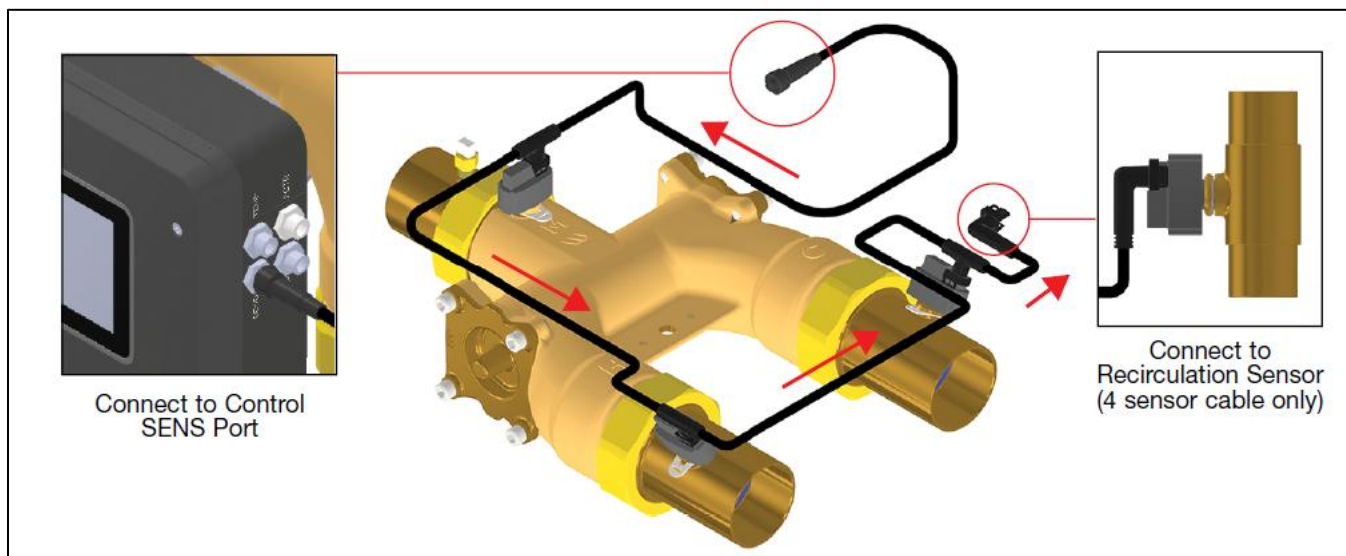
Flathead screwdriver

Preparation

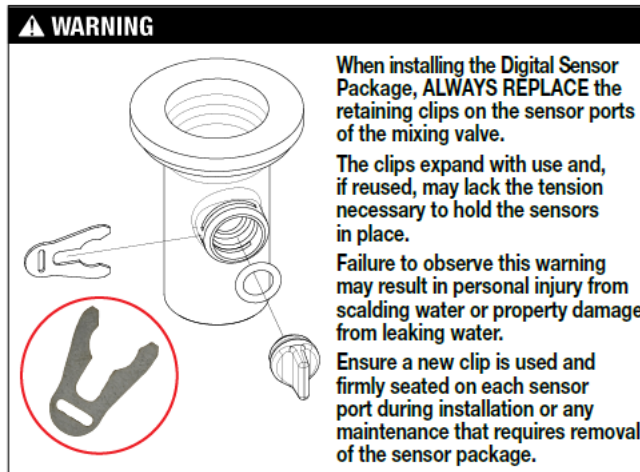
Always power down control unit before connecting sensor cable.

Installation tips

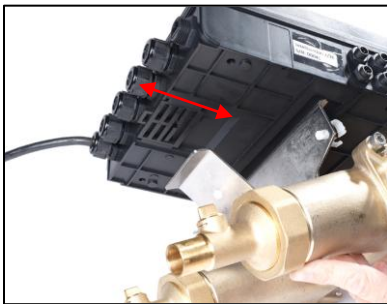
- The sensor package can be installed without dismounting the control unit.
- Each sensor port has a plug, retaining clip, and O-ring. Store port plugs to reinstall if sensors are ever removed.
- Use the O-rings provided in the sensor package. Never reuse the original O-rings. Do not install a new O-ring without first removing the original one.
- Make sure to remove the original retaining clips from the sensor ports and discard them.



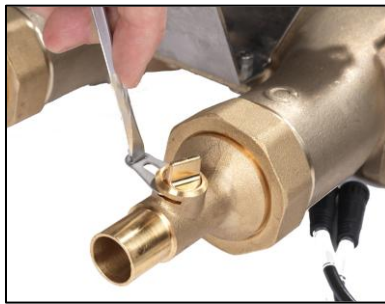
Preparing the Ports for Sensor Installation



1. If necessary, dismount control unit by pulling down the tab on the back of unit slightly, to allow unit to be pulled forward and upward off mounting bracket. The tab is located at the lower back side of the unit and sticks out slightly at the bottom. Store the unit in a safe location until you are ready to remount it.
2. Insert a screwdriver into the groove on the retaining clip and pull the clip out.
3. Pull the plug out of the port. Then extract the original O-ring if it was not removed with the plug. Use end of retaining clip or screwdriver to dig it out if necessary. Repeat steps 2 and 3 on the other sensor ports.



