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Description and Application

The award-winning FlexStat is a **controller and sensor** in a single, attractive package that creates a flexible solution to stand-alone control challenges or BACnet network challenges. Temperature sensing is standard with **optional humidity and motion sensing**. Flexible input and output configurations and built-in or custom programming ensure that a variety of application needs can be met. Such applications include single- and multi-stage packaged, unitary, and split systems (including high SEER/EER variable speed packaged equipment), as well as factory-packaged and field-applied economizers, water-source and air-to-air heat pumps, fan coil units, central station air handling units, and other similar applications.

In addition, an on-board library of programs permits a single model to be rapidly configured for a wide range of HVAC control applications. Thus, a single “one size fits all” FlexStat model can replace multiple competitor models. A single BAC-10163CW, for example, can be configured for any and all of these application options:

- ◆ Air handling unit, with proportional heating and cooling valves, and with optional economizer, dehumidification, and/or fan status
- ◆ Fan coil unit, 2-pipe or 4-pipe, proportional or 2-position valves, with optional dehumidification (w/ 4-pipe option) and/or fan status
- ◆ Heat pump unit, with up to two compressor stages, and with optional auxiliary heat, emergency heat, dehumidification, and/or fan status



Still... Made in the U.S.A.

(Shown with Optional Motion and Humidity Sensors)



- ◆ Roof top unit, with up to two H/C stages, and with optional economizer, dehumidification, and/or fan status

FlexStats also provide the capability to customize the standard library of sequences using KMC's BACstage programming tool. This enables a local authorized KMC installing contractor to adapt the standard library to the unique site needs and application specific requirements of a particular project.

Standard hardware options include a mix of output configurations (relays and universal outputs), optional on-board humidity/motion sensing, and inputs for additional remote external sensors such as outside air temperature and fan status sensors.

Features

Interface and Function

- ◆ User-friendly English-language menus (no obscure numeric codes) on a 64 x 128 pixel, dot-matrix LCD display with 5 buttons for data selection and entry
- ◆ Multiple display options include selectable space temperature display precision, degrees F/C toggle, rotation values, display blanking, hospitality mode, and locked mode
- ◆ Built-in, factory-tested libraries of configurable application control sequences
- ◆ Integral energy management control with optimum start, deadband heating and cooling set-points, and other advanced features to assure comfort while maximizing energy savings

- ◆ Schedules can easily be set uniquely by the entire week (Mon.–Sun.), weekdays (Mon.–Fri.), weekend (Sat.–Sun.), individual days, and/or holidays; six On/Off and independent heating and cooling setpoint periods are available per day
- ◆ Three levels of password-protected access (user/operator/administrator) prevent disruption of operation and configuration—plus Hospitality mode and Locked User Interface mode offer additional tamper resistance
- ◆ Integral temperature and optional humidity and/or motion sensors
- ◆ All models have 72-hour power (capacitor) backup and a real time clock for network time synchronization or full stand alone operation
- ◆ Models functionally replace most Viconics and other competitors' products

Inputs

- ◆ Three analog inputs for additional configurable remote external sensors, such as remote space temperature (with averaging, highest, and lowest options), OAT, MAT, DAT, water supply temperature, fan status, and other sensors
- ◆ Inputs accept industry-standard 10K ohm (Type II or III) thermistor sensors, dry contacts, or 0–12 VDC active sensors
- ◆ Input overvoltage protection (24 VAC, continuous)
- ◆ 12-bit analog-to-digital conversion on inputs

Outputs

- ◆ Up to nine outputs, analog and binary (relays)
- ◆ Each short-circuit protected analog output (if any) capable of driving up to 20 mA (at 0–12 VDC in a high-impedance load)
- ◆ The NO, SPST (Form “A”) relays carry 1 A max. per relay or 1.5 A per bank of 3 relays (relays 1–3 or 4–6) @ 24 VAC/VDC
- ◆ 8-bit PWM digital-to-analog conversion on outputs

Installation

- ◆ Backplate mounts on a standard vertical 2 x 4-inch wall handy-box (or, with an HMO-10000 adapter, a horizontal or 4 x 4 handy-box), and the cover is secured to the backplate by two concealed hex screws
- ◆ Two-piece design provides easy, flexible wiring and installation (see [Dimensions and Connectors on page 7](#))
- ◆ Attractive white (standard) or light almond (optional) plastic case

