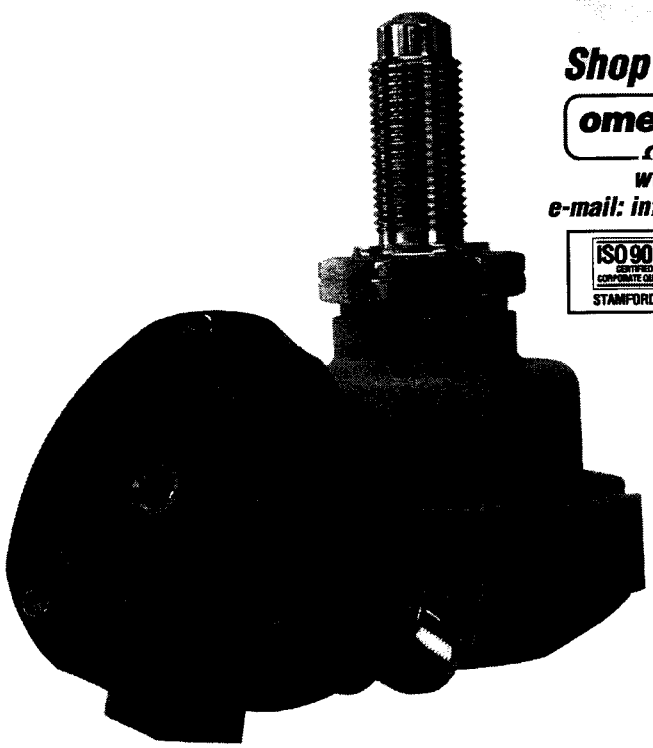
1 YEAR
WARRANTY

User's Guide



FSW-9000/FSW-90-R/ FSCN-90 Series
Liquid Flow Transmitter, Sensor and Switch

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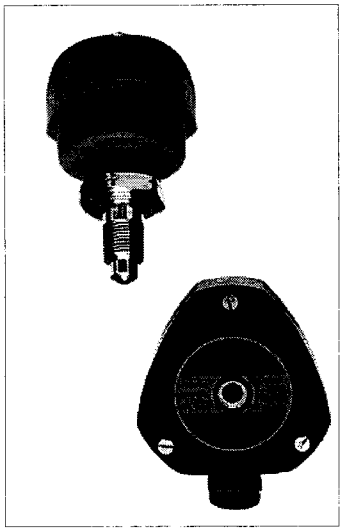
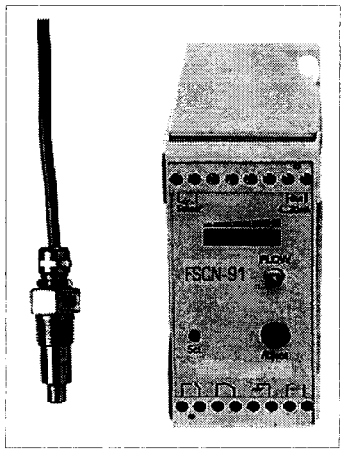
FSW-9000 - Power Supply: 24VDC Analog 4-20mA Output and PNP/NPN Switch Output



The FSW-9000 model is a flow switch monitor that measures the velocity of the flow. It is ideal for use in measurement and control aplications. The FSW-9000 provides two output options; a 4-20mA output, the eletronics module converts the signal from the probe to a 4-20mA analog output, witch can be used to indicate flow rate. For the PNP/NPN output, the measured flow rate is compared to the set point value selected by the user and the switch changes state once the set pint value has been achieved.

A chain of 8 LED's gives the user a visual indication of the flow rate as well as set point status, and one di-chromatic LED indicates switch point status. In addition, if there is a problem with the unit, the 8 LED's will flash continuously providing troubleshooting information.

FSW-91-R Sensor + FSCN-90 Flow Switch Relay

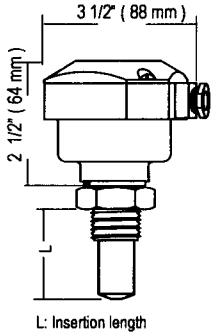


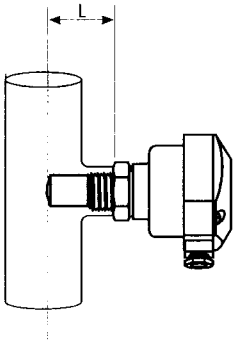
The **FSW-91-R** is very similar to the FSW-9000 with one main difference: The sensor is separate from the electronics and it does not have an enclosed housing. This gives the FSW-91-R the ability to be installed in very small pipes, such as 3/8" (9.5 mm) in diameter and be remotely controlled by the FSCN-91 relay. The FSW-91-R is the ideal solution when there is not a lot of space to install even a compact unit or when there is a need for a mounted relay.