Step 1



Step 2



Step 3

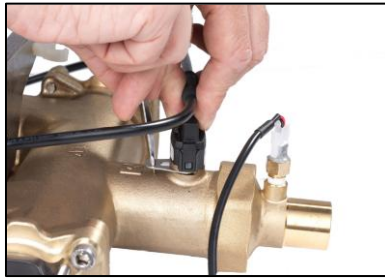
Installing the Sensor Cable

1. Unwind the cable and insert an O-ring onto each sensor, sliding it down to the base of the sensor stem.
NOTE: Do not place the O-ring in the groove on the sensor stem. The groove is for the retaining clip.
2. Install the first sensor on the mixed outlet. Insert the sensor with O-ring into the port as far as possible. While continuing to lightly press the sensor into the valve port, push in a retaining clip from the bottom to lock the sensor in place. Feel and listen for the click that signals proper installation.
3. Install the second sensor on the hot inlet (marked H) and push in the retaining clip from the left side. Feel and listen for the click that signals the sensor has been locked into place. Repeat to install the third sensor on the cold inlet (marked C), and optionally for the fourth sensor on the recirculation tee fitting.
4. Attach the plastic clamps to the mounting bracket to help manage and secure the cable.
5. Reattach the control unit to the mounting frame if it was dismounted. Hook the back of the unit onto the top of the mounting bracket first, then press the bottom of the unit into the bottom bracket. If necessary, pull down the release tab on the back of the unit slightly to guide the unit into the locked position.

6. Align the round end of the cable to the SENS port on the control unit, then push the cable in and tighten by spinning the connector collar clockwise. Reattach all other cables that may have been disconnected.
7. Do not place the O-ring in the groove on the sensor stem. The groove is for the retaining clip. If necessary, dismount control unit by pulling down the tab on the back of unit slightly, to allow unit to be pulled forward and upward off mounting bracket. The tab is located at the lower back side of the unit and sticks out slightly at the bottom. Store the unit in a safe location until you are ready to remount it.



Step 1



Step 2



Step 3



Step 4



Step 5



Step 6

10. FLOW SENSOR

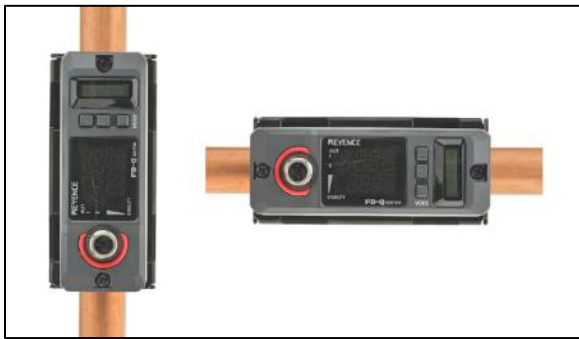
Ensure the sensor unit is installed at a suitable location on the pipe and is attached and aligned correctly to the pipe. Without proper installation and alignment, the sensor is unable to detect or read the flow of liquid accurately.

Mounting Guidelines

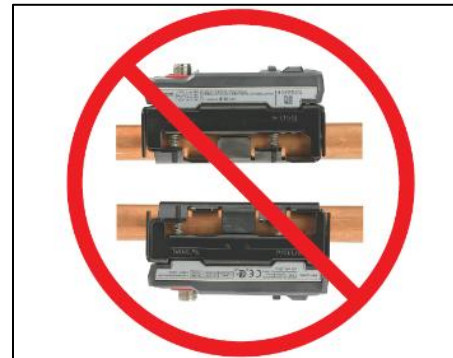
- Do not mount the unit near pumps, bends, valves, or joints. Locate the sensor on a straight section of pipe.
- Do not mount the unit where air pockets form such as the highest section of the pipe system.
- Do not mount the unit on rusty and dirty pipes. If such pipes cannot be avoided, try to clean up or file down the buildup before mounting the sensor.
- When mounting the unit on a vertical pipe, ensure that the liquid is flowing upward.
- Do not use the equipment in environments outside of the temperature specification in the OEM manual or environments with high electrical interference fields.
- On horizontal pipes, mount the unit so that the display is perpendicular to the floor. This avoids air pockets on the top of the pipe or debris settling on the bottom of the pipe.
- Confirm that the guides on the top and bottom brackets are pressed against each other.
- Do not strip the screws. Tighten the unit to the pipe by hand or with a drill that has a torque adapter.
- Be careful not to bend the pins on the unit, particularly the ports that go between the main unit and the subunit.

