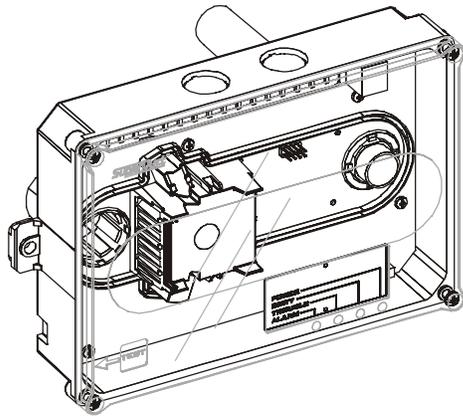# SuperDuct
Four-Wire Smoke Sensor (RJ-45 version)

Product description

The SuperDuct four-wire smoke sensor coupled with a compatible controller make up a SuperDuct four-wire duct smoke detector. The sensor sends an alarm signal to the controller when smoke is detected in the HVAC system. Upon receipt of the alarm signal, the controller takes the appropriate actions to provide early warning of the impending fire and prevent smoke from circulating throughout the building. Sensors can be installed on the supply side and the return side of the HVAC system.

WARNING: SuperDuct duct smoke detectors are not intended as a substitute for open area protection.

The sensor comprises a plastic housing, a printed circuit board, a clear plastic cover, and an exhaust tube. The clear plastic cover permits visual inspections without having to disassemble the sensor. The cover attaches to the sensor housing using four captive screws and forms an airtight chamber around the sensing electronics.

A sampling tube is required to introduce air into the sensor. The sampling tube is ordered separately and varies in length depending on the width of the HVAC duct.

This document provides installation instructions for the following SuperDuct four-wire smoke sensors:

Model	Description
TSD-SJ, ESD-SJ, SD-SJ	Four-wire smoke sensor with RJ-45 modular connector
TSD-SJG	Four-wire smoke sensor with RJ-45 modular connector and cover gasket
TSD-SJCO2	Four-wire smoke sensor with RJ-45 modular connector and TSD-CO2 module

Note: The TSD-CO2 module has not been performance evaluated to UL 2075 or approved by ULC.

Related documents

In addition to this document, information about controller installation and duct smoke detector testing and maintenance can be found in the following:

- *SuperDuct Four-Wire Controller (RJ-45 version) Installation Sheet* (P/N 3100687)

- *SuperDuct 24V Four-Wire Controller (RJ-45 version) Installation Sheet* (P/N 3100962)

- *SuperDuct Four-Wire Duct Smoke Detector Technical Bulletin* (P/N 3100685)

Specifications

Dimensions: 8.70 x 5.45 x 1.90 inches
Smoke detection method: Photoelectric (light scattering principle)
Air velocity rating: 100 to 4,000 ft/min
Air pressure differential: 0.005 to 1.00 inches of water
Sensitivity: 0.67 to 2.46 %obscuration/ft
Reset time: 2 seconds, max.
Power up time: 8 seconds, max.
Alarm test response time: 5 to 7 seconds
LED indicators: Alarm (red), Trouble (yellow), Dirty (yellow), Power (green)
Current requirements: Included in controller specifications
Operating environment
    Temperature: -20 to 70 °C (-4 to 158 °F)
    Temperature with TSD-CO2 module installed: 0 to 55 °C (32 to 131 °F)
    Humidity: 10 to 93%, RH noncondensing at 68 to 72 °C (154.4 to 161.6°F)

Sensor limitations

The sensor will not operate unless connected to a SuperDuct four-wire controller fitted with RJ-45 modular jacks.

The sensor will not sense smoke unless its cover is properly installed and air is moving through the ventilation system.

The sensor must be installed according to these instructions and in accordance with all applicable national and local codes as determined by the local authority having jurisdiction.

The sensor must be operated within the specified electrical and environmental limits.

Installation guidelines

Install the sensor on a flat section of HVAC duct between six and ten duct widths from any bends or obstructions and not more than 15 ft from its controller.

Install supply-side sensors at a point downstream from the supply fan and after the air filter.

Install return-side sensors at a point before the return air stream is diluted by outside air.

Sampling tubes must extend at least two-thirds across the width of the duct. Sampling tubes longer than 36 inches must be supported at both ends.

Installation instructions

Please read these instructions thoroughly before installing. In addition to this document, important information can be found in Technical Bulletin P/N 3100685.

Step 1: Verify the duct air velocity

Drill a small hole at the point where the sensor is being installed. Using the SD-VTK Air Velocity Test Kit and a suitable air velocity meter, verify that the air velocity in the HVAC duct falls within the specified operating range of the sensor and note which direction the air flows.

If the air velocity does not fall within the specified range, relocate the sensor and seal all holes in the HVAC duct.

