

Outdoor Airflow Controller Module with Analog Control Output Signal for Proportional Actuators and Analog Input Fan Speed Controllers



- √ Compensate for damper hysteresis, filter loading, wind, stack and fan speed variations
- √ Provide continuous verification of intake flow rates
- √ Demonstrate compliance with ASHRAE Standards 62.1, 90.1 and 189.1
- √ Satisfy LEED prerequisites and document code compliance
- √ Improve indoor air quality and thermal comfort
- √ Save energy

The OAC-4000 can be provided with a single integrated IAT-DI duct probe, one or two integrated IAT-UI or IAT-US universal mount probes or an approved external BACnet MS/TP airflow measurement device.

The OAC-4000 interfaces with approved MS/TP BACnet CO₂ sensors and occupancy counters when DCV is required.

- ❑ Compatible with GreenTrol IAT integrated thermal dispersion airflow/temperature sensors or approved BACnet MS/TP airflow measuring devices
- ❑ 24 VAC/DC or MS/TP BACnet binary input activates occupied mode operation
- ❑ Provide airflow setpoint control, CO₂-DCV or population based-DCV during occupied mode
- ❑ Accepts approved BACnet MS/TP CO₂ sensors or occupancy counters when DCV is required
- ❑ Clamp DCV airflow rates between minimum and maximum airflow limits
- ❑ Supports unoccupied airflow setpoint control
- ❑ Built-in notification alarms
- ❑ Contact closure relay can be assigned to notification alarms or active control mode
- ❑ MS/TP BACnet connection

The OAC-4000 modulates a proportional damper actuator or variable speed fan (VFD or ECM with analog speed control input) to maintain the outdoor airflow rate when an external binary trigger is active (i.e. occupied mode). The binary trigger is typically provided by a thermostat or other analog or MS/TP BACnet binary output. The trigger can also be provided by the 24 VAC control signal used when a two-position actuator is provided for outdoor air control (replace the two-position actuator with a proportional actuator).

Advanced logic and airflow measurement improves traditional CO₂-DCV when demand control ventilation is required. The OAC-4000 controller resets the outdoor airflow setpoint between user defined minimum and maximum airflow limits to maintain either a user defined fixed CO₂ level or variable airflow setpoint based on the population using a built-in CO₂/airflow counting algorithm or external occupancy counter.

The OAC-4000 interfaces with most MS/TP BACnet building automation systems and supports full read/write privileges as a BACnet 1/8 load master. An RS-485 signal isolator is available when an isolated MS/TP network is required.

OAC-4000 Controller Module Technical Specifications

Functionality

Outdoor Air Control (OAC) Modes Supported

- FLOW:** Maintains a user defined airflow setpoint
- CO2:** Maintains a user defined CO₂ level by resetting the outdoor airflow setpoint (requires a CO₂ sensor)
- CO2/OAF:** Maintains a calculated outdoor airflow setpoint based on the estimated ventilation zone population (requires a CO₂ sensor)
- COUNT:** Maintains a calculated outdoor airflow setpoint based on the occupancy counter population (requires an occupancy counter)
- FIXED:** Maintains a fixed damper position (no control)

Unoccupied Air Control (UAC) Mode Option: Yes, maintains a user defined airflow setpoint

Notification Alarms

- "Unoccupied Mode" High/Low Airflow Alarm
- "Outdoor Airflow Mode" High/Low Airflow Alarm
- "All Modes" CO₂ Alarm (requires a CO₂ sensor)
- "All Modes" System Trouble Alarm

Note: Alarms can be assigned to the contact closure relay

User Interface

- Display:** 16-character alpha-numeric LCD
- Navigation:** 4-button interface

Integrated Sensor Capability

Type: Accepts GreenTrol IAT-DI, IAT-UI and IAT-US Thermal Dispersion Airflow and Temperature Measurement Probe (required unless an external MS/TP airflow measurement device is provided). See appropriate IAT product data sheet for probe information.

Available Configurations: IAT-DI Probes

Single Probe: 1 probe x 1 or 2 sensor nodes/probe

Available Configurations: IAT-UI and IFT-US Probes

- Single Probe:** 1 probe x 1 sensor node/probe
- Dual Probe:** 2 probes x 1 sensor node/probe

General Purpose Input

GP1

- Type:** Binary Input (BI1)
- Assignment:** Mode activation trigger signal
- Configurable Ranges:** 0-24VAC or 0-24VDC
- Trigger Threshold:**
 - VAC Configuration:** 7 VAC
 - VDC Configuration:** 3 VAC

Analog Output

A01

- Assignment:** Airflow control signal
- Configurable Ranges:** 0-5V, 0-10V, 2-10V, or 4-20mA
- Maximum Number of Actuators Supported:**
 - 0-5V, 0-10V or 2-10 V:** Unlimited
 - 4-20mA:** 2

Contact Closure Relay

R1

- Type:** Dry contact w/ onboard jumper to drive a remote LED
- Assignment:** OAC alarms or Control Mode
- Status:** Normally Open (N.O.)
- Rating:** 30 VDC or 24 VAC @ 3 amp. max.