Recommended Pipe Length

To improve the accuracy of flow rate measurement, locate the flow sensor unit on a straight section of pipe. Use the specified pipe lengths in the following table to locate the unit the proper distance from bends, joints, diffusers, reducers, control valves, and pumps. (D: Outer pipe diameter.) Example: For a 90° bend, $L \geq 10D$ upstream means the length of pipe after the bend (or before the sensor) must be greater than or equal to 10 times the pipe diameter; $L \geq 5D$ downstream means the length of pipe after the sensor (or before the bend) must be at least 5 times the diameter of the pipe.



Correct vertical or horizontal mounting



Incorrect mounting on top or bottom of pipe

CHARACTERISTIC	STRAIGHT PIPING LENGTH REQUIRED BEFORE FLOW SENSOR ON UPSTREAM SIDE	STRAIGHT PIPING LENGTH REQUIRED AFTER FLOW SENSOR ON DOWNSTREAM SIDE
90° bend	Before bend $L \geq 10D$ $L \geq 10D$	$L \geq 5D$
Tee-joint	Before tee-joint, each branch $L \geq 10D$ $L \geq 50D$	$L \geq 10D$
Expanding pipe	Before diffuser $L \geq 0.5D$ Diffuser $L \geq 1.5D$ $L \geq 30D$	$L \geq 5D$
Shrinking pipe	$L \geq 10D$	$L \geq 5D$
Flow control valve	$L \geq 30D$	$L \geq 10D$
Pump	$L \geq 50D$	See above for requirements matching the pipe characteristic

Source: Japan Electric Measuring Instruments Manufacturers Association, Standard JEMIS032-1987.

Flow Sensor for Small Pipe Sizes ½" to 2"



Flow sensor, pipe sizes ½" to ¾"



Flow sensor, pipe sizes 1" to 1¼"



Flow sensor, pipe sizes 1½" to 2"



Power adapter with cable, optional cut-to-length power adapter cable, I/O cable, and cable glands

This clamp-on flow sensor kit is available for three ranges of pipe sizes: ½" to ¾", 1" to 1¼", and 1½" to 2".

Kit contents

- Flow sensor with mounting bracket
- Power adapter
- Power adapter cable
- Optional cut-to-length power adapter cable
- I/O cable
- 2 Cable glands

