



TRF-9311C(E)-AMD

Airflow Measurement Device



TRF-9311C-AMD



TRF-9311CE-AMD

DESCRIPTION

TRF-9311C(E)-AMD airflow measurement devices measure up to five airflows at a single location within an HVAC system—such as fan inlets, DOAS (Dedicated Outdoor Air Systems), ducts, etc.—using velocity pickups.

A TRF-9311C(E)-AMD is often installed to provide airflow measurements for a TrueFit Airflow Measurement System in addition to the system’s OA, RA, and SA measurements.

Both models have one integrated pressure sensor and can receive input from up to four external pressure transducers. Models communicate via either MS/TP or Ethernet.

MODEL	FEATURES			
	Pressure Sensor	RTC	Ethernet Ports	MS/TP Port
TRF-9311C-AMD	✓	✓		✓
TRF-9311CE-AMD	✓	✓	✓	

For fan inlet applications, if piezo rings are not already provided, SSS-111x airflow pickup tubes (with mounting feet) can be mounted on the fan bell in a pitot array. For duct applications, use SSS-101x airflow pickup tubes (with mounting flanges). (See [Airflow Pickup Tubes on page 4.](#)) The parallel array of SSS-1xxx airflow pickup tubes connects via poly tubing to the TRF-9311C(E)-AMD’s differential air pressure ports, or an external pressure transducer. (See [External Transducers on page 6.](#))

AMD SPECIFICATIONS

AMD accuracy ±5%; may be field calibrated.

Integrated Air Pressure Sensor

Δ pressure range 0 to 2” wc (0 to 500 Pa)

Sensor accuracy ±4.5% of the reading or (when near zero) 0.0008” wc (0.2 Pa), whichever is greater (@ 25° C); internally linearized and temperature compensated

Connections Barbed for 1/4 inch FR (Flame Retardant) tubing

Communication Ports

MS/TP (optional) One EIA-485 port (removable terminal block) for BACnet MS/TP, operating at 9.6, 19.2, 38.4, 57.6, 76.8, or 115.2 kilobaud; max. length of up to 4,000 feet (1,200 meters) of 18 AWG shielded twisted-pair, no more than 51 pf/ft (167 pf/m); use repeaters for longer distances

Ethernet (optional) On “E” models only, two 10/100BaseT Ethernet connectors for BACnet IP, Foreign Device, and Ethernet 802.3 (ISO 8802-3); segmentation supported; up to 328 ft (100 m) between controllers (using T568B Category 5 or better cable)



NFC	NFC (Near Field Communication) up to 1 inch (2.54 cm) from the top of the enclosure
Room sensor	Modular STE connection jack for STE-9000 series digital sensors and STE-6010/6014/6017 analog sensors
Auxiliary	One serial port with mini Type B connector (reserved for future use)

Hardware Features

Processor, Memory, and Clock

Processor	32-bit ARM® Cortex-M4
Memory	Programs and configuration parameters are stored in nonvolatile memory; auto restart on power failure
RTC	Real time clock with (capacitor) power backup for 72 hours (“C” model only) for network time synchronization or full stand-alone operation

Indicators and Isolation

LED indicators	Power/status and MS/TP communication or Ethernet status
MS/TP bulbs	One network bulb assembly indicates reversed polarity and isolates circuit
Switch	EOL (end of line) for MS/TP

Installation

Power

Supply voltage	24 VAC (50/60 Hz) or 24 VDC; -15%, +20%; Class 2 only; non-supervised (all circuits, including supply voltage, are power limited circuits)
Required power	TRF-9311C(E)-AMD: 8 VA, plus external loads
Wire size	12–24 AWG, copper, in a removable screw terminal block

Enclosure and Mounting

Weight	14 ounces (0.4 kg)
Case material	Gray and black flame retardant plastic
Mounting	Direct mounting to panels or on DIN rails

Environmental Limits

Operating	32 to 120° F (0 to 49° C)
Shipping	-40 to 160° F (-40 to 71° C)
Humidity	0 to 95% relative humidity (non-condensing)

Warranty, Protocol, and Approvals

Warranty

KMC Limited Warranty 5 years (from mfg. date code)