Network Connection

N1

- Type:** Non-isolated MS/TP BACnet master connection (provide an RS-485 network isolator if isolation is required)
- B.A.S. Object Read/Write Access:** Yes
- Device Load:** 1/8 load
- Supported Baud Rates:** 9.6, 19.2, 38.4 and 76.8 kbaud
- MS/TP BACnet Airflow Sensor Capability:** One GreenTrol Automation or approved third-party airflow measurement device (cannot be used if an integrated airflow measurement device is connected).
- MS/TP BACnet CO₂ Sensor Capability:** One GreenTrol Automation or approved third-party space mounted or return air CO₂ sensor
- MS/TP BACnet Occupancy Counter Capability:** One to four GreenTrol Automation or approved third-party occupancy counters

Environmental Limits, Power Requirements & Dimensions

Environmental Limits

- Temperature:** -20 to 120 °F [-28.9 to 48.9 °C]
- Humidity:** 5 to 95%

Important: Provide a weather-proof enclosure if the controller module is mounted outdoors

- Power Requirement:** 24 VAC (22.8 to 26.4 under load) @8.5V-A
- Dimensions:** 4.34H x 6.59W x 1.83D in. [110.2 x 167.3 x 46.6 mm]

Universal Insertion Mount Thermal Dispersion Airflow/Temperature Measurement Probe for Ducts



- Compatible with GreenTrol transmitters and controllers that accept IAT integrated sensors
- Thermal dispersion technology
- Calibrated from 0 to 3,000 FPM
- Stable bead-in-glass thermistor sensors
- NIST traceable airflow and temperature measurement
- Accurate and repeatable
- Designed for openings up to 8 square feet
- Universal mounting design facilitates ordering and installation
- Three probe lengths available
- Aluminum probe construction
- FEP plenum rated cable with terminal DIN connector plug provided

Typical Installations:

- Rectangular, round and oval interior supply, return, exhaust and outdoor air intake ducts

IAT (integrated airflow/temperature) sensors reduce cost by eliminating the redundancy of a separate transmitter for airflow and temperature measurement. The processing circuitry and firmware is integrated into one of GreenTrol's microprocessor-based transmitters or application specific controllers.

The IAT-UI airflow/temperature sensor is designed for insertion mounting into interior ducts (ducts protected from rain and/or snow). One or two probes with a single sensor node are typically used. Sensor node airflow accuracy is $\pm 3\%$ of reading to NIST traceable standards. An installed accuracy of $\pm 10\%$ of reading or better can often be achieved without field adjustment. A field adjust wizard built into GreenTrol's transmitters and application specific controllers facilitate field setup when conditions warrant.

The IAT-UI sensor probe uses the principal of thermal dispersion to determine the airflow rate. Thermal dispersion is

ideal for HVAC applications that typically require measurement of low air velocities. Each sensing node uses two thermistors to determine airflow. One thermistor is self-heated above ambient while a second thermistor determines the ambient air temperature. The power dissipated into the airstream is directly related to the airflow rate.

Each thermistor body is a hermetically sealed bead-in-glass probe. Bead-in-glass thermistors have demonstrated extreme stability and superior performance over chip type thermistors used by other manufacturers. The bead-in-glass sensor used has been time tested for over 35 years by GreenTrol's sister company, EBTRON. Thermistors are potted in a waterproof sensor assembly and are designed for years of trouble-free operation.

Each sensing node is individually calibrated at 7 points in high-performance wind tunnels. Transmitters and controllers measure and process each individual sensor node independently. The result is the true average airflow rate and temperature when more than one sensing node is applied.

IAT-UI Technical Specifications

Functionality

Airflow Measurement: Provides individual sensor node airflow rates to compatible GreenTrol transmitters and controllers
Temperature Measurement: Provides individual sensor node temperatures to compatible GreenTrol transmitters and controllers

Airflow/Temperature Measurement Probe

Type: -US Universal Insertion Mount Thermal Dispersion Airflow and Temperature Measurement Probe

Available Configurations

Single Probe: 1 probe x 1 sensor node/probe
Dual Probe: 2 probes x 1 sensor node/probe

Sensing Node Sensors

Self-heated sensor: Precision, hermetically sealed, bead-in-glass thermistor probe
Temperature sensor: Precision, hermetically sealed, bead-in-glass thermistor probe

Probe Tube

Material: Mill finish 6063 aluminum

Probe Mounting Brackets

Material: 304 stainless steel

Probe Length: 6, 8 or 16 in. [152.4, 203.2 or 406.4 mm] (adjustable)

Sensing Node Housing

Material: Glass-filled Polypropylene
Sensor Potting Materials: Waterproof marine epoxy

Sensing Node Internal Wiring

Material: Kynar® coated copper

Probe to Transmitter Cables

Material: FEP jacket, plenum rated CMP/CL2P, UL/cUL listed, -67 to 392 °F [-55 to 200 °C], UV tolerant
Standard Lengths: 10, 25 and 50 ft. [3.1, 7.6 and 15.2 m]
Connecting Plug: 0.60" [15.24 mm] nominal diameter

Airflow Measurement

Sensor Accuracy: ±3% of reading to NIST-traceable airflow standards
Averaging Method: Independent, arithmetic average
Installed Accuracy: Typically better than ±10% of reading in ducts/ openings ≤ 8 sq ft [0.74 sq m]
Calibrated Range: 0 to 2,000 fpm [0 to 10.16 m/s]
Calibration Points: 7

Temperature Measurement

Averaging Method: Independent, velocity weighted
Accuracy: ±0.15°F [0.08 °C]

Environmental Limits & Power Requirements

Environmental Limits

Temperature: -20 to 160 °F [-28.9 to 71.1 °C]

Note: Temperature limits for operation may be limited by the transmitter or controller selected

Humidity: 0 to 100%

Power Requirement: Power is provided by the transmitter or controller and is included in the transmitter/controller power requirement specification