Connections

- ◆ Screw terminal blocks, wire size 14–22 AWG, for inputs, outputs, power, and network
- ◆ A four-pin EIA-485 (formerly RS-485) data port on the underside of the case enables easy temporary computer connection to the BACnet network (access with a KMD-5624 cable—requires use of KMD-5576 or third-party interface)

BACnet Communication and Standards

- ◆ Integral peer-to-peer BACnet MS/TP LAN network communications on all models (with configurable baud rate from 9600 to 76.8K baud)
- ◆ Meets or exceeds BACnet AAC specifications in the ANSI/ASHRAE BACnet Standard 135-2008

Configurability

I/O

- ◆ Up to 7 analog input objects (IN1 is space temperature, IN2–IN4 are 0–12 VDC inputs, IN5 is reserved for humidity, IN6 is reserved for motion detection, IN7 is reserved for CO₂)
- ◆ Up to 9 analog or binary output objects

Value

- ◆ 150 analog value objects
- ◆ 100 binary value objects
- ◆ 40 multi-state value objects (with up to 16 states each)

Program and control

- ◆ 20 PID loop objects
- ◆ 10 program objects (contains a library of 5 built-in programs and customized Control Basic programming in the other 5 program objects can be done through BACstage or TotalControl)

Schedules and trends

- ◆ 2 schedule objects
- ◆ 1 calendar object
- ◆ 8 trend objects, each of which holds 256 samples

Alarms and events

- ◆ 5 notification class (alarm/event) objects
- ◆ 10 event enrollment objects

Models

If your application is a:

- ◆ Packaged Unit, AHU (Air Handling Unit), RTU (Roof Top Unit)—see all models.
- ◆ FCU (Fan Coil Unit)—see the BAC-1xx36CW and BAC-1xx63CW models.
- ◆ HPU (Heat Pump Unit)—see the BAC-1xx63CW models or, for one compressor only, BAC-1xx-30CW models.
- ◆ Other 1 Heat or 1 Cool Unit—see the BAC-1xx-30CW models.

For more details, see [Application/Model Selection Guide on page 4](#).

Model*	Outputs**	Optional Sensors***	Typical Applications
BAC-10030CW	3 Relays (Binary Outputs) (All models have 3 analog inputs)	None	<ul style="list-style-type: none"> • 1H/1C packaged and split systems • 1H 2-position economizer applications • 1H/1C heat pumps (no auxiliary or emergency heat) • Unit heaters • Single-stage cooling applications
BAC-10130CW		Humidity	<ul style="list-style-type: none"> • Same as BAC-10030CW • Dehumidification sequence (AHU)
BAC-11030CW		Motion/Occupancy	<ul style="list-style-type: none"> • Same as BAC-10030CW • Occupancy-based operation
BAC-11130CW		Humidity and Motion/Occupancy	<ul style="list-style-type: none"> • Same as BAC-10130CW • Occupancy-based operation
BAC-10036CW	3 Relays and 6 Analog Outputs	None	<ul style="list-style-type: none"> • 1H/1C, fan, and 6 universal outputs • 3-speed fan, 2- or 4-pipe FCUs with modulating valves • Central station AHUs with modulating/1/2 Heat/Cool • Variable-speed fan output • Single-stage applications
BAC-10136CW		Humidity	<ul style="list-style-type: none"> • Same as BAC-10036CW • Dehumidification sequence • Humidification sequence (AHU or 4-pipe FCU)
BAC-11036CW		Motion/Occupancy	<ul style="list-style-type: none"> • Same as BAC-10036CW • Occupancy-based operation
BAC-11136CW		Humidity and Motion/Occupancy	<ul style="list-style-type: none"> • Same as BAC-10136CW • Occupancy-based operation
BAC-10063CW	6 Relays and 3 Analog Outputs	None	<ul style="list-style-type: none"> • 1 or 2 H and 1 or 2 C, fan • Multi-stage packaged or split systems • Multi-stage heat pumps with or without factory-packaged economizers • Central station AHUs with modulating Heat/Cool • 3-speed fan, 2- or 4-pipe FCUs with modulating or 2-position valves
BAC-10163CW		Humidity	<ul style="list-style-type: none"> • Same as BAC-10063CW • Dehumidification sequence (AHU, 4-pipe FCU, or RTU)
BAC-11063CW		Motion/Occupancy	<ul style="list-style-type: none"> • Same as BAC-10063CW • Occupancy-based operation
BAC-11163CW		Humidity and Motion/Occupancy	<ul style="list-style-type: none"> • Same as BAC-10163CW • Occupancy-based operation

*The standard color is white. To order the optional light almond color, remove the "W" at the end of the model number (e.g., BAC-11163C instead of BAC-11163CW). All models have a real-time clock. All models have optional discharge air temperature monitoring/trending or fan status monitoring.