BACnet Protocol

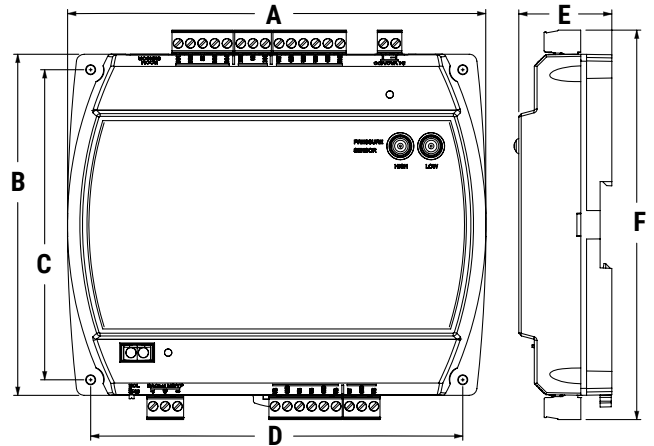
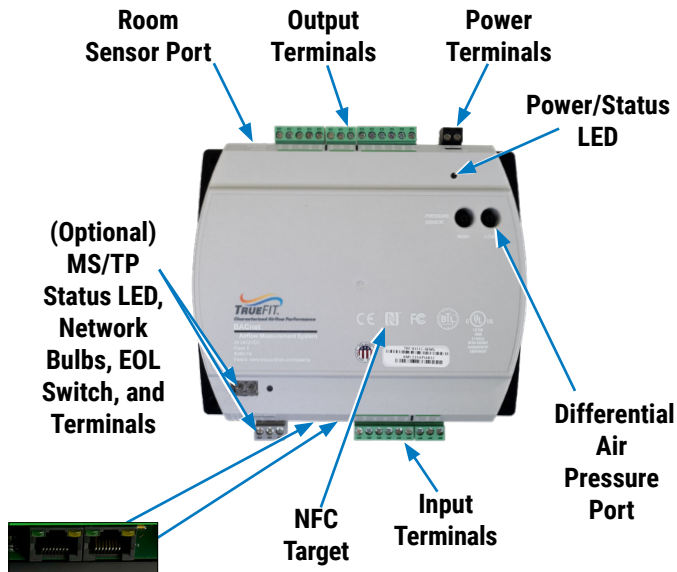
Standard	Meets or exceeds the specifications in ANSI/ASHRAE BACnet Standard 135-2010 for Advanced Application Controllers
Type	BTL-certified as a B-AAC controller type

Regulatory Approvals

UL	UL 916 Energy Management Equipment listed UL 864 Smoke Control Equipment listed (UUKL), 10th edition—for smoke control applications, see Smoke Control Manual for KMC Conquest Systems , P/N 000-035-18)
BTL	BACnet Testing Laboratory listed as Advanced Application Controller (B-AAC)
CE	CE compliant
RoHS 2	RoHS 2 compliant
FCC	FCC Class A, Part 15, Subpart B and complies with Canadian ICES-003 Class A*

*Complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. (NFC operation meets FCC compliance while the controller is in an unpowered state.)

Details and Dimensions



TERMINAL COLOR CODE	
Black	24 VAC/VDC Power
Gray	MS/TP Communications
Green	Inputs and Outputs

DIMENSIONS				
A	6.744 inches	171 mm	D	6.000 inches 152 mm
B	5.500 inches	140 mm	E	1.500 inches 38 mm
C	5.000 inches	127 mm	F	6.279 inches 159 mm

Input/Output Objects/Connections

Inputs		Analog Values		Outputs	
AI9	Diff. Pressure Sensor 1 (integrated, 0-2" wc only)	AV7	Flow 1	A07	Flow 1 (0-10 VDC)
AI3	Differential Pressure Sensor 2 (external)	AV17	Flow 2	A08	Flow 2 (0-10 VDC)
AI4	Differential Pressure Sensor 3 (external)	AV27	Flow 3	A09	Flow 3 (0-10 VDC)
AI5	Differential Pressure Sensor 4 (external)	AV37	Flow 4	A010	Flow 4 (0-10 VDC)
AI6	Differential Pressure Sensor 5 (external)	AV47	Flow 5	Flow 5 is an analog value only	

AIRFLOW PICKUP TUBES

For fan inlet applications, if piezo rings are not already provided, SSS-111x airflow pickup tubes (with mounting feet) can be mounted on the fan bell in a pitot array. For duct applications, use SSS-101x airflow pickup tubes (with mounting flanges). The parallel array of SSS-1xxx airflow pickup tubes connects via poly tubing to the TRF-9311C(E)-AMD's differential air pressure ports, or an external pressure transducer.