Tools required: #2 Phillips screwdriver

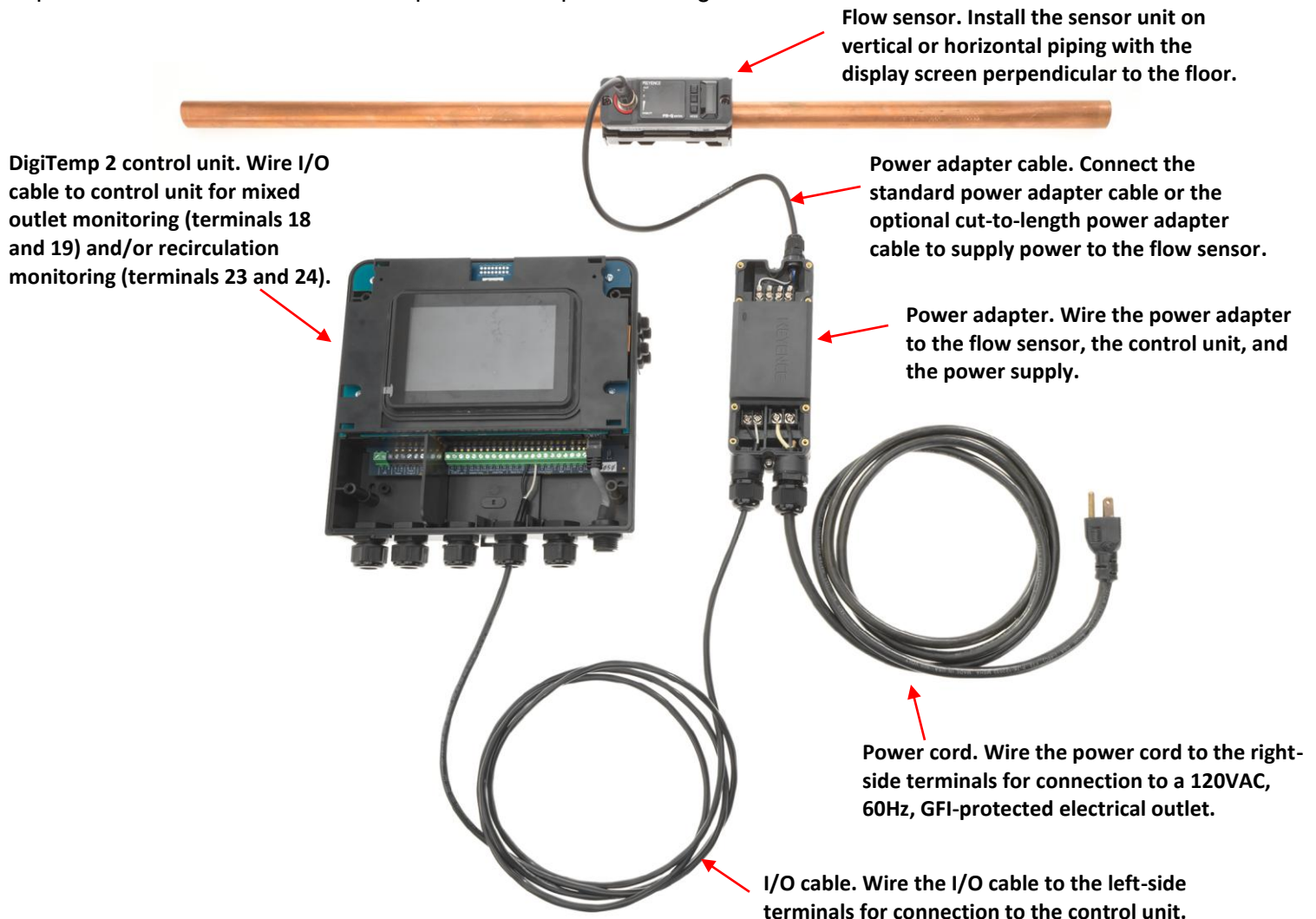
Requirements: Power cord, open wiring

Installation tips

- Each flow sensor comes with a mounting bracket that is adjustable for two pipe sizes. The mounting bracket consists of two pieces (upper bracket and base bracket) that join around a pipe for attaching the flow sensor unit.
- Rotate the base bracket 180 degrees to switch the diameter from one size to the other.
- To ensure the bracket is set for the correct diameter, place the upper bracket completely over the base bracket and check that the triangular indicator on each bracket is aligned one with the other.
- Note the complete alignment of the bracket when the two pieces are joined. On the pipe, the upper and base brackets must be installed end to end with no portion of either bracket extending beyond the other piece.
- Attach bracket on a straight section of pipe that is an adequate distance from bends, joints, or other pipe formations.
- Locate the sensor away from direct sunlight or any other intense light and away from the radiation of a heat source.
- Ensure the sensor is located where it will not be submerged in water or other liquid.
- Whether sensor unit is installed on vertical or horizontal plane, display screen must be perpendicular to floor.
- At least two of the four stability indicators on the display screen must show steady illumination for adequate detection of flow. Only one steady indicator or one blinking indicator means detection stability is low. If necessary, change the location of the sensor unit to another straight section of pipe away from bends and joints so that at least two steady indicators are illuminated.

Installing the Mounting Bracket and Flow Sensor

NOTE: The wiring of the flow sensor to the power source and to the control unit depends on the field configuration. A qualified electrical technician is required to complete this segment of the installation.



1. Place the base bracket on the back side of the pipe and align the upper bracket to it on the front side.
2. Join the brackets with the screws provided, tightening in a uniform manner to attain even mounting.
3. Connect either standard power adapter cable or optional cut-to-length power adapter to sensor unit.
4. Connect the other end of the standard power adapter cable or the optional cut-to-length power adapter to the DC terminal port of the power adapter. If using cut-to-length power adapter cable, remove cover of DC terminal block then disconnect and remove existing connector cable. Thread power adapter cable through port and attach WHITE wire to ANLG terminal, BLACK wire to N.C. terminal, BLUE wire to 0V terminal, and BROWN wire to 24V terminal. Reattach cover and tighten cable gland.
5. Remove the power supply cover to wire the I/O cable and the power cord.
Connect I/O cable to left-side analog output block: BLACK to ANLG terminal; WHITE to COM terminal.
Connect power cord to right-side AC power supply block: WHITE to N terminal; BLACK to L terminal.
Reattach cover and tighten cable gland.

6. Remove terminal cover from control unit and attach other end of I/O cable.

For mixed outlet monitoring, attach the I/O cable to the Outlet Flow terminals: BLACK wire to terminal 18 mA+ and WHITE wire to terminal 19 Com.

For recirculation monitoring, attach I/O cable to Recirc Flow 2 terminals: BLACK wire to terminal 23 mA+ and WHITE wire to terminal 24 Com.

Reattach cover and tighten cable gland. Plug power cord into a 120VAC, GFI-protected electrical outlet.



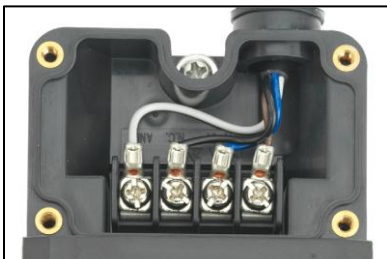
Step 1



Step 2



Step 3



Step 4



Step 5



Step 6

Configuring the Flow Sensor

Each flow sensor for small pipe sizes has three buttons for setting a configuration: Up arrow and Down arrow to scroll directionally through the menu structure and Mode to access the menu structure and choose a setting. The buttons are arranged vertically to the right of the display screen, as shown here.

