SIEMENS
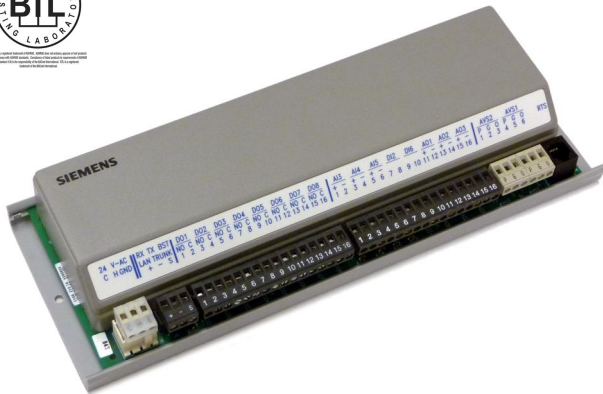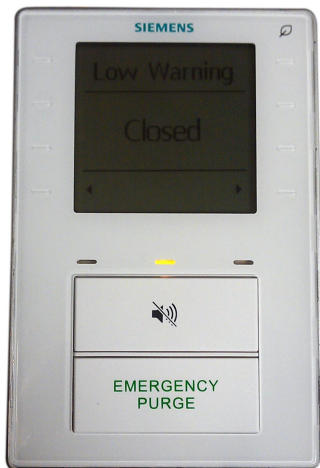
BACnet Fume Hood Controller

BACnet Fume Hood Controller.

Off-board Air Module (550-819B).

Operator Display Panel II (ODP II).

The BACnet Fume Hood Controller is a proven, patented stand-alone Direct Digital Control (DDC) system for Variable Air Volume (VAV) control of laboratory fume hoods. The controller maintains constant face velocity as the fume hood sash is raised and lowered. An Operator Display Panel provides the fume hood user with the face velocity readout, operating status of the hood, alarm horn, and an emergency purge function. The controller operates independently and extends the benefits of DDC to an entire facility's HVAC equipment.

Features

Controller

l   Communicates using BACnet MS/TP protocol for open communications on BACnet MS/TP networks.

l   BTL listed as a B-ASC device.

l   Programmable using PPCL.

l   Plenum rated controller.

l   Constant face velocity fume hood operation.

l   Maintains programmed minimum exhaust flow.

l   True exhaust flow measurement used to monitor safe operation and provide fine flow control.

l   Modular components, easy to install and service.

l   Program and calibration parameters are user-defined or modified via the Laptop Terminal.

l   PID closed loop control for all control devices.

l   Electrically Erasable Programmable Read Only Memory (EEPROM) memory for setpoint and control parameters; no battery is needed.

l   Supports multiple hood sash inputs.

l   Supports external face area calculation inputs.

l   Supports damper, VFD and Venturi Air Valve airflow control devices, and DP or linear flow measurement.

Operator Display Panel II (ODP II)

l   Continuous display of hood operating parameters using a large alpha-numeric display.

l   Colored hood status lights for normal (green), marginal (yellow), and alarm (red) conditions.

l   Purge push-button for activation of emergency operation mode.

l   Alarm horn for high and low face velocity and emergency purge indication.

l   Easy to install and connect to the controller via a single cable and telephone type connectors.

l   "Greenleaf" turns red to indicate unsustainable operation, such as keeping sash open when not in use. Animated graphics to encourage safe use.

l   Communicates using BACnet MS/TP protocol for open communications on BACnet MS/TP networks.

l   BTL listed as a B-ASC device.

l   Programmable using PPCL.

l   Auto-discovery and Auto-addressing over entire MS/TP network. (WCIS 4.0 or later)

l   *(Optional)* UL864 Listed for Smoke Control.