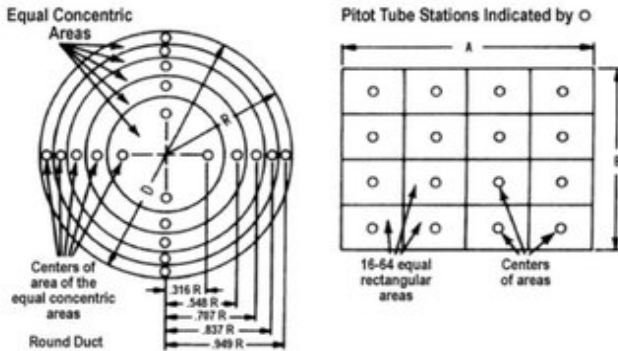
Options for Installation Location

The array of airflow pickup tubes can be installed in one of two places:

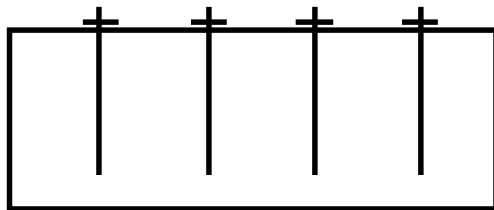
- At a fan inlet
- In a duct, at least 10 duct diameters upstream and 5 downstream of bends, elbows, or restrictions

Arrangement in Parallel Array

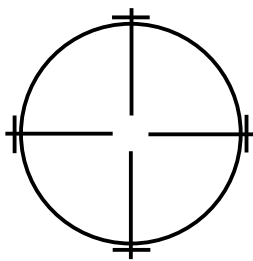
The pickup points must be arranged in a parallel array that evenly covers the area of the fan inlet or duct, similar to what is shown below:



traverse on round and square duct areas



rectangular duct array



round duct array

Determining the Number of Pickup Points

1. Measure the fan inlet or duct:
 - For a fan inlet or circular duct, measure the diameter.
 - For a rectangular or square duct, measure the length of the longest side.
2. Consult one of the tables below to determine the total minimum number of pickup points needed:

FOR A RECTANGULAR OR SQUARE DUCT	
If the longest side is less than or equal to:	Total minimum number of pickup points needed is:
4 inches	2
15 inches	3
24 inches	4
35 inches	5
48 inches	6
63 inches	7
80 inches	8
99 inches	9
100 inches or greater	10

FOR A FAN INLET OR CIRCULAR DUCT	
Duct diameter	Total minimum number of pickup points needed:
<10 inches	6
≥10 inches	10

Selecting the Tubes

Select multiple airflow pickup tubes (at least two) from below that are the maximum length that will fit in the space and total to at least the minimum number of pickup points needed:

SSS-101x models have 3/16" connections for 1/4" outer diameter polyethylene tubing and flat mounting flanges for installation in ducts (or on fan inlets that have struts):

- SSS-1012** One pickup point, 80 mm (about 3") length tubes
- SSS-1013** Two pickup points, 137 mm (about 5.5") length tubes
- SSS-1014** Three pickup points, 195 mm (about 8") length tubes
- SSS-1015** Four pickup points, 252 mm (about 10") length tubes



SSS-101x airflow pickup tubes

SSS-111x models have 3/16" connections for 1/4" outer diameter polyethylene tubing and right-angled mounting feet for installation on the supply air fan bell.

Single mounting feet:

- SSS-1112** One pickup point, 80 mm (about 3") length tubes
- SSS-1113** Two pickup points, 137 mm (about 5.5") length tubes
- SSS-1114** Three pickup points, 195 mm (about 8") length tubes

Dual mounting feet:

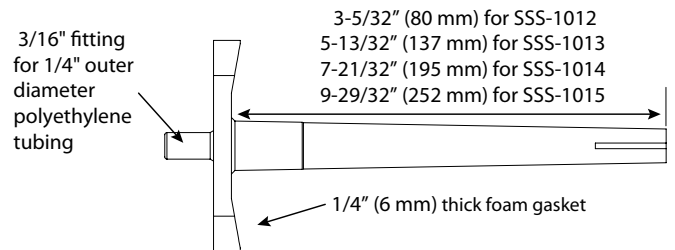
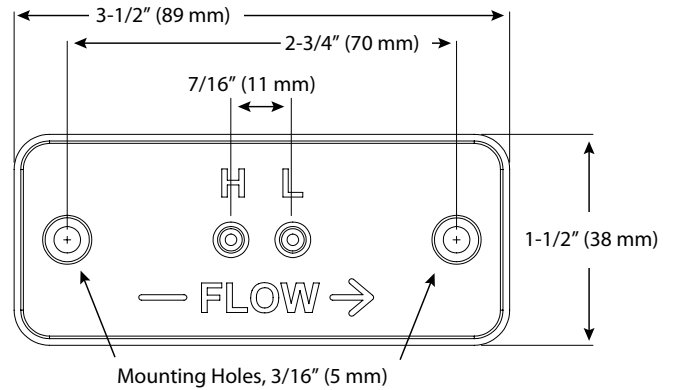
- SSS-1115** Four pickup points, five sections, 315 mm (about 13") length tubes
- SSS-1116** Five pickup points, six sections, 395 mm (about 15.5") length tubes
- SSS-1117** Six pickup points, seven sections, 457 mm (about 18") length tubes



SSS-111x airflow pickup tubes

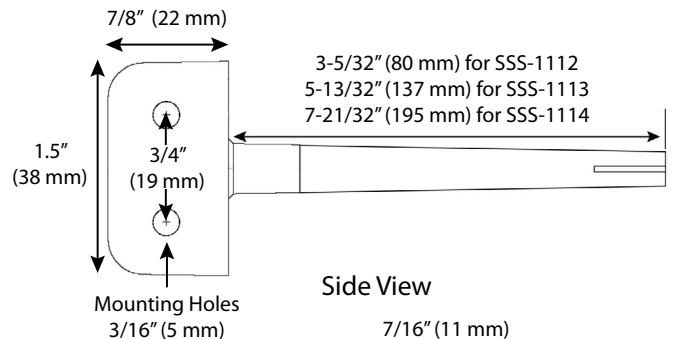
Dimensions and Details

SSS-101x Models

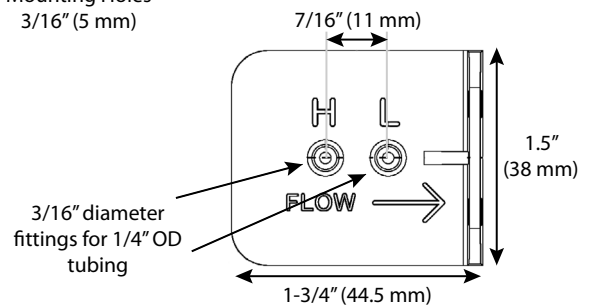


SSS-1112/1113/1114 Models

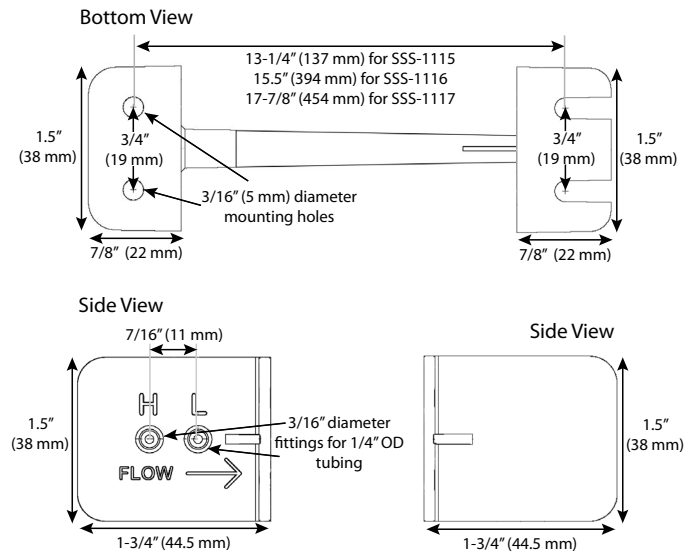
Bottom View



Side View



SSS-1115/1116/1117 Models



Specifications

Material	ABS/polycarbonate (UL94-5V)
Weight	1 oz. (28 grams)
Temperature Limits	
Operating	40 to 120° F (4 to 49° C)
Shipping	-40 to 140° F (-40 to 60° C)
Approvals	RoHS compliant

Maintenance

Recommend in filtered airstreams. Deployment in unfiltered airstreams will require shorter maintenance intervals.

