Lab & Fume Hood Control
MODERN CRITICAL ENVIRONMENT CONTROL

The American Auto-Matrix® critical environments solution provides for the control of all aspects of the laboratory environment and allows simple interface capabilities for interaction with users.

Laboratories can be accessed over the internet through any standard web browser and fume hoods and laboratories can communicate with most Building Automation Systems using the ANSI/ASHRAE industry standard BACnet® protocol.

WEB BASED CONTROL SYSTEM

A collection of laboratories can be networked through the Aspect® environment to provide powerful and robust features including:

- Web-based access to laboratory and fume hood graphics and performance data
- Archival storage of all pertinent laboratory data in secure yet industry standard MySQL databases
- System communicates through BACnet to compatible BMS systems worldwide

LABORATORY CONTROLLER CAPABILITIES

A state-of-the-art laboratory controller used to take charge of the individual laboratory.

- Accumulates fume hood exhaust volumes and provides communications to pertinent laboratory data
- Provides volumetric offset control and/or static pressure control
- Configurable for most control logic and uniquely programmable for specialized control logic and routines.
- Pulse inputs for energy meters and outputs for the control of linear and non-linear dampers and VFD’s
- Internal schedules for laboratory management

FUME HOOD CONTROLLER & DISPLAY

A robust and flexible controller for fume hood face velocity control, display, and configuration through a password-protected touchscreen interface.

- Utilizes popular face area and calibrated Venturi valve open loop control approaches
- Hot wire or vortex shedding face velocity measurement control inputs for closed loop control approaches
- Utilizes direct face velocity measurements to institute closed loop control
- Accommodates all popular types of non-linear dampers and sensors
- Multi-color display flashes different colors for intermediate and critical alarm conditions
- Controller supports intrinsic alarming of critical data points
- BTL listed MS/TP BACnet communications at all standard baud rates

Fume Hood Controller Readings
Venturi Air Valve

- Available in a range of sizes
- Stainless steel control rod
- Baked phenolic P403 Heresite® powder coating
- Zero leakage model available
- Teflon® (optional)
- Venturi valve is a factory calibrated device

BACnet Fume Hood Controller

- 50ms response time
- 18-bit input resolution
- Dedicated full color display
- Native BACnet
- PID control of face velocity (optional)

Sash Position Sensor

- Compact, durable, long cable life
- Withstands impacts and chemicals
- Designed for high-cycle applications

Sash Position

Face velocity calculated by configured sash position; also considers bypass flow and hood leakage

Complete closed loop control based on exhaust flow is made possible using secondary flow measurement (optional)

High-speed tunable PID control algorithms

Electronic Damper Actuator

- 1.5 second travel time through 90° rotation
- Exclusive long-life design
- Non-contact internal control feedback
- Capacitance-based fail safe position control

Fume Hood Display

- 272x480 pixel, color TFT display
- Icon-driven touch screen interface
- Audible and visual alarm indications
- Monitor and modify inputs and control parameters
- Displays real time fume hood operating conditions
- Hood setup routines built-in with no need for secondary software

The Sash Position approach represents a widely accepted method designed to control face velocity based on calculations configured directly into the controller. Face velocity is controlled by calculating the flow area based on sash position and then controlling a calibrated air valve.

Secondary air flow feedback is also possible. The Sash Position method uses polymer coated string pots, a linear airflow valve, and a differential pressure switch to regulate face velocity.
The NB-GPC\textsuperscript{FHC} in combination with the FHC-SD color touch-screen Local User Interface offers unprecedented technology combined with flexibility of control found nowhere else in the industry today.

These controllers offer the maximum in control power, flexibility and speed based on a 32 bit processor with a real time operating system. They employ one of the most complete Native BACnet implementations in the industry.

Flexibility is expanded through the use of the FHC-SD by offering multiple levels of configurability and accessibility designed to give users security and safety on a highly visible, live local user interface. The FHC-SD allows for two-staged alarming, notifying users of a potential problem through visual and audible alarms.

Should a cautionary preset “low/high-limit” be reached, the display will begin to flash yellow and emit a 3 second pulsing alarm from the display as a caution to the hood operator. Should an extreme “low/high-limit” alarm occur, the display then will go into emergency override, displaying a red flashing background and emitting a constant pitch alarm from the display, while driving the damper or valve to a preconfigured position.

A separate emergency touch-screen icon can be operator activated, forcing the controller to activate the preset emergency procedure; which may also include audible and visual alarms through the Native BACnet network.

