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User's Guide



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FST1000 SERIES

Air Flow Switch with Two SPST Relay Contact Closures



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Section 1 - Introduction

The FST1000 series measures air velocities up to 10,000 FPM (50.8 m/sec) and provides two SPST relay contact closures corresponding to high and low alarm set points. The alarm set points are adjustable from 0 to 100% of the air flow range. This unit can be used in HVAC applications, R&D labs, exhaust/ventilation hoods and other manufacturing processes.

The sensor is designed based on RTD elements. The air velocity is measured by the heat loss from the RTD sensor as it cools down by the air flow. The sensor is housed in a 1/4" OD x 12" long 304 Stainless Steel tube with inch marks for ease of insertion depths. The sensor probe comes in two configurations:

- Fixed mount probe
- 12" long remote probe connected via 15 feet of shielded cable

The following table shows all the models of this product.

Model No.	Range FPM (m/sec)	Description
FST1001A	0 to 5000 (0 to 25.4)	Air velocity switch, 2 relay outputs, fixed probe
FST1001R	0 to 5000 (0 to 25.4)	Air velocity switch, 2 relay outputs, remote probe
FST1002A	0 to 10,000 (0 to 50.8)	Air velocity switch, 2 relay outputs, fixed probe
FST1002R	0 to 10,000 (0 to 50.8)	Air velocity switch, 2 relay outputs, remote probe

NOTE:

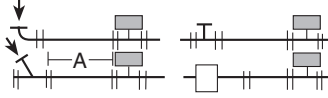
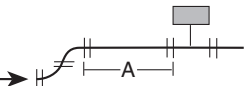
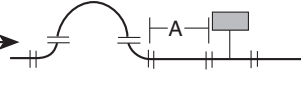
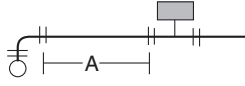
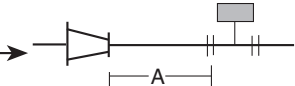
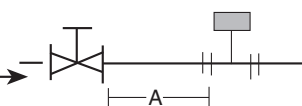
The FST1000 air velocity switch is not explosion proof, nor is it intrinsically safe. Do not use for flammable or hazardous gases, or in Hazardous areas.

The FST1000 series air velocity switch is intended for use with clean air or Nitrogen ONLY. Do not use with other gases, as it will produce an error in measurement. In addition, air carrying dust or oil (such as found in blower/compressor systems that utilize oil) can lead to coating of the sensor and thus inaccurate readings.

Refer to the Maintenance section for information on cleaning the sensor. The FST1000 is a bi-directional device, meaning the air flow in the forward or reverse direction provides the same readings. The FST1000 can be mounted vertically or horizontally without shift in calibration.

Section 2 – Installation

1. Remove the protective cap from the sensor tip.
2. Run a length of straight pipe before and after the flow sensor probe. The amount of upstream straight pipe required depends on the type of obstruction which is immediately upstream of the flow sensor. See Table 1 for specific requirements. Downstream of the flow sensor, in all situations, run 5 diameters of straight pipe regardless of the downstream obstruction.
3. Align the sensor probe with the air flow. Make sure the air flow is perpendicular to the sensor window. The score line on the sensor tubing is another way of aligning the sensor to the flow stream. The score line starts from the center of the sensor window and as a result it can be aligned properly.
4. One way of installing the sensor probe into a flow stream is to utilize a compression fitting such as Omega's SSLK-14-14 stainless steel compression fitting with PTFE ferrule, which allows adjustment of the insertion depth of the probe.
5. Connect your wirings to the terminal block in the back of the unit. Figure 2-1 shows the back plate. The back plate has the terminal block connections, and two potentiometer adjustments for high and low alarm set point. It also has two red LED alarm indications, and the green LED for power indication. Figure 2-2 shows a typical wiring diagram.