 **Up arrow**  **Down arrow**  **Mode**

When powering on the flow sensor for the first time, press Mode + Up arrow for 3 seconds to access the initial setup menu then follow these steps:

1. Use the **Up** or **Down** arrow to switch between nPn and PnP. Press **Mode** to choose PnP.
2. Press and hold the **Up** and **Down** arrows simultaneously to access the Unit menu. Then use the **Up** or **Down** arrow to switch from liters (L) to gallons (G). Press **Mode** to choose G.
3. Use the **Up** or **Down** arrow to choose AnLG, which sets Channel 1 as the control output and Channel 2 as the analog output. Press **Mode** to confirm the selection.

4. To change the flow direction (dir), use the Up or Down arrow to set =r (left to right) or L= (right to left). Press **Mode** to confirm the selection.
5. Use the Up or Down arrow to choose the bore diameter of the piping connected to the sensor (PiPE). Press **Mode** to confirm the selection.
6. Use the **Up** or **Down** arrow to choose End then press **Mode** to exit the initial settings menu.

To return to a previous screen, press **Mode** + **Up** arrow simultaneously. To restore default settings and restart this initialization process, hold down **Mode** and press the **Up** arrow 5 times.

NOTE: For complete instructions on configuration of the sensor settings, refer to the OEM manual.

IMPORTANT: The flow sensor must now be turned on in the DigiTemp 2 application. Consult the IOM-P-DigiTemp 2 manual for settings.

Flow Sensor for Large Pipe Sizes 2½" to 5"



Flow Sensor, Pipe Sizes 2½ - 3"



Flow Sensor, Pipe Sizes 4 - 5"



Connector cable, I/O cable, cable glands

This clamp-on flow sensor kit is available for two ranges of pipe sizes: 2½" to 3" and 4" to 5".

Kit contents: Sensor connector cable, I/O cable, Cable glands

Tools required: #2 Phillips screwdriver

Requirements: Power cord, 3-prong, open wiring

Installation tips

- Attach the bracket on a straight section of pipe that is an adequate distance from bends, joints, or other pipe formations.
- Locate sensor away from direct sunlight or any other intense light and away from the radiation of a heat source.
- Ensure the sensor is located where it will not be submerged in water or other liquid.
- Whether sensor is installed on vertical or horizontal plane, the display screen must be perpendicular to floor.
- At least two of the four stability indicators on the display screen must show steady illumination for adequate detection of flow. Only one steady indicator or one blinking indicator means detection stability is low. If necessary, change the location of the sensor unit to another straight section of pipe away from bends and joints so that at least two steady indicators are illuminated.

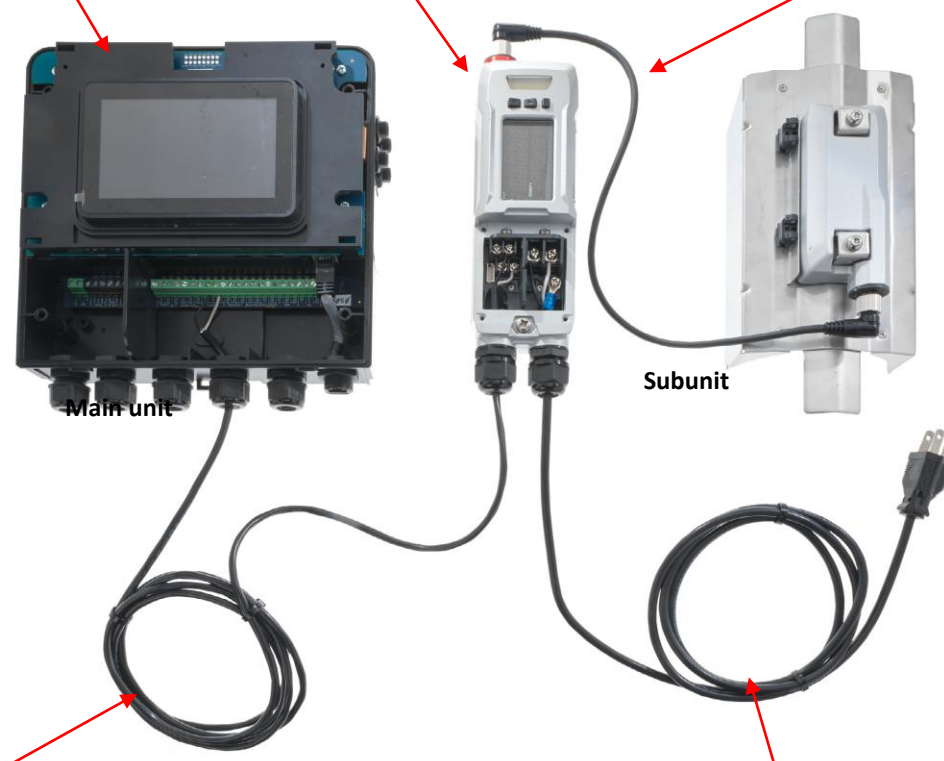
Install the mounting bracket and the flow sensor

NOTE: The wiring of the flow sensor to the power source and to the control unit depends on the field configuration. A qualified electrical technician is required to complete this segment of the installation.