**Analog outputs produce 0–12 VDC @ 20 mA maximum, and relays carry 1 A max. per relay or 1.5 A per bank of 3 relays (relays 1–3, 4–6, and 7–9) @ 24 VAC/VDC.

***All models have an internal temperature sensor and 3 analog inputs. Optional sensors include humidity and/or motion.

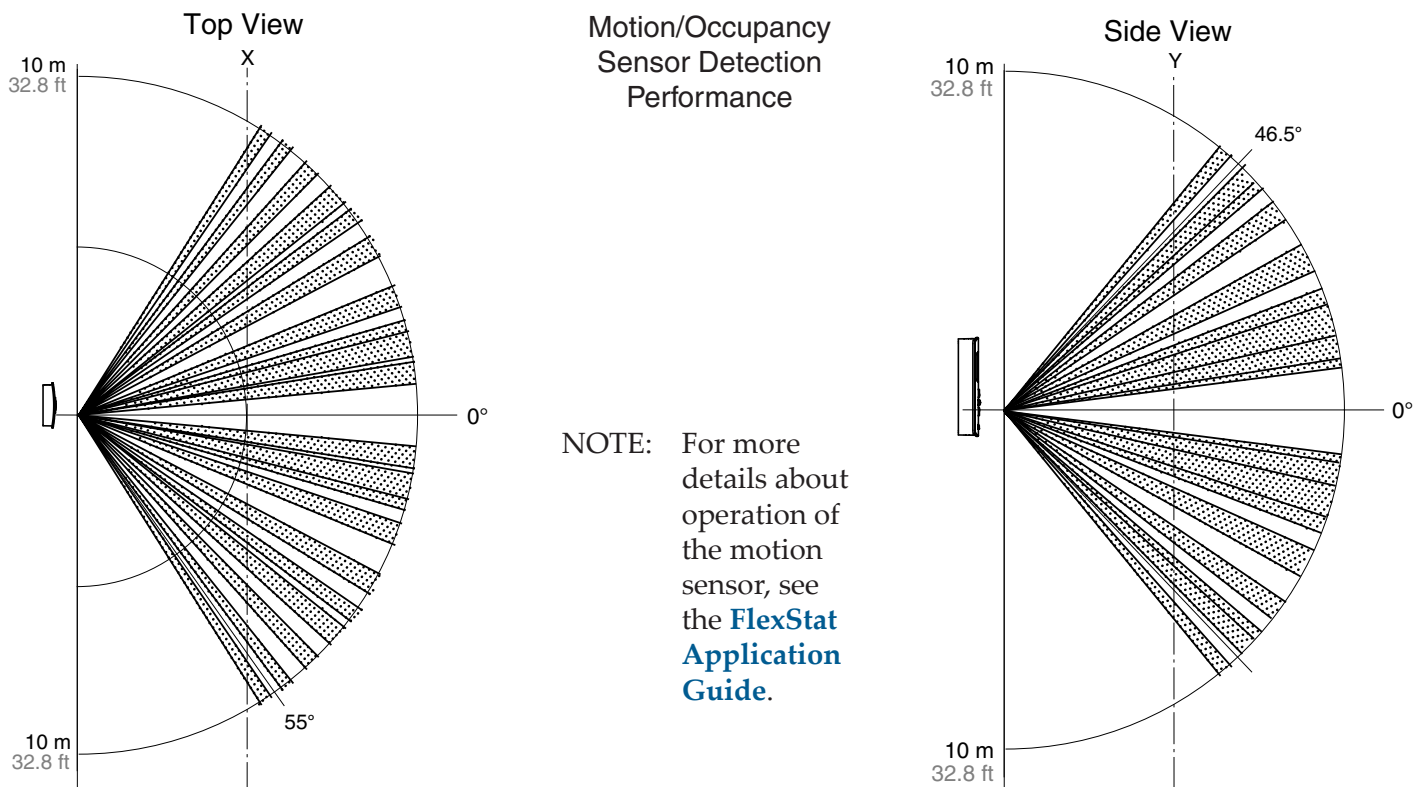
Application/Model Selection Guide

Applications and Options	FlexStat Models and Outputs											
	6 Relays & 3 Analog				3 Relays & 6 Analog				3 Relays & 0 Analog			
	BAC-10063CW	BAC-10163CW (+ Humidity)	BAC-11063CW (+ Motion)	BAC-11163CW (+ Humidity/Motion)	BAC-10036CW	BAC-10136CW (+ Humidity)	BAC-11036CW (+ Motion)	BAC-11136CW (+ Humidity/Motion)	BAC-10030CW	BAC-10130CW (+ Humidity)	BAC-11030CW (+ Motion)	BAC-11130CW (+ Humidity/Motion)
Packaged Unit (Air Handling Unit and Roof Top Unit) (See also Heating OR Cooling Unit)									D/E can select dehumidification or economizer (not both)			
1 Heat and 1 Cool					✓	✓	✓	✓	✓	✓	✓	✓
1 or 2 Heat and 1 or 2 Cool	✓ (In RTU Menu Only)											
1 or 2 Heat and Modulating Cool					✓	✓	✓	✓				
Modulating Heat and 1 or 2 Cool					✓	✓	✓	✓				
Modulating Heat and Modulating Cool	✓ (In AHU Menu Only)				✓	✓	✓	✓				
Opt. Outside Air Damper, Modulating	✓	✓	✓	✓	✓	✓	✓	✓				
Opt. Outside Air Damper, 2 Position	✓ (In RTU Menu Only)				✓	✓	✓	✓	✓	D/E	✓	D/E
Opt. Mechanical Cooling									✓	✓	✓	✓
Opt. Fan Speed Control					✓	✓	✓	✓			✓	