- Native BACnet control utilizing American Auto-Matrix state of the art GPC technology
- Complies with ASHRAE Standard 110-1995
- 32-bit microprocessor utilizing tunable high-speed PID control algorithms
- PID control loop cycles every 50ms, for exhaust damper output
- I/O updated 20 times per second
- Stand-alone or network operation
- Reliable high-speed communication over twisted pair (EIA-485) wire, up to 115.2k baud
- Controls using measured face velocity or sash position
- Pre-programmed function blocks
- Configurable setpoints, multistage alarms, and alarm delays
- Separate Flow Totalization Network for multiple hood volumetric offset flow control of laboratories
- 18-bit input resolution enables various measured variable inputs (sash position, face / side wall velocity, hood static pressure)
- Emergency saving setback mode via sensor input or network
The FHC-SD is a compact, fume hood controller display device for use with the NB-GPC\textsuperscript{FHC} that offers multiple levels of accessibility, configurability, safety and security on a highly visible live local user interface.

The fume hood mounted FHC-SD can display measured or calculated face velocity (through face velocity or sash position) and allows for two-stage alarming; notifying users of potential problems through visual and audible alarms.

Additionally, the FHC-SD has the ability to setup and modify system-specific information to the NB-GPC\textsuperscript{FHC}.

- Custom Icon Based, 256 Bit Color TFT touch screen local user interface for displaying and modification of system information specific to the NB-GPC\textsuperscript{FHC}
- Multi level numerical password based control
- Includes SD/MMC card socket accessible by removing casing giving the ability to:
  - Flash program upgrades
  - Flash hood set-up to multiple displays
  - Store debugging information for multiple hood applications
- Hood calibration and adjustments through touch screen interface without need for external software
- Programmable Alarming
- Set-up and display English or Metric units
- Chemical resistant Kydex\textsuperscript{®} plastic case, mountable on both US and Euro switch boxes
The NB-GPCLC1 is a fully programmable Native BACnet solution designed for laboratory and critical environment applications, providing hardware flexibility utilizing onboard I/O and STATbus; our innovative sensor networking protocol.

Based on our proven GPC technology, it can be configured to control sensitive environments through the use of both built-in logic blocks and support for line-by-line custom programming.

- Simultaneously supports up to 16 PID control algorithms and 24 comparative logic algorithms that process in 50ms
- Intrinsic alarming of critical data points
- Internal calendars and schedules that can be used to also maintain control if network communications are lost
- Internal enthalpy calculations for energy optimization routines
- 12 onboard universal inputs and is expandable to 24 UIs
- 6 binary outputs and 6 analog outputs which are expandable to 12 and 12
- Communicates BACnet and is BTL listed for compliance with ASHRAE 110-200

The NB-SD is a compact, addressable, network display device for MS/TP based BACnet networks that enables users to quickly monitor their system and easily make changes to the way their building is controlled.

The wall-mounted NB-SD has a touchscreen interface featuring permission-based menu icons, allowing simple navigation to read and write BACnet values, view alarms, grouped data, and point descriptions. The NB-SD is easily configured using API-Pro™ software.

- Color touch screen display for human interaction with the laboratory environment
- Display of the conditions in the laboratory and fume hoods
- Password protected to adjust laboratory conditions locally
- Can interface with up to 150 data points from any device on the local BACnet network
- Up to 50 programmable screens and navigation touch points
- Chemically resistant Kydex cover with Mylar® touch screen protective film
The Auto-Flow critical environments architecture includes a robust family of controllers and peripheral devices. Our Native BACnet implementation is one of the most flexible and open in the controls industry. There is no need for gateways to convert protocols to BACnet with the control architecture, as all controllers are Native BACnet. There are several ways that an Auto-Flow system can be integrated to other systems. It can interface directly via BACnet to most building automation networks and utilize their GUI capabilities.

Moreover, by integrating with Aspect, a complete web-based frontend and data archiving system, a solution is created that can be independent of the installed BMS system or integrated with it. This approach has the further advantage of enabling an interface to Modbus energy measurement technologies.

American Auto-Matrix fume hood controllers, through their implementation of standard and non-standard control objects, make virtually every aspect of the controllers available within the BMS architecture. Any industry standard BACnet system that supports non-standard objects can interface with the control family over its network.

These and other members of the GPC family are peer-to-peer controllers with the ability to share values and information among each other on the BACnet network.

Pressure offset control schemes can be easily implemented in the laboratory controller as can flow offset logic. In the case of the flow offset application, a dedicated cascade flow circuit is available to assure high-speed updates to this control loop independent of the BACnet network when multiple fume hoods are employed in a single laboratory.
Auto-Flow Lab & Fume Hood Control

Auto-Flow. The only solution of its kind in the industry.

The Auto-Flow line offers an unprecedented amount of flexibility and durability through the use of our patented technologies. Fume hoods, laboratories, clean room environments, and other critical environments can be controlled using a number of popular methodologies through BACnet BTL listed controls that are designed for integration to a building automation system. In addition, critical lab data can be accessed and mined through the use of a standard web browser.