

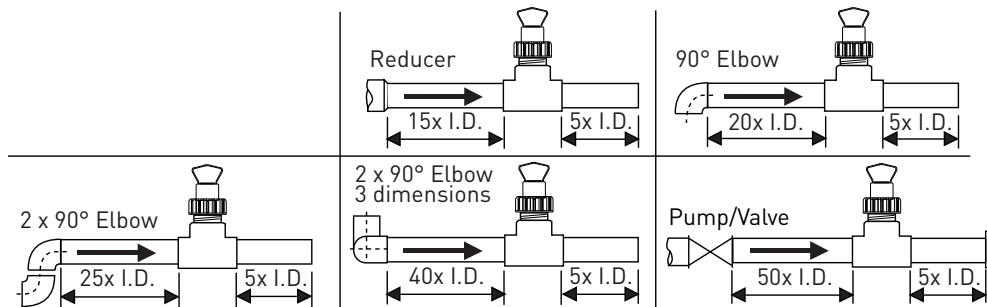
Installation of Flow Sensors: Paddlewheel

Flow Installation Tips

- Use Signet fittings for proper insertion into the process flow.
- Recommended upstream distances are stated as a multiplier of the I.D. (inner diameter) dimension of the pipe. Note that these multipliers are different for each example and depend upon the upstream obstruction.
- Paddlewheel sensors can be used for all water-like fluids with little or no particulates (<100 micron in diameter/length), and non-ferrous, non-fouling in nature.
- Always use these sensors in full pipes.
- Always maximize the distance between sensors and pump sources.

I. Piping Location

- The correct location of the sensor in the piping system helps to ensure a proper flow profile in the pipe. It is important to have sufficient straight pipe immediately upstream of the sensor to create “fully developed turbulent flow.” Such a flow profile provides the stability required for the paddlewheel to measure accurately.
- The diagrams below illustrate the minimum distances that are recommended to mount plastic and metal paddlewheel sensors.
- In all scenarios, it is recommended to choose a location with as much straight, uninterrupted pipe length upstream of the sensor as possible.

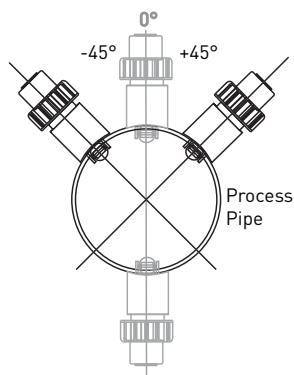
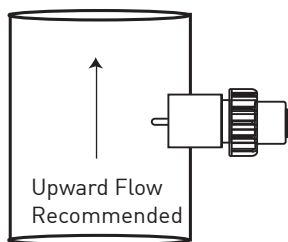


II. Mounting Angle

Paddlewheel sensors are affected by the mounting angle due to the effect of gravity increasing the friction between rotor and bearing surfaces. Air entrapment and sediments within the pipe may also adversely affect sensing accuracy and/or impede operation.

Paddlewheels in Vertical pipes:

- Mount the sensor in a pipe with an upward flow. This position is recommended for all scenarios, as it ensures a full pipe.
- Vertical installations with downward flow are not recommended.



Paddlewheels in Horizontal pipes:

- $\pm 45^\circ$ from vertical is the recommended sensor mounting angle to avoid air bubbles (pipe must be full). With the sensor at greater angles, the drag created by the rotor resting against the sensor body may compromise performance at the lower end of the operating range.
- Straight up installations may experience interference from entrained air at the top of the pipe.
- Inverted installations are often subject to blockage due to sediments in the pipe. Mounting sensors in the bottom of the pipe is NOT recommended if sediments are likely to be in the pipe.

Note that K-factors are published for pipe sizes of DN15 to DN300 (1/2 in. to 12 in.). For other pipe sizes, statistical K-factors may be available. Contact Technical Support for more information.

K-Factors

K-factors are calibration values (pulses per unit of volume) used to convert flow sensor output frequencies to flow rates. Signet publishes K-factors for water only in gallons (pulses per gallon) and liters (pulses per liter) for all sensors, in all applicable pipe sizes and materials,

and/or all applicable installation fitting sizes and materials. K-factors for fluids other than water must be determined empirically, typically on-site using a secondary standard.

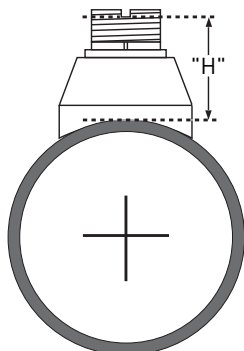
Installation of Flow Sensors: Paddlewheel

Flow Installation Tips

- Ensure that all wetted materials are chemically compatible with the process liquid.
- Pressure and temperature ratings are reduced when plastic flow sensors are mounted in metal piping systems.
- The flow sensor is designed to fit tightly into the fittings. Lightly lubricate o-rings with a non-petroleum based lubricant to ease the installation.
- Cut the cable to the desired length if too long. Do not coil extra cable.