Opt. Dehumidification		✓		✓		✓		✓		D/E		D/E
Opt. Humidifier						✓		✓				
Opt. Motion/Occupancy Sensor			✓	✓			✓	✓			✓	✓
FCU (Fan Coil Unit)	With 3-speed fan				With 3-speed fan							
2 Pipe, Modulating	✓	✓	✓	✓	✓	✓	✓	✓	N/A			
2 Pipe, 2 Position	✓	✓	✓	✓								
4 Pipe, Modulating	✓	✓	✓	✓	✓	✓	✓	✓				
4 Pipe, 2 Position	✓	✓	✓	✓								
Opt. Dehumidification (4 pipe only)		✓		✓		✓		✓				
Opt. Humidifier (4 pipe only)						✓		✓				
Opt. Motion/Occupancy Sensor			✓	✓			✓	✓				
HPU (Heat Pump Unit)	1 or 2 compressors with auxiliary and emergency heat								1 compressor (only)			
Opt. Outside Air Damper, Modulating	✓	✓	✓	✓	N/A							
Opt. Dehumidification		✓		✓								
Opt. Motion/Occupancy Sensor			✓	✓								✓
Heating OR Cooling Unit												
1 Heat (Only) or 1 Cool (Only)	N/A				N/A				✓	✓	✓	✓
Opt. Motion/Occupancy Sensor											✓	✓
<p>All models have a real-time clock. They also have optional discharge air temperature monitoring/trending or fan status monitoring (but not both).</p> <p>To order light almond instead of white, remove W from the end of the model number (e.g., BAC-10036C).</p> <p>Model "Code" for BAC-1mhra CW: BAC = BACnet Device r = Number of Relays (3/6) 1 = Model Series a = Number of Analog Outputs (0/3/6) m = Motion Sensor (0/1) C = Real-Time Clock h = Humidity Sensor (0/1) W = White Color (no W = light almond)</p>												

See also *Models on page 3*.