DigiTemp 2 control unit. Wire the I/O cable to the control unit for mixed outlet monitoring (terminals 18 and 19) and/or recirculation monitoring (terminals 23 and 24).

Flow sensor. The flow sensor consists of the main unit (positioned on the front side of the pipe) and the subunit (positioned on the back side of the pipe), joined by the connector cable. Install sensor unit on vertical or horizontal piping with the display screen perpendicular to the floor.

Sensor connector cable. Join the main unit to the subunit with the connector cable.



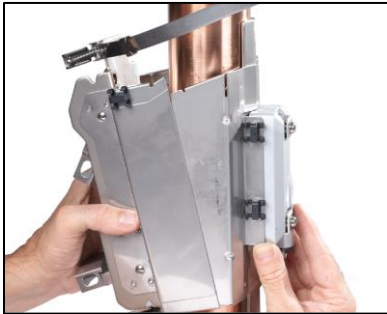
I/O cable. Wire the I/O cable to the left-side terminals to connect the flow sensor to the control unit for monitoring the mixed outlet or recirculation.

Power cord. Wire the power cord to the right-side terminals for connection to a 120VAC, 60Hz, GFI-protected electrical outlet.

Mount flow sensor 2½" to 3"

1. Place the base bracket and the upper bracket around the pipe.
2. Pull the belts tight around the pipe then close the tabs on the belts to join the base and the upper brackets.
3. Tighten the screws on the tabs to secure the brackets together.
4. Close the screw covers on each end.
5. Mount the sensor unit to the mounting bracket, securing it with the screws provided.
6. Remove rubber cover from connector port at top of unit and screw sensor connector cable onto main unit.
7. Thread connector cable through clamps on bracket and screw other end of cable onto subunit connector port.
8. Remove power supply cover and port plugs, then disconnect connector cable on left side and pull out cable.
9. Install a new cable gland on each port.

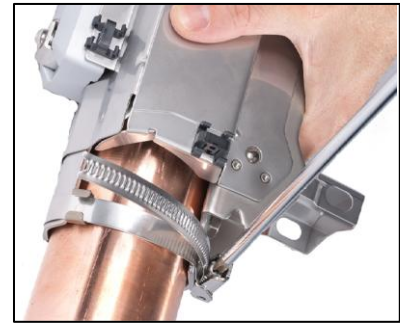
10. Thread the I/O cable through the left port. Thread the power cord through the right port.
Attach I/O cable to left-side I/O terminal block: BLACK to CH2 terminal (2); WHITE to COM terminal (4).
Attach power cord leads to right-side power supply terminal block: BLACK to L terminal (5); WHITE to N terminal (6); GREEN wire to protective grounding terminal (7). Reattach power supply cover.



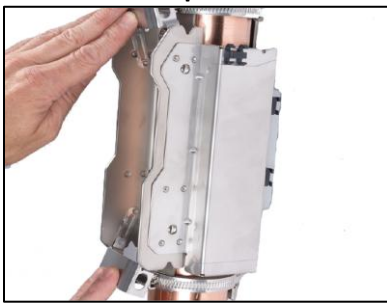
Step 1



Step 2



Step 3



Step 4



Step 5



Step 6



Step 7



Step 8



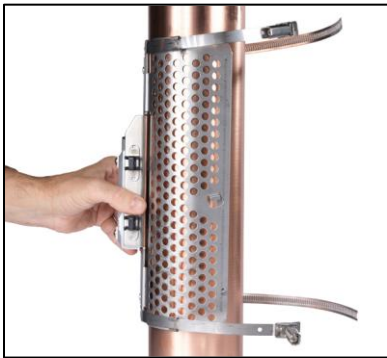
Step 9

11. Remove the terminal cover from the control unit and attach the other end of the I/O cable.
For mixed outlet monitoring, attach the I/O cable to the Outlet Flow terminal block: BLACK wire to terminal 18 mA+ and WHITE wire to terminal 19 Com.
For recirculation monitoring, attach the I/O cable to the Recirc Flow 2 terminal block: BLACK wire to terminal 23 mA+ and WHITE wire to terminal 24 Com.
Reattach the cover and tighten the cable gland.