Typical Piping		Recommended Straight Pipe Length "A"		Remarks
		Without Vanes	With Vanes	
All Fittings in Same Plane		15D	15D	Closed Branch
		20D	15D	Elbow, Tee, Branch Pipe
		25D	15D	Elbow, 2 planes
		25D	15D	Long-radius bends
Fittings in Two Planes		30D 25D	15D 15D	Elbow Long-radius bends
		40D 35D	15D 15D	Elbow Long-radius bends
Varied Section		20D	15D	Contracting Pipe
		40D	20D	Expanding Pipe
Valves		Recommend Meter Be Installed Upstream		Regulating, reducing valves Ball, check valves Shut-off valves

Note: Straight pipe length on the downstream side to be 5 pipe diameters minimum.

* D – Pipe internal diameter.

Table 1. Piping Requirement

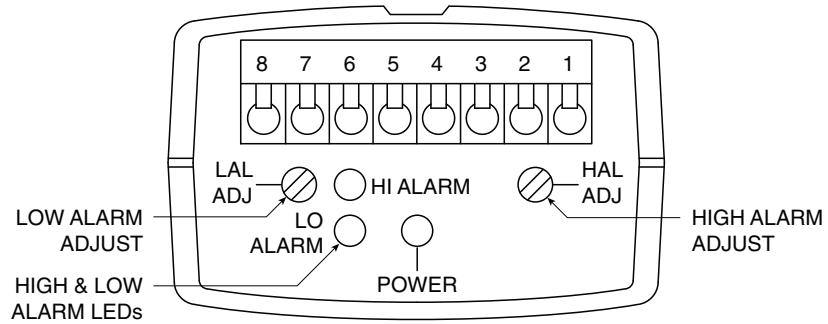


Figure 2-1. FST1000 Back Plate View

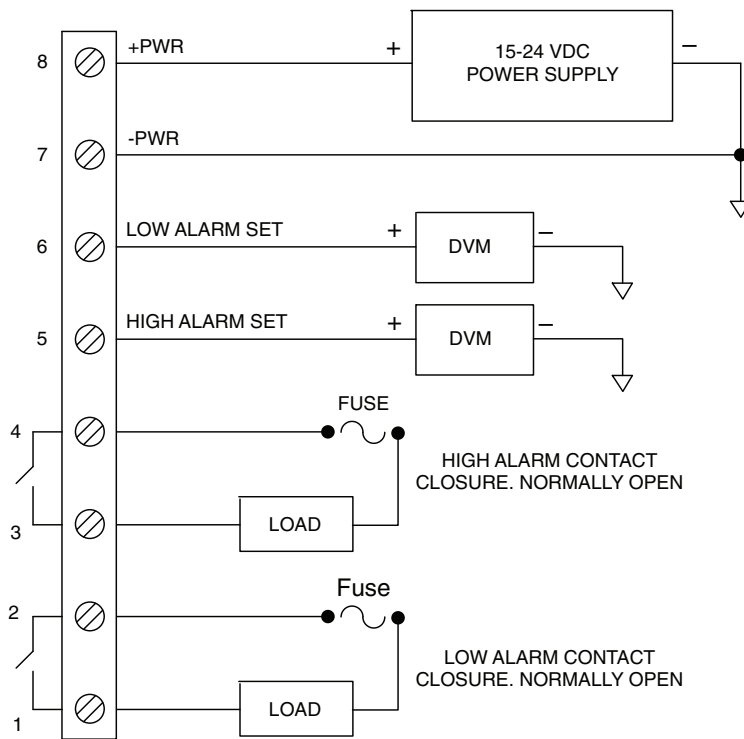


Figure 2-2. Typical Wiring Diagram

Figure 2-3 shows the FST1000 general dimensions with fixed mount probe. Figure 2-4 shows the FST1000 with remote probe. Both on next page.