Applications

Operating independently, or integrated with the Siemens Industry, Inc. control system, the Fume Hood Controller may be configured for the following types of laboratory fume hood applications:

l   6740 — 2-position for use with Damper

l   6741 — VAV for use with Damper

l   6742 — VAV for use with Venturi Air Valve or VFD

⚠ **WARNING:**

The applications cannot detect a broken wire to the analog input for the second sash!
The Sash Open Area Module (SOAM) should be used for all fume hoods with more than one sash.

Description

The VAV Fume Hood Controller consists of the following components, which are required for each fume hood:

l   Fume Hood Controller

l   Operator Display Panel, Power Module and Cable

l   Sash Sensor Kits (Vertical/Horizontal)

l   Hoods with more than 1 sash will require use of Sash Open Area Module (SOAM)

l   Airflow Measurement and Control Options

Works with airflow control devices with electronic or pneumatic actuation.

Controller

The Fume Hood Controller consists of a control circuit board and metal enclosure. The enclosure may be mounted directly on the exterior of the fume hood or remotely on the laboratory wall or ceiling. The controller circuit board is snap mounted inside the enclosure and provides all wiring terminations for input and output points, 24 Vac power, FLN trunk, and the Operator Display Panel. A spare digital input and output are provided for user applications such as auxiliary sensors and alarms.

The control algorithms are pre-programmed. The controller is ready to begin operation after selecting the proper application number defining the network address, and appropriate setpoint and control parameters using the laptop terminal. User-definable parameters include:

l   Face Velocity Setpoints:

   Unoccupied, Occupied-High, -Medium, -Low

l   Alarm and Warning Limits

l   Minimum Exhaust Flow

l   Maximum Exhaust Flow

l   Hood Sash Dimensions

l   Control PID Gains

l   Display Resolution

l   Alarm Delay

l   Emergency Setpoint

l   Sash Open Area "Alert" for both Attended and Unattended conditions

The controller uses the measured sash position and the exhaust airflow to calculate the fume hood face velocity using the equation:

Face Velocity = Exhaust CFM ÷ Hood Open Area*

*Includes the sash opening, air foil and bypass area

The face velocity is compared to the face velocity setpoint to calculate the required exhaust flow. The controller modulates the damper using a floating output to maintain the required exhaust airflow. VFD and Venturi Air Valve applications include use of calibration table and an analog output to take advantage of the special flow control characteristics of these devices. The fume hood controller performs this control algorithm up to 10 times per second to ensure maximum speed of response to changes in hood sash upsets. Concurrently, the controller continually monitors and updates all fume hood points including:

l   Face Velocity

l   High/Low Alarms

l   Exhaust Airflow

l   Sash Position

NOTE: Fume hoods with more than one sash require use of a Sash Open Area Module (SOAM).

BACnet FHC Specifications

Dimensions	4-1/8" W × 11-1/4" L × 1-1/2" H (105 mm × 197 mm × 38 mm)
Weight	Approx. 3 lbs (1.35 kg)

Power Requirements	
Operating Range	19.2 to 27.6 Vac 50 or 60 Hz
Power Consumption	8 VA (Nominal) to 12 VA (Peak) @ 24 Vac (plus 12 VA per DO)

Inputs	
Analog	1 Vertical sash sensor (10K thermistor) 1 Spare AI (0 to 10 Vdc/4 to 20 mA) 1 External face area or Flow sensor (0 to10 Vdc/4 to 20 mA) 2 air velocity sensor inputs (Only for OAM inputs)
Digital	2 dry contacts

Outputs	
Analog	(3) 0 to 10 Vdc
Digital	(8) DO 24 Vac optically isolated solid state switches @ 0.5 amp (1) DO dedicated to AZ function

Communications	
Remote	BACnet MS/TP (EIA 485), 9600 bps to 76800 bps FLN Trunk
Local	WCIS and PTEC Tool
Control Performance Speed of Response	<1 second to flow change

Ambient Conditions	
Shipping and Storage Temperature	-13°F to 158°F (-25°C to 70°C)
Operating Temperature	32°F to 122°F (0°C to 50°C)
Humidity Range	5% to 95% rh (non-condensing)