Note: In order to verify airflow direction and velocity, air must be moving through the HVAC system.

Step 2: Drill the mounting holes

Attach the drill template to the HVAC duct. Drill (or punch) the mounting holes where indicated. Remove any rough edges from the holes.

Step 3: Assemble the sensor

Assemble the sensor as shown in Figure 1. Rotate the air sampling tube so the inlet holes face the direction of airflow.

Note: In some applications, it may be desirable to install the sampling tube through the front of the sensor. For details, refer to Technical Bulletin P/N 3100685.
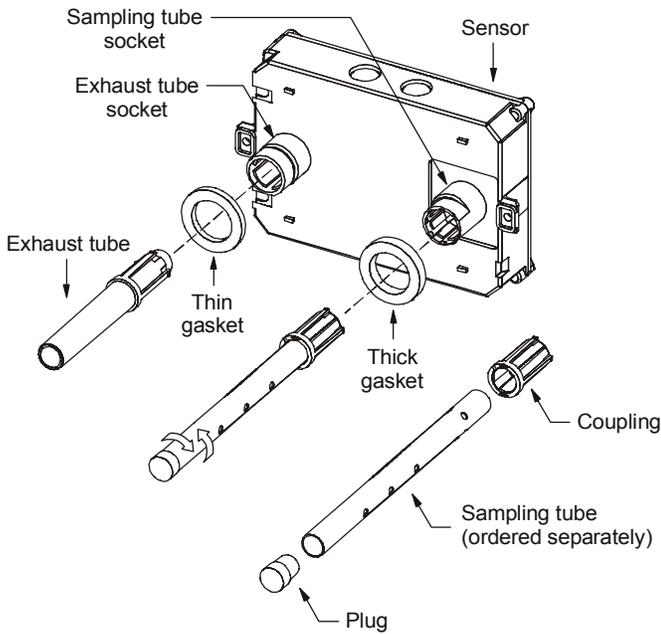

Figure 1: Sensor assembly diagram

Sampling tubes must extend at least two-third across the width of the duct and must be supported at the far end if longer than 36 inches. Sampling tubes are available in the lengths listed below.

Model	Description
SD-T8	8-inch sampling tube
SD-T18	18-inch sampling tube
SD-T24	24-inch sampling tube
SD-T36	36-inch sampling tube
SD-T42	42-inch sampling tube
SD-T60	60-inch sampling tube
SD-T78	78-inch sampling tube
SD-T120	120-inch sampling tube

Note: For duct widths greater than 36 inches, use a sampling tube that is longer than the width of the duct (see Figure 3).

Step 4: Mount the sensor

Mount the sensor to the HVAC duct as shown in Figure 2. Secure the sensor using the two sheet metal screws provided in the hardware kit.
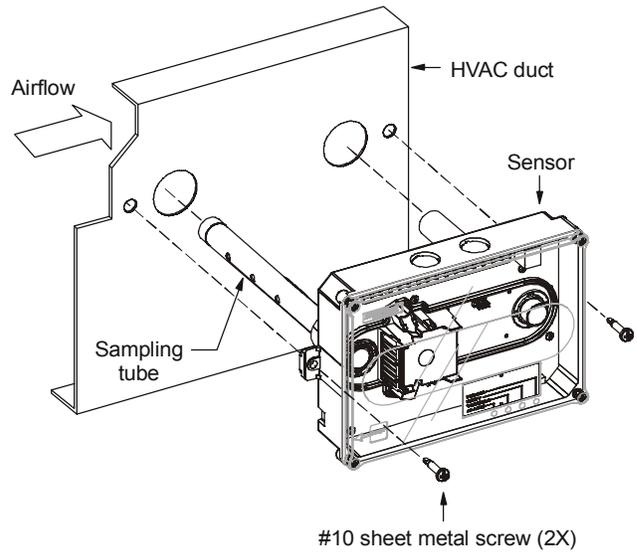

Figure 2: Sensor installation diagram

If the sampling tube is longer than the width of the duct, drill a 3/4-inch hole on the opposite side of the duct. Extend the sampling tube through the hole as shown in Figure 3 and seal all openings outside the duct with an approved sealant.
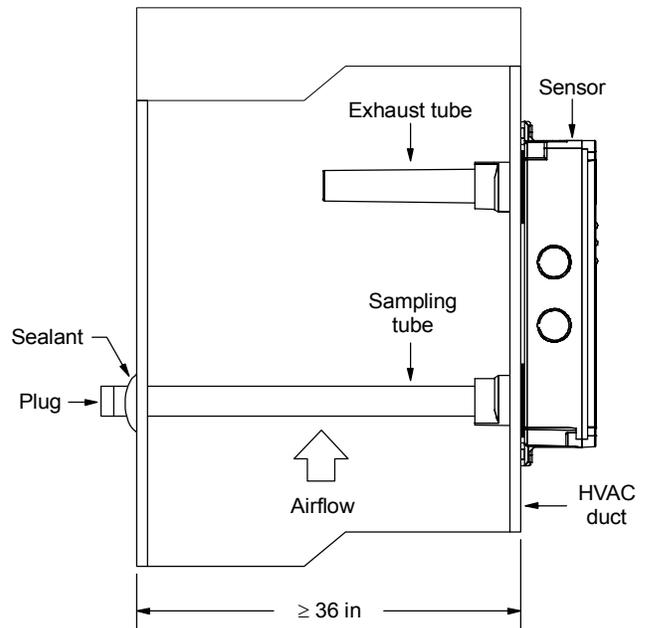