Specifications

Supply Voltage	24 VAC (+20%/–15%), Class 2	Weight	0.48 lbs. (218 g)
Supply Power	13 VA (not including relays)	Humidity Sensor (Optional)	
Outputs (up to 9)	Analog outputs (if any) produce 0–12 VDC, 20 mA maximum (in a high impedance load) Binary outputs (NO, SPST, Form “A” relays) carry 1 A max. per relay or a total of 1.5 A per bank of 3 relays (relays 1–3 or 4–6) @ 24 VAC/VDC	Sensor Type	CMOS
		Range	0 to 100% RH
		Accuracy @ 25°C	±2% RH (10 to 90% RH)
		Response Time	Less than or equal to 4 seconds
Inputs (IN2–IN4)	Analog 0–12 VDC (active/passive contacts, 10K thermistors)	Motion Sensor (Opt.)	Passive infrared with 10 meter (33 feet) range (see diagrams at right)
Connections	Wire clamp type terminal blocks; 14–22 AWG, copper Four-pin EIA-485	Temperature Sensor (without Humidity)	
Display	64 x 128 pixel dot matrix LCD	Sensor Type	Thermistor, Type II
Case Material	White (standard) or light almond flame-retardant plastic	Accuracy	±0.36° F (±0.2° C)
Dimensions	5.551 x 4.192 x 1.125 inches (141 x 106 x 28.6 mm)	Resistance	10,000 ohms at 77° F (25° C)
Approvals	UL 916 Energy Management Equipment; FCC Class B, Part 15, Subpart B and complies with Canadian ICES-003 Class B; BACnet Testing Laboratory (BTL) listed; SASO PCP Registration KSA R-103260	Operating Range	48 to 96° F (8.8 to 35.5° C)
		Temperature Sensor (with Humidity)	
		Sensor Type	CMOS
		Accuracy	±0.9° F offset (±0.5° C) from 40 to 104° F (4.4 to 40° C)
		Operating Range	36 to 120° F (2.2 to 48.8° C)
		Environmental Limits	
		Operating	34 to 125° F (1.1 to 51.6° C)
		Shipping	–22 to 140° F (–30 to 60° C)
		Humidity	0 to 95% RH (non-condensing)



Accessories

Damper (OAD/RTD) Actuators (Fail-Safe)

- MEP-5372** 6.25 ft² max. damper area, 50 in-lb., 2–10 VDC, 19 VA
- MEP-7252** 15 ft² max. damper area, 120 in-lb., 0–10 VDC, 25 VA
- MEP-7552** 22.5 ft² max. damper area, 180 in-lb., 0–10 VDC, 25 VA
- MEP-7852** 40 ft² max. damper area, 320 in-lb., 0–10 VDC, 40 VA



Mounting Hardware

- HMO-10000** Horizontal or 4 x 4 handy box wall mounting plate for BAC-12xxxx models (not needed for BAC-13xxxx/14xxxx models), light almond (shown)
- HMO-10000W** HMO-10000 in white
- SP-001** Screwdriver (KMC branded) with flat blade (for terminals) and hex end (for cover screws)



Network Communications and Firmware

- HTO-1103** FlexStat firmware upgrade and BAC-14xxxx CO₂ calibration adapter kit
- KMD-5567** Network surge suppressor
- KMD-5575** Network repeater/isolator
- KMD-5576** EIA-485 to USB Communicator
- KMD-5624** PC data port (EIA-485) cable (FlexStat to USB Communicator)—included with the KMD-5576 (buy for third-party EIA-232 interfaces)



Relays (External)

- REE-3211** (R1/R2/R3) SPDT, multi-voltage control relay, 1.2 VA
- REE-3112** (HUM) SPDT, 12/24 VDC control relay



Sensors (External)

- CSE-110x** (FST) differential air pressure switch
- STE-1402** (DAT) duct temperature sensor w/ 8" rigid probe
- STE-1416** (MAT) 12' (flexible) duct averaging temp. sensor
- STE-1451** (OAT) outside air temp. sensor
- STE-6011** Remote space temp. sensor
- SAE-10xx** Remote CO₂ sensor, space or duct
- STE-1454/1455** (W-TMP) 2" strap-on water temp. sensor (with or without enclosure)



Transformers, 120 (or more) to 24 VAC (TX)

- XEE-6111-040** 40 VA, single-hub
- XEE-6112-040** 40 VA, dual-hub
- XEE-6311-050** 50 VA, dual-hub
- XEE-6311-075** 75 VA, single-hub
- XEE-6311-100** 96 VA, dual-hub



Valves (Heating/Cooling/Humidification)