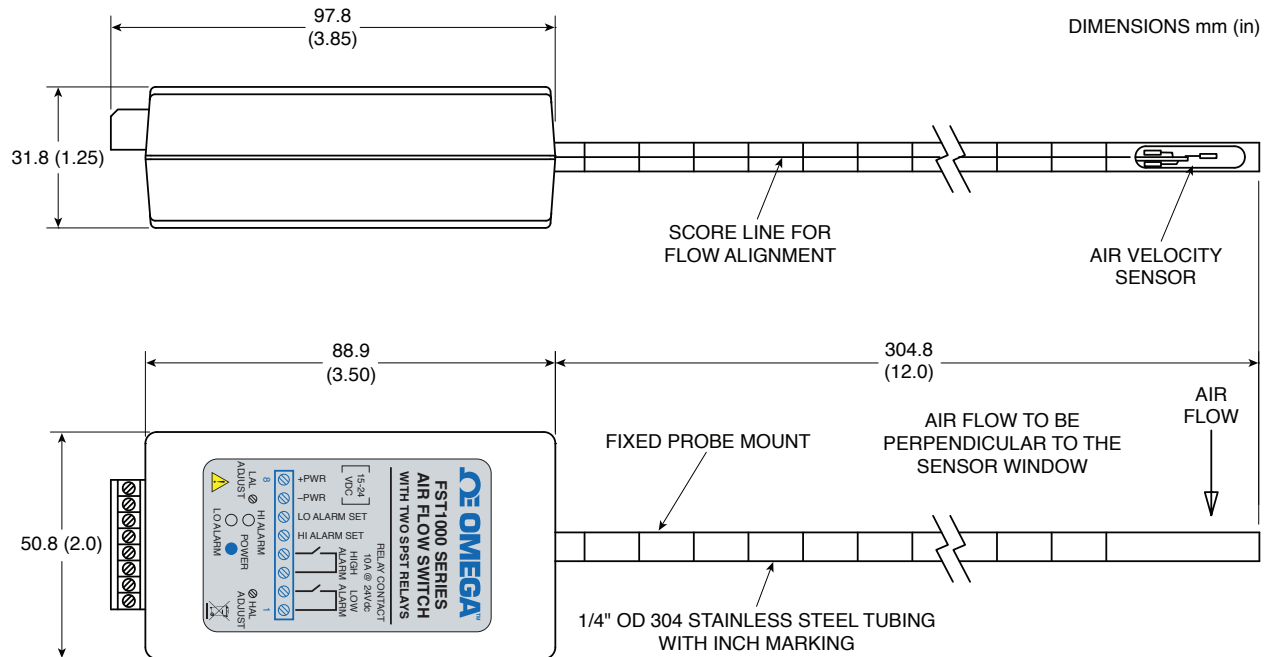


Figure 2-3. FST1000 Fixed Mount Probe, General Dimensions

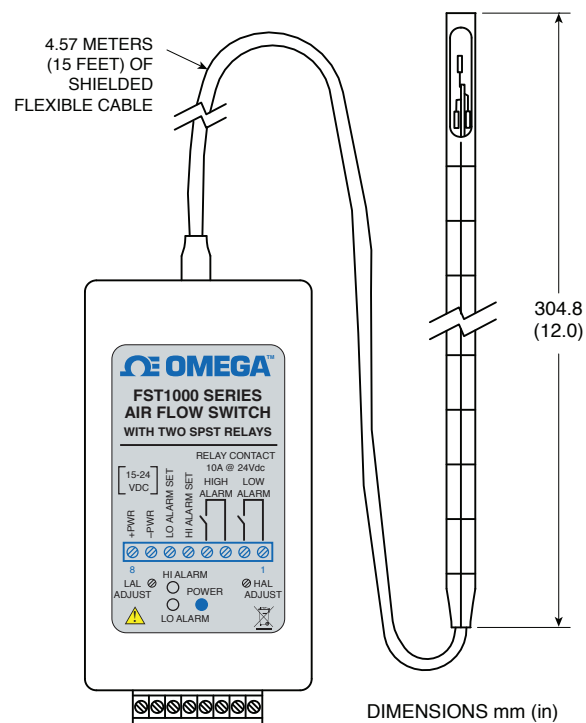


Figure 2-4. FST1000 Remote Probe

Section 3 - Operations

CAUTION:

