FSI-S-SP3 Series

Pulse Output PVC Saddle Flow Sensor

Installation Guide

Introduction:



Creative Sensor Technology FSI series flow sensors feature proven impeller based technology designed for flow monitoring/flow control applications in irrigation, water conservation and related industries. The term sensor is used because this measurement device produces an output signal rather than a visual display.

The PVC saddle type sensor may be used on schedule 40 and 80 and all class rated PVC piping systems.

The SP3 version features a scaled output signal.



1 pulse = 10 gallons of flow.

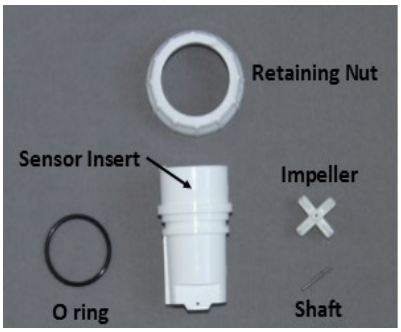
This signal is compatible with all Hunter Hydrawise irrigation controllers and other devices that require pulse type inputs.

The flow sensor insert, held in place with a retaining nut, contains the detection circuitry and carries the unique four-bladed impeller on a transverse axle. The insert and mounting saddle are fabricated to form an integrated measurement chamber resulting in highly accurate, repeatable flow measurements through a wide range of velocities. The axle and impeller along with the sealing o-ring are replaceable in the field.

Mechanical Installation– Location and Orientation:

Because an impeller sensor measures the velocity of the liquid and converts it to a flow measurement based on area, proper flow measurement depends on the condition of the pipe interior and the sensor's location in the piping system. The pipeline must be full, free from trapped air, floating debris and built up sediment.

The 3 inch saddle should be installed with a minimum of 10 diameters of straight pipe, 35 inches upstream and a minimum of 5 diameters of straight pipe, (17 1/2 inches downstream to eliminate irregular flow profiles caused by valves, fittings or pipe bends.



1. Always install flow arrow on the saddle pointed downstream. Allow 3 3/4" clearance to remove flow sensor insert from tee for service. The tee is usually installed with the insert up in the vertical or 12:00 O'clock position. However, if necessary, it may be installed with sensor insert at an angle from vertical to provide clearance.
2. Flow sensors may be installed inside a building, outside above grade or underground. If installed above grade, consider security issues to prevent damage or disassembly. If installed below grade, always provide a valve box or meter pit for service access.

Creative Sensor Technology, Inc.
www.creativesensortechnology.com
Ph: 508-763-8100

3. Flow sensors are most typically installed below grade in a horizontal section of pipe with the sensor housing up. Do not direct bury the flow sensor. Provide a meter pit or valve box of adequate size and drainage to service the sensor. Provide a service loop in the wire connections to allowing the sensor housing to be brought above grade.
4. Flow sensors may be installed on vertical sections of pipe providing that the piping is full and does not contain trapped air. A vertical pipe with rising flow is preferred over falling flow. The sensor housing may be oriented in any direction radially around the pipe.

Mechanical Installation– Installing sensor in pipe

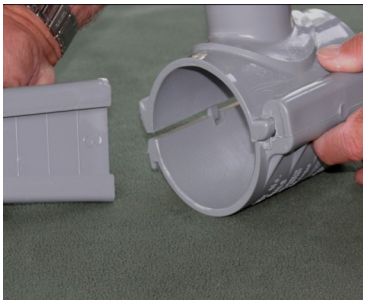
Do not attempt to Hot Tap!
The pipe must be drained and depressurized for installation

Disassemble the flow sensor.



1. Disassemble the flow sensor insert by turning the retaining nut counter-clockwise and pulling the insert housing straight out of the tee.

Do not pull on the wire leads!



2. Remove the tapered wedge from the side of the saddle and fold the bottom half of the saddle down to separate it at the hinge.

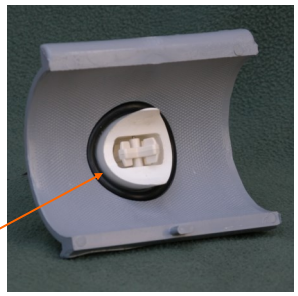
Prepare the Pipe.

1. The PVC saddle type flow sensor is attached to the outside of a section of PVC pipe with the same nominal size as the saddle after an entry hole for the sensor insert has been drilled through the pipe. Use Best Industry Practices to insure that the sensor is installed correctly.