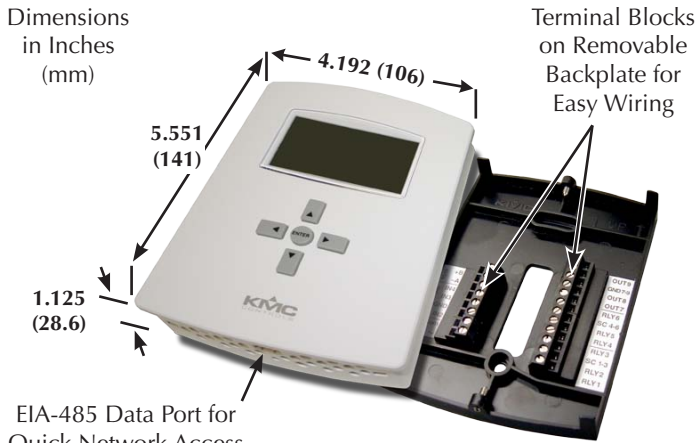
- VEB-43xxxBDL** (HUMV/CLV/HTV) Fail-safe control valve, w/ MEP-5372 2-10 VDC actuator, 19 VA
- VEB-43xxxBCK** (VLV/CLV/HTV) control valve w/ MEP-4002 0–10V actuator, 4 VA
- VEZ-4xxxxMBx** (VLV/CLV/HTV) fail-safe control valve, 24 VAC, 9.8 VA



NOTE: For details, see the respective product data sheets and installation guides. See also the [FlexStat Application Guide](#).

Dimensions and Connectors

Dimensions
in Inches
(mm)



EIA-485 Data Port for
Quick Network Access

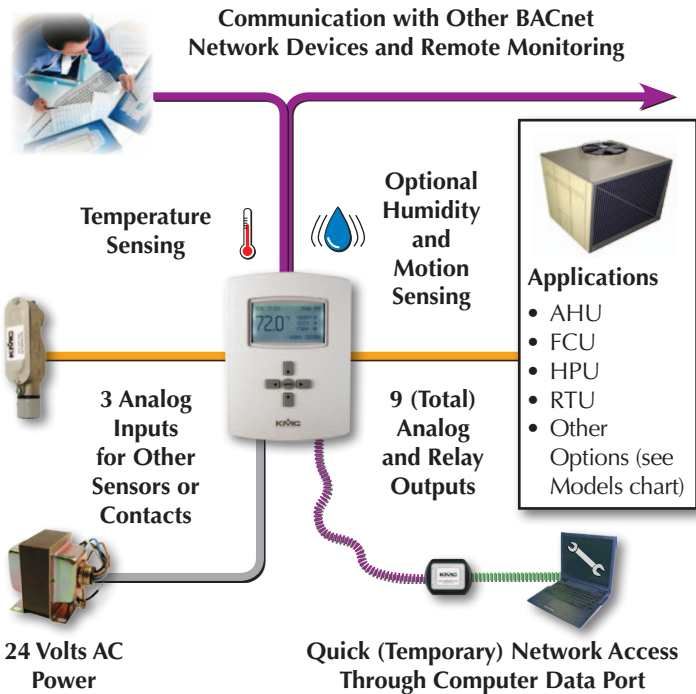
NOTE: Two-piece design allows field rough-in and termination of field wiring to the backplate without needing the FlexStat at the site—permitting FlexStats to be bulk-configured off-site and plugged into the wired backplates at a later time if desired.

Product and Documentation Awards

- ◆ Gold medal in the Networked/BAS category of *Consulting-Specifying Engineer* magazine's Product of the Year competition (September 2010)
- ◆ Editors' Choice product in *Commercial Building Products* (October 2010)
- ◆ Winner in the HVAC & Plumbing category of *Green Thinker Network's Sustainability 2012* competition (April 2012)
- ◆ FlexStat support documents also won an Award of Merit in the 2009–2010 publications competition sponsored by the Chicago Chapter of the Society for Technical Communication (April 2010)



Sample Installation



Support

FlexStats come with a printed Installation Guide. Additional award-winning resources for configuration, application, operation, programming, upgrading and much more is available on the KMC Controls web site (www.kmcccontrols.com).



NOTE: For specifications on the newer BAC-12xxxx/13xxxx/14xxxx series FlexStats (with six external inputs and IP/Ethernet and CO₂ options), see the **BAC-12xxxx/13xxxx/14xxxx Series FlexStat Data Sheet** (914-035-01).



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