EXTERNAL TRANSDUCERS

TRF-9311C(E)-AMD have an integrated pressure sensor with a differential pressure range of 0 to 2" wc (0 to 500 Pa). The AMD can also receive input from up to four external pressure transducers. Select the number and type needed from the table below (or select similar differential pressure transducers).



MODEL NUMBER	INPUT PRESSURE RANGES (SELECTABLE)
TPE-1475-21	-2 to +2" or 0 to 2" wc (-0.5 to +0.5 kPa or 0 to 0.5 kPa)
TPE-1475-22	-10 to +10" or 0 to 10" wc (-2.5 to +2.5 kPa or 0 to 2.5 kPa)

Specifications

Pressure Ranges	See table above.
Accuracy	±1% FSO (Full Scale Output)
Measurement Type	Differential (two port) or static
Response Time	250 ms
Stability	< ±1% FSO per year
Thermal Effects	< ±3% over compensated range
Compensated Range	32 to 122° F (0 to 50° C)
Proof Pressure	40" wc (10 kPa)
Burst Pressure	120" wc (30 kPa)
Operating Conditions	32 to 122° F (0 to 50° C), 10 to 90% RH non-condensing
Media Compatibility	Non-corrosive, non-ionic clean dry air or inert gases
Power Supply (at transmitter)	20 to 28 VAC/VDC (non-isolated half-wave rectified)
Supply Current	< 4 mA in voltage mode or 20 mA max. in current mode
Input Voltage Effect	Negligible over specified operating range
Protection Circuitry	Reverse voltage protected and output limited

Output Signal Options

4–20 mA (2-wire)

0–10 VDC (3-wire)

Output Drive Capability

400 ohm maximum @ 24 VDC for current mode or 10K ohms minimum for voltage mode

Zero Adjustment

Push-button auto-zero

Wiring Connections

Screw terminal block (14 to 22 AWG)

Pressure Connections

Barbed ports for 0.170" (5 mm) ID flexible tubing (two for TPE-1475 or one port and one probe for TPE-1477)

Conduit Connection

Access hole for 1/2" NPT conduit or cable gland

Enclosure Material

Polycarbonate UL94-V0, IP65 (NEMA 4X)

Weight

6 oz. (170 grams)

Manufacturing

ISO 9001 registered quality system

Approvals

CE and RoHS Compliant

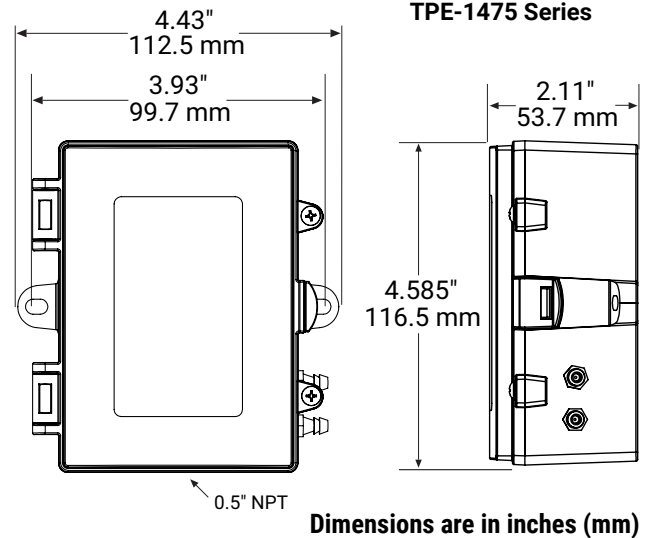
▲ CAUTION

Ensure that the maximum individual port pressure does not exceed the maximum pressure range of the unit.

Use electrostatic discharge precautions during installation and do not exceed the device ratings.

Do not use in an explosive or hazardous environment, with combustible or flammable gases, as safety or emergency stop devices, or in any other application where failure of the product could result in personal injury.

Dimensions and Mounting



Avoid locations with severe vibrations or excessive moisture. Mount the transmitter on a vertical surface using #10 screws (not supplied) through the two integrated mounting holes. The enclosure has a opening for a standard 1/2-inch conduit fitting. Ensure there is enough space around the unit to make the tubing (without kinking) and electrical connections. For added security, two (provided) screws may be installed in the integrated screw tabs of the hinged cover.