OMEGA

- Simple to install
- No moving parts-maintenance free reliability
- Maximum working pressure of 4,500 PSI (300 bar).
- Fast response time.
- Excellent low flow sensitivity
- Can be coated for aggressive mediums
- Available in EX-Proof version
- Available in threaded, sanitary and adjustable
- Insertion length connections

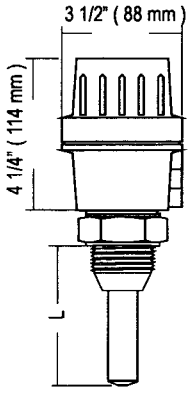
FSW-9000



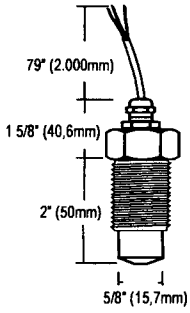


Code	Insertion length(suggestion)
L = 1 3/8" (35mm)	For pipes up to 1" diameter
L = 2" (50mm)	For pipes up to 3" diameter
L = 3" (75mm)	For pipes over 3" diameter

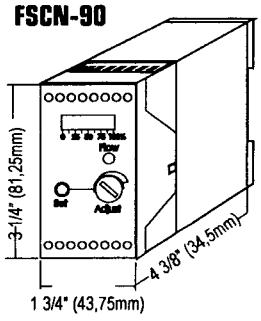
FSW-9000 w/ Alluminum Head

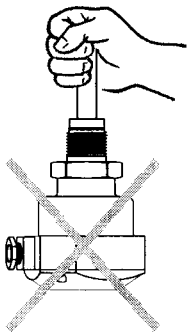


FSW-91-R

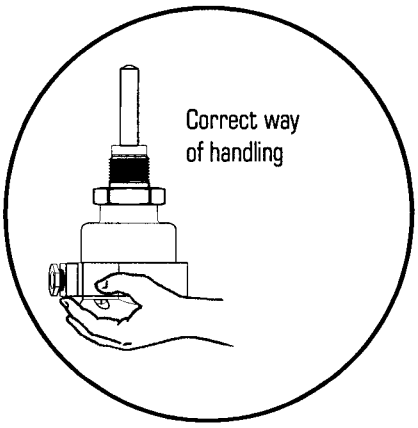


FSCN-90



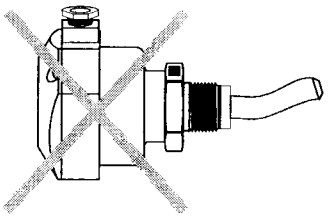


Do not hold
FSW-9000 by the sensor



Correct way
of handling

Do not alter or bend the shape of the sensor



Pre-Installation Checks:

1) - Before installing the FSW-9000, check if the wire connections are correct and that the available power supply is compatible with the FSW-9000.

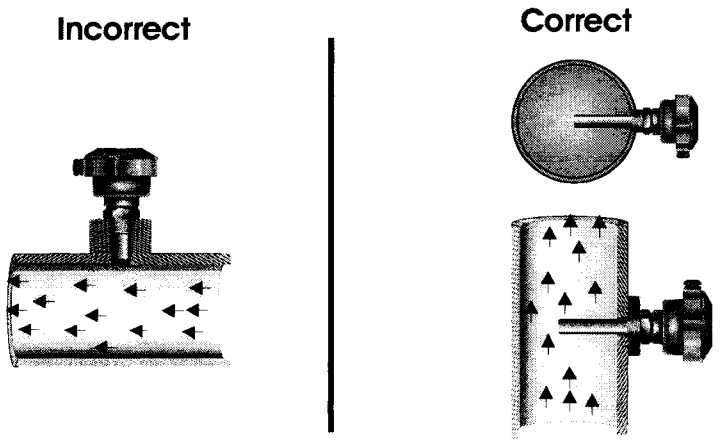
2) - Check if the operating pressure and temperature of the process corresponds to the FSW-9000.