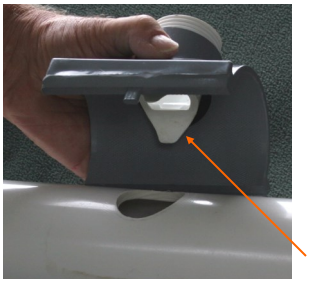
2. Locate a straight section of pipe with a minimum of 15 diameters of straight pipe. Clean a 12 inch (minimum) section of pipe 10 diameters downstream of any valve, fitting or change in size to mount the saddle.

3. Use a 1 ¾ inch hole saw, **NO SMALLER NOR LARGER**, to drill the entry hole in the center of the cleaned area of the empty depressurized pipe. Make sure the hole is perpendicular to the pipe and centered. Remove the pipe coupon with the saw; do not allow it to fall into the pipe. Remove the burr from the edge of the hole.

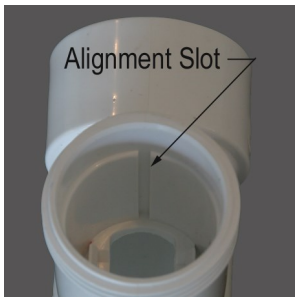
Attach the saddle.



4. Make sure the o-ring seal is in place on the underside of the saddle around the protruding sensor housing.



5. Place the top half of the saddle with the alignment slot inside the sensor housing on the downstream side, over the pipe so that the mount fits into the drilled hole.





6. Attach the bottom half of the saddle to the top half on the hinged side of the top half and close it around the pipe.



7. Push the larger end of the tapered wedge over the guides sliding it until the saddle haves are clamped together. The wedge should go on half-way by hand. Finish setting wedge with a couple of taps with a rubber mallet.



8. Reassemble the flow sensor insert with the arrow on the top of the housing in the downstream direction. This will align the guide key on the insert with the slot inside the housing. Push straight in so that the key enters the slot until the o-ring seals the opening. Slide the retaining nut over the wire leads and tighten by hand turning it clockwise.

Wiring

1. Wire leads may be extended up to 1,000 feet using #20 gauge twisted three wire (Triad) cable. Shielded cable is recommended for distances over 300 feet or where cable may run next to other conductors carrying power loads that might cause signal interference.
2. All wire connections should be made using waterproof connectors, such as 3M 316IR or 3M DB0.
3. Provide a service loop in the cable to allow the flow sensor housing to be removed from the tee and brought above grade for servicing.
4. Avoid making splices in the direct burial cable.

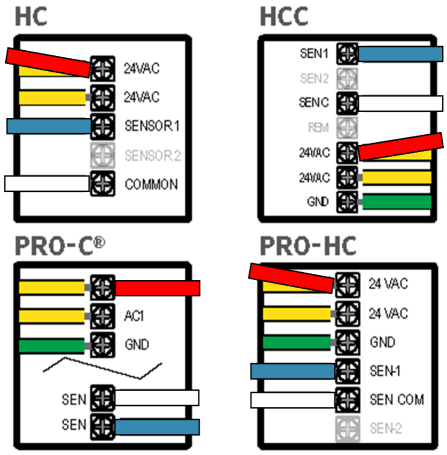
⚠ **Make all wire connections with the power to the controller OFF.**

All SP3 models require 24 VAC to power the circuit so they have three wire connections to the controller. Each Hydrawise model has a different terminal configuration. Follow the diagram for your controller model.

The **RED** lead must be connected to the "load" power terminal of the controller, usually the top 24V terminal.

Connect the **BLUE** lead to SEN 1 or SEN 2

Connect the **WHITE** lead to SENSOR COM



- Test the flow sensor connections by turning controller power ON. The LED on the sensor should blink three times on start up then pause and blink again to indicate its circuit is active. If it does not blink, disconnect power and connect the red lead to the other 24V power terminal and retry.

Calibration Constants

- Saddle-SP3 sensors produce a scaled pulse **1 pulse = 10 gallon.** There are no calibration options like frequency producing sensors.
- In the controller set-up; if asked for **liters per pulse, enter 37.85**

⚠ **Note :** SP3 saddle sensor inserts are pre-scaled for each saddle size. Do not interchange inserts between different size tees. Inserts may be identified by the blink code when power is first connected.

Operation

1. Make sure the flow sensor is assembled and the retaining nut is tightened **(hand tight)** before pressurizing system.
2. Fill pipeline and eliminate trapped air.
3. Flow sensor should begin transmitting flow immediately. LED will blink every time a pulse is sent. At low flow rates this could be longer than one minute between pulses. Also, most controllers have a flow averaging routine that requires several seconds before it displays flow.
4. Always wait for flow to stabilize before setting control limits. Stabilization may take several minutes in large piping systems.