



DESCRIPTION

Building wellness and indoor air quality assurance is the current industry focus. Fresh air exchanges with conditioned outside air are a fundamental component of all major IAQ strategies. The ASHRAE Epidemic Task Force's 2021 *Core Recommendations for Reducing Airborne Infectious Aerosol Exposure* recommend that HVAC systems "provide and maintain at least required minimum outdoor airflow rates for ventilation as specified by applicable codes and standards." ASHRAE Standard 62.1-2019, *Ventilation for Acceptable Indoor Air Quality*, set guidelines for determining ventilation rates for a building. However, reliably measuring outdoor air can be challenging in many equipment types.

The KMC Conquest Airflow Measurement System (AFMS) reliably provides accurate outside, return, and supply airflow data for monitoring and control. The system delivers accurate, repeatable results on any type of equipment, without the traditionally expected mechanical limitations, performance issues, or ongoing maintenance issues.

It consists of the following components, installed on an AHU, RTU, or unit ventilator:

- One controller with airflow measurement programming [BAC-9311C(E)-AFMS or BAC-5901C(E)-AFMS]
- One inclinometer (included with the controller) mounted on an outside air damper blade
- At least two pressure flow pickup tubes (SSS-1000 Series) installed on the supply air duct, or on the fan inlet
- If a BAC-5901C(E)-AFMS is used, one pressure transducer (TPE-1475-21)
- If pressure-assist measurements are needed (for units with changing pressure in mixed and/or return air sec-

tions), one additional pressure transducer (TPE-1475-21), connected to two additional pressure flow pickup tubes (SSS-1000 Series) mounted on both sides of the outside air damper

- Three temperature sensors (STE-1400 Series) for outside, mixed, and return air
- One proportional actuator mounted on the damper shaft

The system measures outside and return air by characterizing damper performance. A characterization curve allows the controller to determine airflow percentages at each angle of the damper. The system's programming generates the curve using a Learn Mode sequence, leveraging the relationship between the inclinometer and a mixed air equation. During Learn Mode, the damper is positioned at several known points. At each point, the airflow and outside, return, and mixed air temperatures readings are allowed to stabilize before being sampled and averaged. Thereafter, the sensors are no longer needed to measure the airflow rates, but can be left installed for recalibration and fault-detection purposes.

FEATURES

- Accurate OA, RA, and SA CFM measurements
- Sensor and system fault detection for Title 24 compliance
- Install without restrictions of installation location
- Reduced system maintenance requirements
- AHU, RTU, and unit ventilator applications
- Applicable to both VAV and CAV systems
- Characterization (Learn Mode) started locally or remotely
- OA volume, MAT, OAD position, and pass through control modes
- **Interoperability with any BACnet open automation system**