Connection to the power supply, and the relay outputs should be made by qualified personell only. When the relay connections are made to voltages greater than 40 Vac, extreme care must be taken to avoid injury, and the device should be operated in an enclosure as provided by your local BOCA code. The relay load should be resistive (eg. Not a torque motor).

The FST1000 measures the air velocity and energizes either of the two built-in relays when the air velocity goes above or below the alarm set points. Here is the procedure to operate this unit:

- After completing the wiring connections, use a regulated DC power supply (15 to 24 Vdc) to power the device.
- Measure the high alarm set point voltage using a DVM (Digital Volt-meter). This voltage is measured from terminal block # 5 to # 7. The air flow range is based on 0 to 5 Vdc. For example, if you have a 0 to 5000 FPM range unit, and want to adjust the high alarm set point to 3500 FPM, you need to adjust the high alarm potentiometer on the back plate (HAL ADJ) so that the DVM measures 3.5 volts.
- Measure the low alarm set point voltage using a DVM. This voltage is measured from terminal block # 6 to # 7. For example, if you have a 0 to 5000 FPM range unit, and want to adjust the low alarm set point to 1500 FPM, you need to adjust the low alarm potentiometer (LAL ADJ) so that the DVM measures 1.5 volts.
- Now you are ready to operate the unit. When the air flow goes above 3500 FPM, the high alarm relay will energize and will provide a contact closure. When the air flow falls below 1500 FPM, the low alarm relay will energize and will provide a contact closure. In either case, the corresponding alarm (red LED) will also turn on.

Maintenance

Except for intermittent removal of the sensor from the line for cleaning, there is no routine maintenance. If the sensor probe becomes coated with dust, blow the dust away with clean air. If the sensor probe is coated with sticky material, clean it with water or alcohol (Ethanol) using an artist's brush.

Calibration

Each FST1000 is individually calibrated in a NIST traceable wind tunnel. For calibration certification or calibrating to a new air flow range, the unit must be returned back to the factory.

Section 4 - Specifications

Air Velocity Range:	0 to 5000 FPM (0 to 25.4 m/sec), 0 to 10,000 FPM (0 to 50.8 m/sec)
Accuracy:	2% of Full Scale
Sensor Probe	
Standard:	6.3 OD x 305 mm (1/4 OD x 12") – 304 Stainless Steel
Remote:	Standard probe connected via 15' of shielded cable
Velocity Sensor:	One 100 ohms RTD, Two 1000 ohms RTD
Response Time:	250 msec, 0 to 90% of final value
High Alarm Set Point:	0 to 100% adjustable, 0 to 5 Vdc
Low Alarm Set Point:	0 to 100% adjustable, 0 to 5 Vdc
Alarm Indications:	Two Red LEDs, High & Low
Alarm Deadband:	5% of FS
Built-in Relays:	Two 12V SPST NO relays (High & Low)
Contact Rating:	10A @ 24 Vdc, 10A @ 250 Vac (Resistive)
Operating Ambient Temperature	
Sensor Probe:	-40 to 93°C (-40 to 199°F)
Electronic Case:	0 to 50°C (32 to 122°F)
Power:	15 to 24 Vdc @ 200 mA
Power Indicator:	Green LED
Dimensions:	89 H x 51 W x 32 mm D (3.5 x 2 x 1.25")
Weight:	160 g (5.6 oz)



FST1000 SERIES
Air Flow Switch With Two SPST Relay Contact Closures

NOTES:



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NOTES:

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 in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

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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