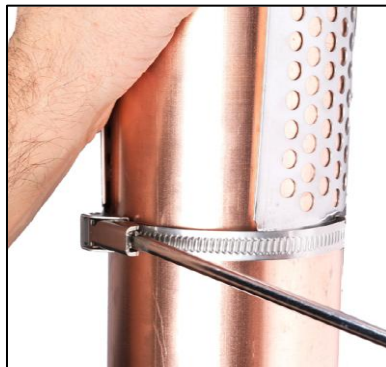


Mount flow sensor 4" to 5"

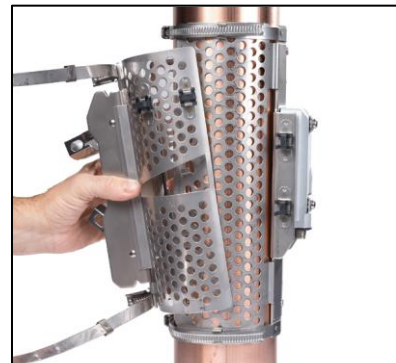
1. Place the base bracket with the subunit on the back side of the pipe.
2. Tighten the belt tab screws to lock the base bracket into place.
3. Add upper bracket to base bracket, locking belts down. Make sure small tabs on base bracket wrap around the angled edge of the upper bracket. Close the screw covers.
4. Mount the sensor unit to the retaining bracket, securing it with the screws provided.
5. Remove rubber cover from connector port at the top of the unit and screw on the sensor connector cable.



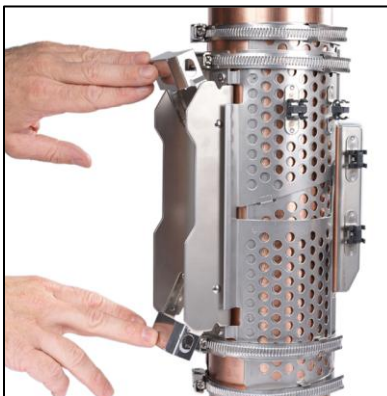
Step 1



Step 2



Step 3



Step 4



Step 5



Step 6

6. Thread connector cable through clamps on bracket and screw other end of cable onto subunit connector port.
7. Remove power supply cover and port plugs, then disconnect connector cable on left side and pull out cable.
8. Install a new cable gland on each port.
9. Thread the I/O cable through the left port. Thread the power cord through the right port
Attach I/O cable to left-side I/O terminal block: BLACK to CH2 terminal (2); WHITE to COM terminal (4).

Attach the power cord leads to the right-side power supply terminal block: BLACK wire to the L terminal (5); WHITE wire to the N terminal (6); GREEN wire to the protective grounding terminal (7).

Reattach the power supply cover.

10. Remove the terminal cover from the control unit and attach the other end of the I/O cable.

For mixed outlet monitoring, attach the I/O cable to the Outlet Flow terminal block: BLACK wire to terminal 18 mA+ and WHITE wire to terminal 19 Com.

For recirculation monitoring, attach the I/O cable to the Recirc Flow 2 terminal block: BLACK wire to terminal 23 mA+ and WHITE wire to terminal 24 Com.

Reattach the cover and tighten the cable gland.



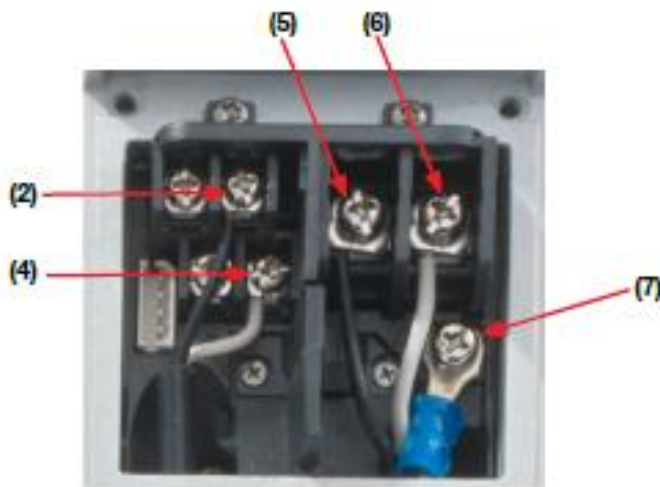
Step 7



Step 8



Step 9



Step 10



Step 11

Configure the sensor

Each flow sensor for large pipe sizes has three buttons for setting a configuration: Up arrow and Down arrow to scroll directionally through the menu structure and Mode to access the menu structure and choose settings. The buttons are arranged vertically to the right of the display screen, as shown here.



When powering on the flow sensor for the first time, set the configuration by following these steps:

1. Set the current date and time values by using the Up and Down arrows.
 - a. Input YEAR then press Mode to confirm the selection.
 - b. Input DATE (month and date) then press Mode to confirm the selection.
 - c. Input TIME then press Mode to confirm the selection.
2. Press Up or Down arrow to set channel 1 to OUT (Control output). Press Mode to confirm selection.
3. Press Up or Down arrow to set channel 2 to ANLG (Analog output). Press Mode to confirm selection.
4. Press Up or Down arrow to set sensor output to PNP. Press Mode to confirm the selection.
5. To set the flow direction (DIR), use the Up or Down arrow to set =R (from left to right) or L= (from right to left). Press Mode to confirm the selection.
6. To set the flow unit to gallons:
 - a. Press and hold Mode and the Down arrow simultaneously to access the measurement unit submenu, then use the Up or Down arrow to choose ON. Press Mode to confirm selection.
 - b. Press the Up or Down arrow to set the flow unit to G/MIN (gallons per minute). Press Mode to confirm the selection.
7. Set temperature unit to Fahrenheit or Celsius by using Up or Down arrow. Press Mode to confirm.
8. Use the Up or Down arrow to choose the bore diameter of the piping to which the sensor is connected (PIPE). Press Mode to confirm the selection.
9. Press Mode to confirm the configuration (SAVE) then press Mode again to exit to the menu (END).