Installation:

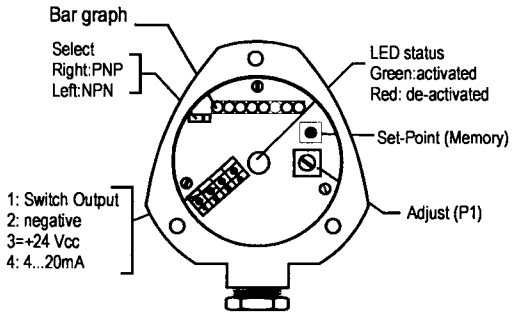
The FSW-9000 may be installed in a pipe or tank using the thread or connection provided. This location must be free of turbulence or vortices. Use only the hexagon when tightening to achieve a seal, do not use the body. The body should rotated after tightening to leave the cable gland in a suitable orientation.

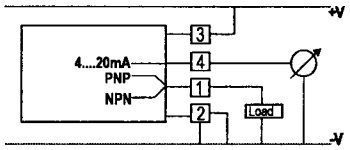
The FSW-9000 is not affected by its fixing position, so it may be installed at any angle into the pipe. However, it is recommended that with horizontal pipe runs the sensor should be installed on the side, into the middle of the pipe. In vertical pipes, the FSW-9000 should be installed when there is flow in an upward direction against gravity.

Care should be taken when installing the sensor that the probe extends clear of the pipe's internal wall and that it is fully immersed into the flow. In pipes with smaller diameters, some care should also be taken that the sensor is not screwed too far into the line. In both cases, if the installation is not correct the FSW-9000's performance may contain measurement errors.



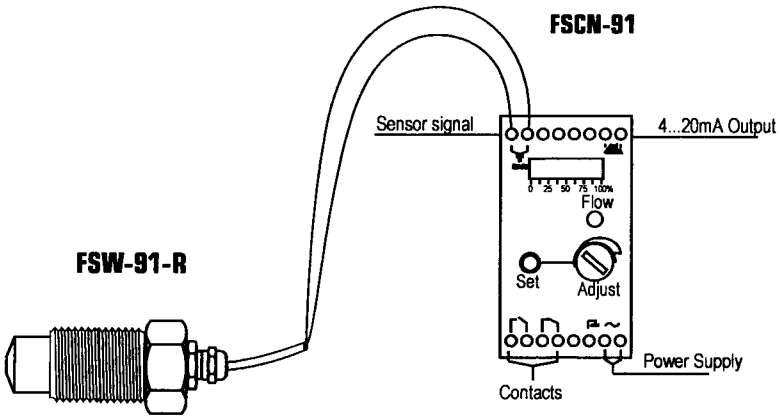
FSW-9000





FSCN-91

FSW-91-R



(Range 0.04 to 2.0 m/s):

1) - Remove the housing lid. (Note: the screws are self-retaining.)
2) - Start the power supply and wait 2 minutes until the FSW-9000 is active and can achieve a stability point. During start-up of the FSW-9000, the central flow LED will blink yellow.
3) - Let the regular or desired flow rate achieve its point of normal operation.
4) - With the pipe completely full of liquid and no flow (velocity = 0), turn the potentiometer totally counter-clockwise to its far left-hand and adjust 4-20mA.
Note: Any air gaps will cause inaccuracies in the measurement of the fluid velocity.
5) - If the process requires a 4/20-mA output with low flow, just maintain this flow during calibration remembering that this value can shift up to 25% from the 0.04 range.
6) - Press the SET button to store the value.
7) -The central flow LED will blink green for a few seconds. Wait until it stops blinking and turns red.
Note: If any error occurs (i.e. the LED doesn't blink) press SET button again.
8) - Start up the flow in the pipe. The flow velocity range must be over 75% of the 0.04 range
9) - Turn the potentiometer clockwise to its far right hand and adjust 20 mA.
10) - Press the SET button to store the value.
11) - The central flow LED will blink green for a few seconds. Wait until it stops blinking and turns red. At this point, the chain of 8 LEDS will be on.
Note: If any error occurs (i.e. the LED doesn't blink) press the SET button again.
12) - After calibrating the FSW-9000, adjust the potentiometer to the desired switch point.
13) - Use the chain of 8 LEDS to find the correct switch point.
14) - Use the following formula to check that the process velocity falls into this measuring Range:

V = velocity (m/s)

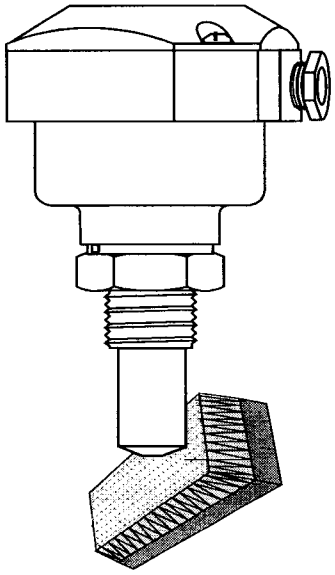
Q= flow rate (m^3/s)

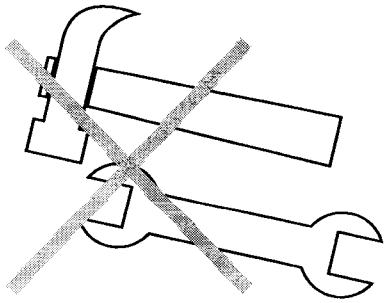
D= internal pipe diameter

$$V = \frac{1.27 \times Q}{D^2}$$

Note: The FSW-9000 is factory calibrated to a nominal range (0.04 to 2 m/s). To restore this calibration, simply turn the potentiometer counter-clockwise to the far-left hand and press the SET button. While the central flow LED is blinking, turn the potentiometer clockwise. In the event of a power failure the calibration program will store values for maximum and minimum flows for up to 10 years.

Periodic visual inspection of the FSW-9000 is required to check for corrosion or deposit build-up. If deposits are found, clean the sensor to ensure optimum performance.





When cleaning the Flow Switch, use a soft brush or any other similar object.

MODELS	FSW-9000	FSW-91-R	FSW-9000 w/ Alluminum Head
Application	Flow for liquids	Flow for liquids	Flow for liquids
Operating Voltage	DC - 24 Vdc +/- 10%	DC - 24 Vdc +/- 10% AC - 85...240Vac and 125 Vdc	DC - 24 Vdc +/- 10%
Current Consumption	Max. 1VA	Max. 1VA	Max. 1VA
Output	4-20mA and transistor NPN/ PNP (400mA)	4-20mA and relay (SPDT)	4-20mA and transistor NPN/ PNP (400mA)
Set point range	0.04 to 2m/s - water 0.1 to 4m/s - oil	0.04 to 2m/s - water 0.1 to 4m/s - oil	0.04 to 2m/s - water 0.1 to 4m/s - oil
Electrical connection	Cable gland or M12 connector	Cable gland with 6,57ft (2000mm) cable or M12 connector	1/2" or 3/4" NPT
Operating Temperature	14 to 176° F (-10 to 80°C) sanitary option to 248°F (120°C)	Sensor: 14 to 176° F (-10 to 80°C) sanitary option to 248°F (120°C)	14 to 176° F (-10 to 80°C)
Gradient Temperature	not affected	not affected	not affected
Accuracy	Typical +/- 5% setpoint	Typical +/- 5% setpoint	Typical +/- 5% setpoint
Response time	3 to 10 seconds	3 to 10 seconds	3 to 10 seconds
Repeatability	+/- 1% setpoint	+/- 1% setpoint	+/- 1% setpoint
Flow rate indication	8 LED's bar graph	8 LED's bar graph	8 LED's bar graph
Process connection	½" to 1 1/2" BSP or NPT, adjustable, sanitary connections	1/2" BSP or NPT, adjustable, sanitary connections	½" to 1" NPT
Wetted material	316 SS	316 SS	316 SS
Enclosure material	Glass filled nylon	Relay ABS	Alluminum Die Cast Explosion Proof
Max pressure	4408 PSI (300 Bar)	4408 PSI (300 Bar)	4408 PSI (300 Bar)
Class Protection	IP 65	IP 65	Eex II B,C

Fault	Cause	Solution
Does not switch	No LED, no power	Check power supply
	LED doesn´t change the state	Check the installation (insertion lenght). Verify the calibration

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's Warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

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RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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