Airflow Sensing and Control	
OAM Measurement Range Accuracy	0 to 5600 fpm (0 to 26 m/s) 3.5% reading maximum error from velocity pressure of 0.02"WC(5 Pa) to 2.0% error at maximum velocity.
(Optional) Differential Pressure Input Measurement Range Accuracy	0 to 2.5" WC ± 0.4 % FS
Speed of Response	<1 second to flow change

Agency Listings	
UL Listing	UL 916, PAZX
cUL Listed	Canadian Standards C22.2 No. 205, PAZX7
FCC Compliance	47 CFR Part 15
BTL Listed	As a B-ASC device

Operator Display Panel

The Operator Display Panel (ODP) includes a custom designed package for visual and audible indication of fume hood operating conditions and push-buttons for emergency mode operation, alarm silence and user-defined auxiliary functions. The panel is mounted on the fume hood in an easy-to-access location and will fit over an unused hood electrical box or over pre-drilled holes. RJ-11 type connectors provide termination to the Fume Hood Controller and for the Portable Operator's Terminal. One Operator Display Panel is supported per Fume Hood Controller.

The Operator Display Panel supports the following functions:

l   Digital display of face velocity in fpm (MPS)

l   Green, yellow and red status lights

l   Emergency purge push button

l   Alarm horn with silence push button

l   Auxiliary push buttons for more information

l   Animated Graphics to encourage users to close sashes when not using the hood

The face velocity display also indicates high and low alarm conditions, emergency purge activation, and diagnostic failure mode conditions when the controller is in the minimum flow mode. Face velocity fpm (MPS) display may be blanked as an option for applications where the user does not desire the face velocity reading.

Operator Display Panel Specifications

Face Velocity Display Range	0 fpm to 255 fpm (0.0 MPS to 1.3 MPS)
Display Resolution	1 fpm adjustable up to 255 fpm
Push-Buttons Switch inputs	1 Emergency Purge 1 Horn Silence 2 Momentary Auxiliary
Alarm Horn	85 dB @ 4" (10 cm)
Dimensions	5.5" H × 3.125" W × 1.5" D (140 mm × 80 mm × 39 mm)
Weight	8 oz. (0.2 kg)

Product Ordering

Description	Product Part Number
BACnet Fume Hood Controller	570-00701PA
BACnet Lab Controller Module	570-8xxPA
BACnet Fume Hood Controller (smoke listed)	570-00701PKA
Sash Open Area Module	DXA.S12C
Off-board Air Module	550-819B

Description	Product Part Number
Operator Display Panel	575-820A
Power Module (for ODP)	AQM2200
UniTrak Sash Sensors	149-269
Room Sensor Cable 25 ft.	588-100A
Room Sensor Cable 50 ft.	588-100B
Retracting Cable Sash Sensor 50 in range 80 in range	546-04000 546-04001
Exhaust Terminal	LGEn….n
Venturi Air Valve – Constant Volume – Variable Volume – Zero Leakage Shut-Off	AVCn….n AVVn….n AVZn….n
Venturi Air Valve Accessories	AVAn….n
Laboratory Electronic Actuator	GNP191.1P

Document Information

Description	Product Part Number
BACnet Protocol Implementation Conformance (PIC) Statement	149-1033
BACnet Lab Controller Module	149-855
Operator Display Panel II	149-1029
Conical Venturi Air Valve for Critical Environments	149-524
Venturi Air Valve Accessories	149-495
Laboratory Exhaust Air Terminal	149-320
Laboratory Electronic Actuator Submittal Sheet	155-771
Fume Hood Sash Open Area Module (SOAM) Installation Instructions	A6V10801244
Sash Open Area Module (SOAM) Technical Specification Sheet	A6V10801251
Retracting Cable Sash Sensor	570-112
UniTrak Sensor Assembly Kit	546-00449

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