Figure 3: Installation with sampling tubes longer than the width of the duct

Step 5: Verify the air pressure differential

Open the sensor and connect a suitable air pressure differential meter to the sampling tube and exhaust tube openings as shown in Figure 4. Verify that the air pressure differential measured between the two openings falls within the specified operating range of the sensor.
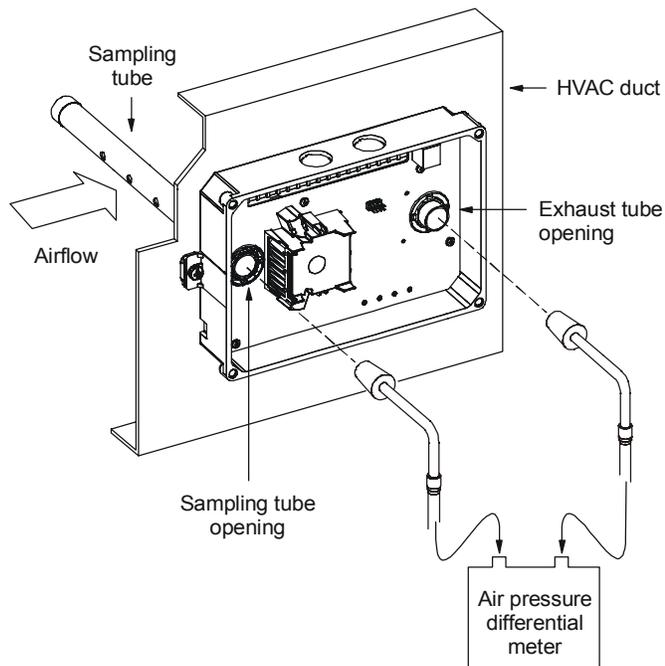
Figure 4: Air pressure differential measurement

Note: To measure air pressure differential, you must have a suitable air pressure differential meter (supplied by the installer) and an SD-VTK Air Velocity Test kit.

Sensor to controller wiring

Connect the sensor to the controller as shown in Figure 5. Make sure the cable grommets are seated securely into their respective openings.
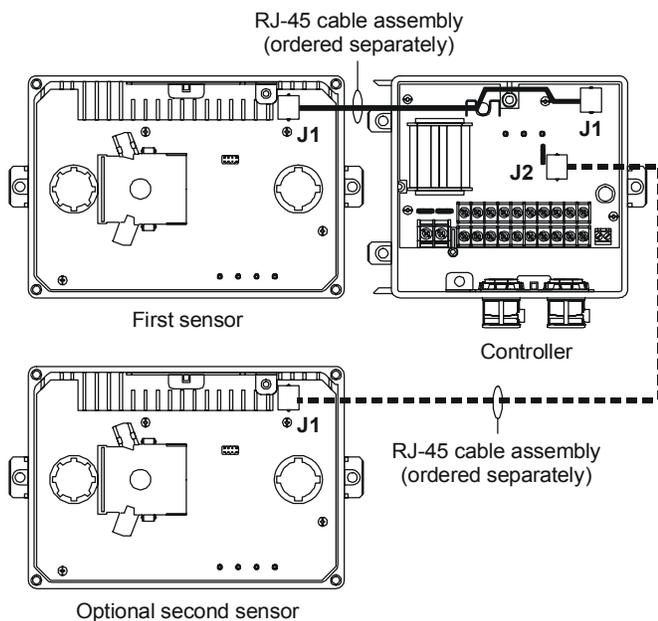

Figure 5: Controller to sensor wiring diagram

RJ-45 cable assemblies are available in the lengths listed below.

Model	Description
SD-RJ5	RJ-45 wiring harness kit (5 ft)
SD-RJ10	RJ-45 wiring harness kit (10 ft)
SD-RJ15	RJ-45 wiring harness kit (15 ft)

Note: If strain relief is required, secure the cable assembly using the cable clamps provided in the cable kit.

Testing

After completing the installation, test the sensor to ensure that it is operating correctly before leaving the site. For details, refer to Technical Bulletin P/N 3100685.