Fixed Depth

The insertion depth of a paddlewheel in a flow stream is critical and must be achieved and maintained to ensure accurate flow measurements. Signet installation fittings for Rotor-X and Metalex paddlewheel flow sensors set this depth automatically and facilitate the use of convenient K-factors (calibration values) published in individual sensor instruction manuals.












The H-dimension controls the insertion depth and they are critical for proper seating of the flow sensor into the pipe. These dimensions can be found listed in the flow sensor instruction manuals.

III. Installation Fittings

515, 2536 and 2537 Rotor-X

- This section outlines the installation fittings available from Signet for the 515, 2536 and 2537 Rotor-X family of flow sensors. The fitting controls the location of the paddlewheel inside the pipe, which in turn determines the calibration constant (K-factor).
- Refer to the Fittings section of this catalog for a complete listing of part numbers.

Type	Description
Plastic tees 	<ul style="list-style-type: none"> • 0.5 to 4 inch versions • PVC or CPVC • Available with or without pipe extensions
PVC Glue-on Saddles 	<ul style="list-style-type: none"> • Available in 10 and 12 inch sizes only • Cut 2-1/2 inch hole in pipe • Weld in place using solvent cement
Clamp-on Saddles 	<ul style="list-style-type: none"> • 2 to 4 inch, cut 1-7/16 inch hole in pipe • 6 to 8 inch, cut 2-1/8 inch hole in pipe
PP Clamp-on Saddles 	<ul style="list-style-type: none"> • Available in 10 and 12 inch sizes only • Cut 2-1/8 inch hole in pipe
Iron Strap-on saddles 	<ul style="list-style-type: none"> • 2 to 4 inch, cut 1-7/16 inch hole in pipe • Over 4 inch, cut 2-1/8 inch hole in pipe • Special order 12 in. to 36 in. • 2 inch to 8 in. PVDF insert • >8 in. PVC insert

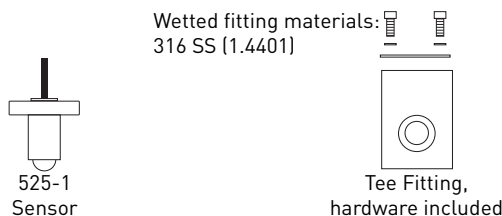
Type	Description
Iron, Carbon Steel, 316 SS Threaded tees 	<ul style="list-style-type: none"> • 0.5 to 2 in. versions • Mounts on threaded pipe ends • wetted PVDF insert
Carbon steel & stainless steel Weld-on Weldolets 	<ul style="list-style-type: none"> • 2 to 4 inch, cut 1-7/16 inch hole in pipe • Over 4 inch, cut 2-1/8 inch hole in pipe • 1.5 in. to 8 in. PVDF insert • >8 in. PVC insert
Fiberglass tees & saddles: 	<ul style="list-style-type: none"> • 1.5 in. to 8 in. PVDF insert • > 8 in. PVC insert • Special order 12 in. to 36 in.
Metric Union Fitting 	<ul style="list-style-type: none"> • For pipes from DN 15 to 50 mm • PP or PVDF • Socket fusion equipment required

525 Metalex

- This section outlines the installation fittings available from Signet for the 525 Metalex family of flow sensors. The fitting controls the location of the paddlewheel inside the pipe, which in turn determines the calibration constant (K-factor).
- Refer to the Fittings section of this catalog for a complete listing of part numbers.

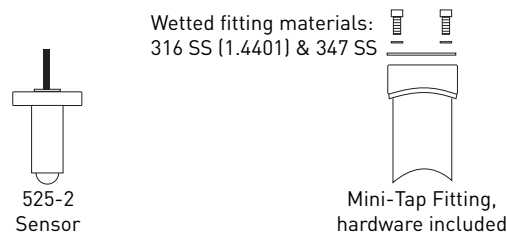
525-1 Metalex Flow Sensor

The smallest Metalex Flow Sensor (525-1) must be installed into a specially constructed tee fitting with socket-weld piping connections.



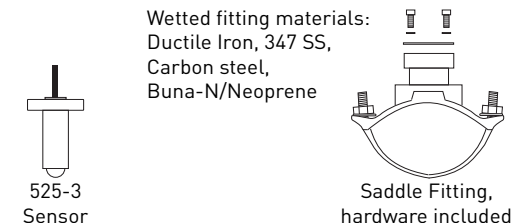
525-2 Metalex Flow Sensor

Use the 525-2 and one of these weld-on fittings for stainless steel pipes from DN32 (1¼ inches) up to DN300 (12 inches) in diameter.



525-3 Metalex Flow Sensor

The 525-3 is the longest Metalex Flow Sensor. It requires one of the strap-on saddles for pipes from 2 inches up to 12 inches in diameter.