COMPREHENSIVE PERFORMANCE TEST RESULTS

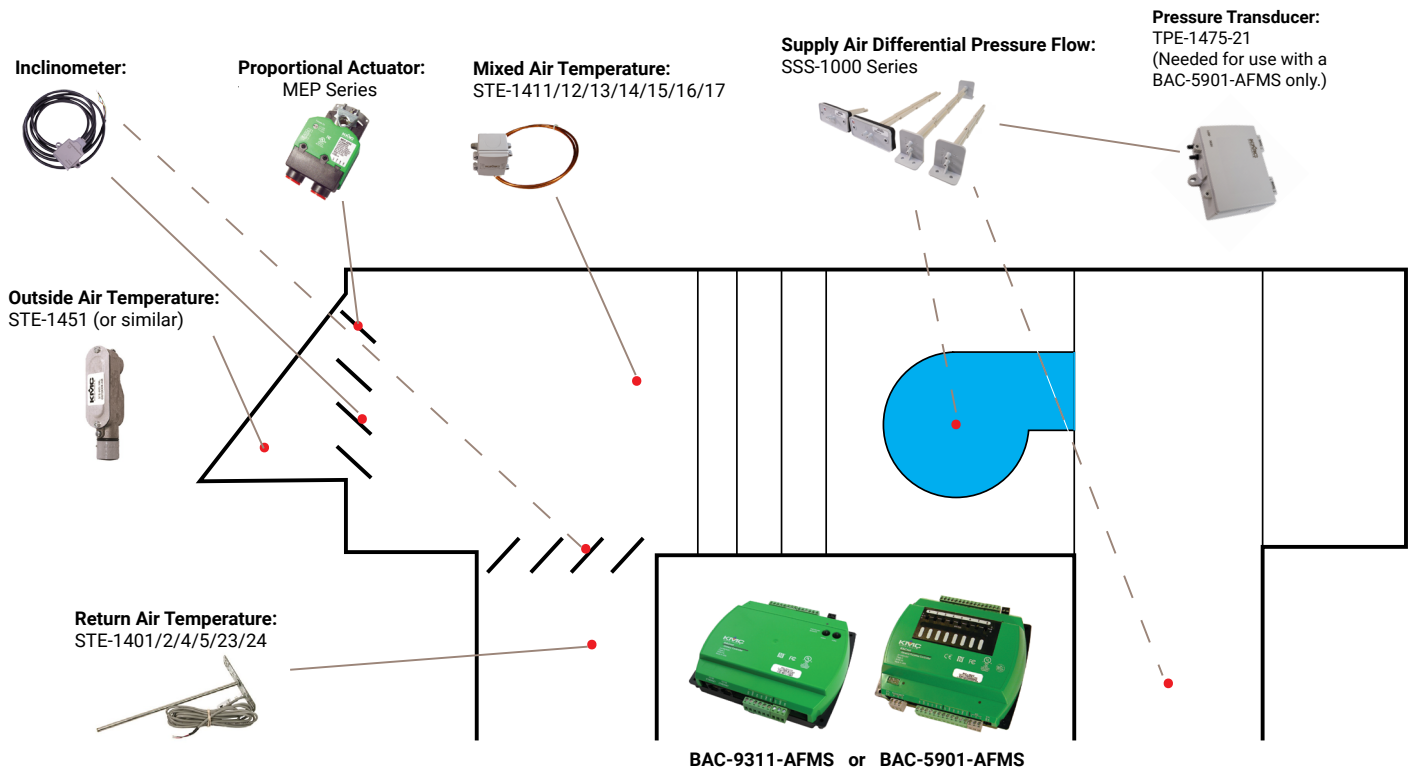
KMC CONQUEST AFMS OA CFM

OA CFM CALCULATION FROM TEMPS

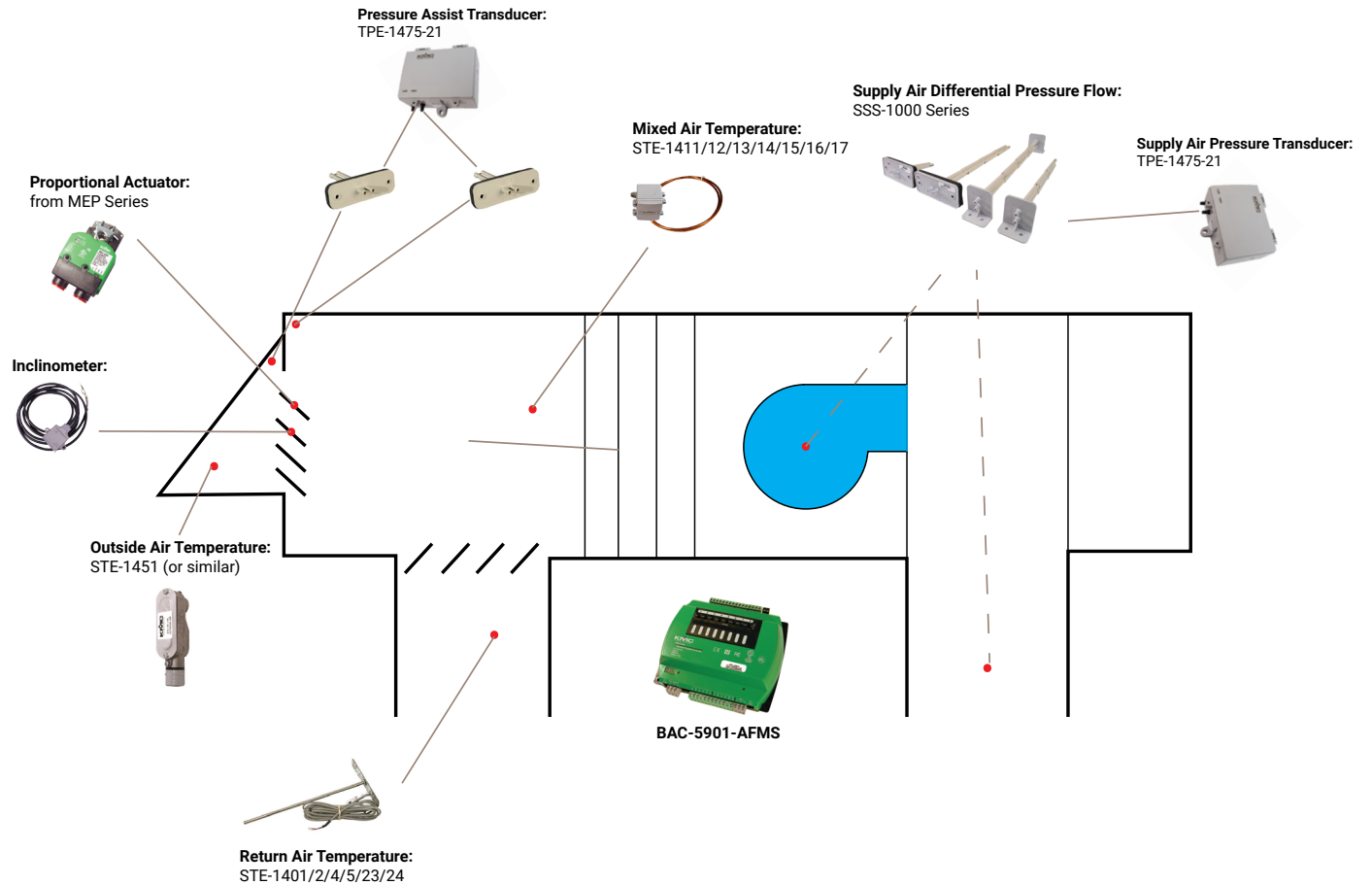


This trend demonstrates the KMC Conquest AFMS outdoor air CFM value (green), with the supply fan and VAV boxes modulating. The mixed air damper is in a steady position. The red line is the outdoor air CFM calculation using a trusted temperature ratio formula in ASHRAE Standard 111, similar to that used in a duct traverse by an air balancer. Note that the KMC Conquest AFMS value closely matches the standard.

Components of a KMC Conquest Airflow Measurement System for *standard* applications:



Components of a KMC Conquest Airflow Measurement System for *pressure assist* applications:



COMPONENTS

NOTE: For details, see the KMC Conquest Airflow Measurement System Selection Guide and the respective product data sheets and installation guides for each component.

AFMS Controller with Inclinometer

NOTE: Select one controller.

BAC-5901C-AFMS	BACnet controller with real-time clock, MS/TP communication port, and inclinometer
BAC-5901CE-AFMS	BACnet controller with real-time clock, two Ethernet communication ports, and inclinometer
BAC-9311C-AFMS	BACnet controller with real-time clock, MS/TP communication port, and inclinometer
BAC-9311CE-AFMS	BACnet controller with real-time clock, two Ethernet communication ports, and inclinometer

Pressure Flow Pickup Tubes

NOTE: Select at least 2.

SSS-1x1x	Pickup tubes, 3-5/32 to 9-29/32 in. (80 to 252 mm) length, with one to six pickup points
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Transducer (BAC-5901-AFMS models only)

NOTE: Select at least 1.

TPE-1475-21	Low Pressure Transducer, -2 to +2' wc
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MAT, RAT, and OAT Sensors

STE-14xx	10,000 ohm, Type III thermistor, temperature sensor
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Proportional Actuator

similar to MEP-4xxx	Actuator, 25 to 90 in.-lb., fail-safe and non-fail-safe
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SPECIFICATIONS

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)

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	BAC-5901C(E)-AFMS: 14 VA, plus external loads BAC-9311C(E)-AFMS: 8 VA, plus external loads
Wire size	12-24 AWG, copper, in a removable screw terminal block

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*

*This device 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.)

SUPPORT

Additional resources for product specifications, installation, configuration, application, operation, programming, upgrading and much more are available on the KMC Controls web site (www.kmcccontrols.com). Log in to see all available files.

