

FSI-T-SP3 Series Pulse Output PVC 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 tee type sensor with socket connections is pressure rated for service in all class and schedule rated PVC piping systems.

The SP3 version features a scaled output signal.





1 pulse = 1 gallon 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 tee are custom molded 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 mounting tee should be installed with a minimum of 10 diameters of straight pipe ex.15 inches for 1 1/2 inch pipe), upstream and a minimum of 5 diameters of straight pipe (ex. 7 1/2 inches for 1 1/2 inch pipe) downstream to eliminate irregular flow profiles caused by valves, fittings or pipe bends.



- 1. Always install flow arrow on the mounting tee 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.



- 3. Flow sensors are most typically installed below grade in a horizontal section of pipe with the sensor insert 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 leads to allow the sensor insert 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 insert may be oriented in any direction radially around the pipe.

Mechanical Installation-Installing sensor in pipe

- 1. The PVC flow sensor tee features socket ends intended for solvent welding into PVC piping systems. Use Best Industry Practices to insure that the sensor is installed in the correct position with strong permanent joints.
- 2. Disassemble the flow sensor before joining the tee to the piping system. Remove the flow sensor insert from the tee by loosening the retaining nut by turning it counter-clockwise and pulling the housing straight out of the tee.

Do not pull on the wires!

- 3. Use appropriate tools to cut the pipe. Remove all chips, filings or cuttings from the pipe.
- 4. Solvent weld the tee to the pipe using manufacturer's recommendations.
- 5. After the joints have set, reattach the sensor insert to the tee. Make sure the insert and tee are clean and free from dirt or debris. Align the arrow on the top of the insert with the downstream direction. This will align the guide key on the insert with the slot inside the tee.

Rotate the insert slightly to make sure the key finds the slot in the tee. It should then push in with little force. If not, lubricate the o-ring with mineral grease or liquid soap

- 6. Push straight in. With the key in the slot, the insert flange should contact the top of the mounting tee.
- 7. Slide the retaining nut over the wire leads and tighten by turning clockwise.







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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 higher 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.

ELF 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 is 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 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

- SP# sensors produce a scaled pulse **1 pulse = 1 gallon**. There are no calibration options like frequency producing sensors.
- In the controller set-up; if asked for liters per pulse, enter 3.785



Note : SP3 sensor inserts are pre-scaled for each tee size. Do not interchange between different size tees.

Inserts may be identified by the blink code when power is first connected

1 inch insert= 5 +1 blinks 1/1/2 inch insert= 5+2 blinks 2 inch insert = 5+3 blinks

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.