Consult a qualified welder to install metalex fittings. Use of saddle fittings reduces the pressure rating for the 525 sensor.

Installation & Wiring

Installation of Flow Sensors: Paddlewheel

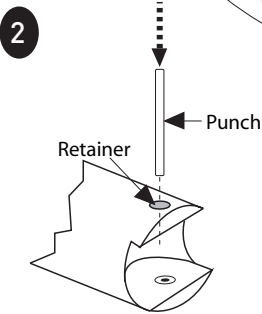
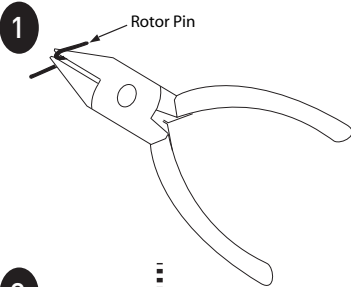
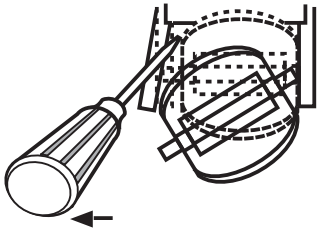
IV. Rotor replacement

Procedure for plastic paddlewheel sensors

- 1) Hold the sensor upside down and hold the rotor still.
- 2) Place the tip of a medium blade screwdriver between the rotor and the sensor body.
- 3) Turn the screwdriver blade 90° to flex the "ear" back just enough to angle the rotor pin out of one side.

NOTE:

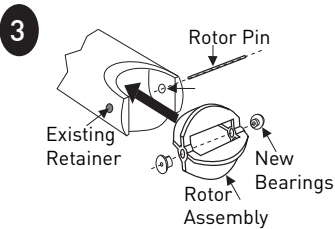
Do not flex the ear more than required to remove the pin. If it cracks, it cannot be repaired!



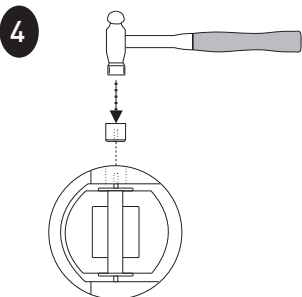
Procedure for metal paddlewheel sensors

- 1) With a small pair of needle-nose pliers, firmly grip the center of the rotor pin (shaft) and with a twisting motion, bend the rotor pin into an "S" shape. This should pull the ends of the pin out of the retainers and free the rotor assembly.

- 2) Remove retainer from each side by gently tapping it inwards using a punch. Install a new retainer with its rotor pin clearance hole inward. Only install one retainer at this time.



- 3) Insert the new rotor assembly and bearings into the rotor housing of the sensor and place the new rotor pin (shaft) through the open end of the rotor housing, through the rotor and bearings, and into the previously installed retainer.



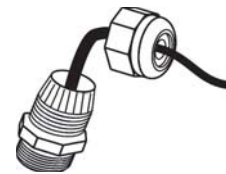
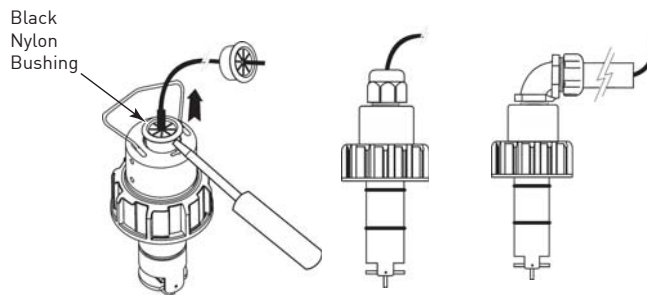
- 4) Tap the second retainer (rotor pin clearance hole inwards) into the hole while lining up the rotor pin with the center of the retainer hole. This completes the rotor replacement procedure.

Installation of Flow Sensors: Paddlewheel

V. Cable glands and conduit adapter kits

Cable Glands and Conduit adapter kits are available to install on Models 515, 2536, and 525 when used in wet environments. These items protect against moisture entering the back end of the sensor. Follow these simple instructions to prolong the life of the sensor. Conduit adapters are included with the 2540 sensors.

- 1) Remove the black Nylon® bushing to expose the female threads at the back end of the flow sensor. Use a standard medium size screwdriver to pry the bushing up and out of the port. Slide it up and off the entire length of the cable, or cut it away carefully so as not to nick the cable jacket.
- 2) Thread the gland or conduit adapter over the cable and screw the ½ in. NPT male threads into the top of the sensor in place of the bushing.
- 3) For liquid-tight glands, tighten the compression fitting onto the fitting sufficiently to achieve a seal around the cable.
- 4) For conduit adapters, thread the cable through the adapter and tighten the adapter into the sensor fitting.



Cable Gland 3-9000.392-1
(Liquid Tight Connector)



Conduit Adapters P51589
(suitable for all plastic and metal Paddlewheel Sensors)