NOTE: To input advanced settings for this series of flow sensors, refer to the DigiTemp manual for complete instructions.

IMPORTANT: The flow sensor must now be turned on in the DigiTemp 2 application. Consult the DigiTemp 2 manual for settings.

11. REPAIR KITS

CODE	MODEL NUMBER	DESCRIPTION
199994	RK-DT2 CONTROLLER KIT	Control Kit, Wi-Fi and BAS Capable, Fits All Valve Sizes
199995	RK-DT2 T&P 4 SENSOR KIT	Pre-piped System Digital Temperature and Pressure Sensor Kit with 4 Sensors
199996	RK-DT2 FLOW KIT 1/2–3/4	Flow Sensor Kit for Pipe Sizes ½ IN to ¾ IN, Clamp on
199997	RK-DT2 FLOW KIT 1–1 1/4	Flow Sensor Kit for Pipe Sizes 1 IN to 1¼ IN, Clamp on
199998	RK-DT2 FLOW KIT 1 1/2–2	Flow Sensor Kit for Pipe Sizes 1½ IN to 2 IN, Clamp on
199999	RK-DT2 FLOW KIT 2 1/2–3	Flow Sensor Kit for Pipe Sizes 2½ IN to 3 IN, Clamp on
200000	RK-DT2 FLOW KIT 4–5	Flow Sensor Kit for Pipe Sizes 4 IN to 5 IN, Clamp on
200001	RK-DT2 TP ADPT KIT 075VL	Tailpiece NPT Adapter Kit for 075VL, Sweat/Press to NPT Threaded End Connections
200002	RK-DT2 TP ADPT KIT 100VL	Tailpiece NPT Adapter Kit for 100VL, Sweat/Press to NPT Threaded End Connections
200003	RK-DT2 TP ADPT KIT 150VL	Tailpiece NPT Adapter Kit for 150VL, Sweat/Press to NPT Threaded End Connections
200004	RK-DT2 TP ADPT KIT 200VL	Tailpiece NPT Adapter Kit for 200VL, Sweat/Press to NPT Threaded End Connections
200005	RK-DT2 CABLE EXT KIT	Cable Extension Kit for Actuator, Encoder, Analog Sensor & Digital Sensor Connections
200006	RK-DT2 ACTUATOR KIT	Actuator Kit
200007	RK-DT2 MIX TEMP SENSOR KIT	Analog Mixing Temperature Sensor Kit
200008	RK-DT2 CAP/SEAT KIT SMALL	Cap and Seat Kit 075VL to 150VL
200009	RK-DT2 CAP/SEAT KIT LARGE	Cap and Seat Kit 200VL
200010	RK-DT2 TP O-RING 075VL–100VL	Tailpiece O-ring Kit 075VL to 100VL
200011	RK-DT2 TP O-RING 150VL	Tailpiece O-ring Kit 150VL
200012	RK-DT2 TP O-RING 200VL	Tailpiece O-ring Kit 200VL
200013	RK-DT2 ACTUATOR CABLE KIT	Actuator Cable Kit
200014	RK-DT2 CHECK RK 075VL–100VL	Check Repair Kit 075VL to 100VL
200015	RK-DT2 CHECK RK 150VL	Check Repair Kit 150VL
200016	RK-DT2 CHECK RK 200VL	Check Repair Kit 200VL
200017	RK-DT2 TP KIT IN 075VL	Tailpiece for 075VL Inlet Sweat/Press
200018	RK-DT2 TP KIT OUT 075VL	Tailpiece for 075VL Outlet Sweat/Press
200019	RK-DT2 TP KIT IN 100VL	Tailpiece for 100VL Inlet Sweat/Press
200020	RK-DT2 TP KIT OUT 100VL	Tailpiece for 100VL Outlet Sweat/Press
200021	RK-DT2 TP KIT IN 150VL	Tailpiece for 150VL Inlet Sweat/Press
200022	RK-DT2 TP KIT OUT 150VL	Tailpiece for 150VL Outlet Sweat/Press
200023	RK-DT2 TP KIT IN 200VL	Tailpiece for 200VL Inlet Sweat/Press
200024	RK-DT2 TP KIT OUT 200VL	Tailpiece for 200VL Outlet Sweat/Press
200025	RK-DT2 T&P 3 SENSOR KIT	Valve Digital Temperature and Pressure Sensor Kit with 3 Sensors
200026	RK-DT2 SS SHUTTLE SMALL 075VL–150VL	Stainless Steel Shuttle Kit 075VL to 150VL
200027	RK-DT2 SS SHUTTLE LARGE 200VL	Stainless Steel Shuttle Kit 200VL

