CRITICAL ROOM CONTROL
www.criticalroom.com

# Fume Hood Monitor / Controller

## CRC-FHM/C

## FEATURES:

- Full color energy efficient ultra thin LCD touch screen interface
- Stand alone monitor and controller
- Configurable for direct face velocity, constant volume, or sash sensing volumetric control strategies
- Supports vertical and horizontal sash configurations
- Capable of controlling low flow hoods
- Supports CRC valves, exhaust terminals, linear valves and variable frequency drive control
- Fail safe control
- Energy saving sequencing and logic
- Multiple user modes
- Face velocity, CFM (l/s), sash and energy saver alarms
- Supports English and metric readouts
- Audible and visual alarms
- Password protected access
- Visual I/O and network diagnostics
- Water spray and dust resistant ultra thin surface mount or recess mount enclosure.
- Resistive touch control – use bare finger, gloved finger, or stylus for interaction
- All parameters / settings saved in non-volatile memory
- Field configurable, easy, and intuitive menus
- Ability to calibrate the sash and velocity with a touch of a finger
- Supports multiple BMS protocols

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## OVERVIEW:

The Critical Room Control's Fume Hood Monitor / Controller model CRC-FHC accurately monitors and/or controls ventilation of a fume where proper face velocity or air volume is vital. The CRC-FHC can meet the stringent critical environment of; wet chemistry, open bench, bio-containment laboratories, pharmacies, clean rooms and animal research facilities. The CRC-FHC supports variable volume, constant volume and low volume hood configurations. The CRC-FHC controller is configurable for direct velocity control, vertical sash sensing, horizontal sash sensing, combination vertical / horizontal sash sensing and constant volume applications.

The CRC-FHC supports multiple air control devices including the CRC-CLV (Closed Loop Valve), exhaust air terminals, mechanical linear plunger valves and variable frequency drives. Each monitor/controller incorporates an easy to navigate microprocessor based controller with full color touch screen interface. All settings and programming is made via simple touch screen or network.

The CRC-FHC is designed to be a monitor only or complete system controller. Controller analog inputs/outputs and/or communications allow the CRC-FHC to seamlessly integrate with the CRC-CLV valves or building automation systems via hardwire analog inputs, outputs, relays, and / or via network communication.

## DISPLAY:

**Description**: 4.3" full color LED TFT 16 bit (65,535) color depth, sunlight viewable, 320cdm brightness, touch screen interface - resistive touch (will work with gloved finger). Screen is capable of wipe down cleaning and water spray and dust resistant meeting (IP-54)

**Listing**: CSA©, RU(us), UL 60950, UL 94 V-0 (Enclosure)

**Modes**: 4 Modes: In Use, Emergency Override, Standby, Decommission.

**Alarms**: audible 2 Alarms: flow and sash (both have and visual alarms)

**I/O Diagnostic**: Graphical display of controller analog inputs/outputs and digital inputs/ outputs

**Mounting**: Low profile surface

## POWER REQUIREMENTS:

**Input Power**: 22 to 26VAC; 50/60Hz, fully isolated

**Power Draw:** 18 VA Max

**Primary**: 24VAC Input (Isolated)

## ENCLOSURE:

**Dimensions**: 3.625”W x 6”H x .75”D (92 mm x 152 mm x 19 mm)

**Color:** White

**Mounting**: Surface Mount

## ENVIRONMENTAL CHARACTERISTICS:

**Temperature Limits:**

| | |
|---|---|
| Storage: | -40 to 180 |
| Operating: | +0 to 160 |
| Compensated Range: | +35 to 130 |

**Listing**: UL-94-5VA

**EMC**: Œ compliant to EN61326: 1997+A1: 1998+A2: 2001 annex A (heavy industrial)

## CONTROLLER I/O:

**Analog Inputs**: 4

**Analog Outputs**: 4

**Digital Inputs**: 4

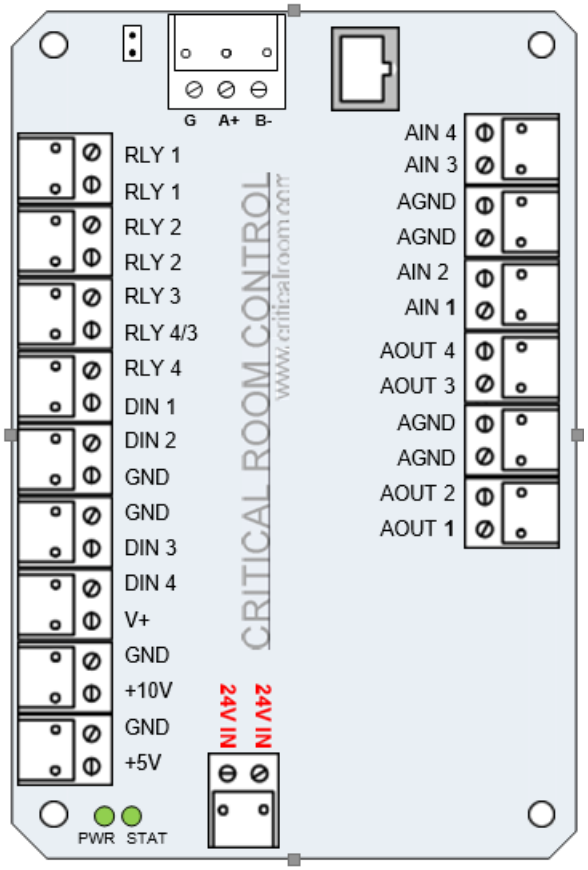
**Relays**: 4 (normally closed - 0.5 A at 125 VAC; 2A at 30 VDC)

**Terminals**: Removable screw terminals (18ga - 26ga wire)

**Enclosure**: Fire retardant, extruded acrylic/PVC Alloy UL94V

**Communication**: RS-485

**Onboard power**: 10vdc (80mA max.), 5vdc (80mA max.), and onboard loop power circuit 22VDC (80mA max.)




## COMMUNICATION:

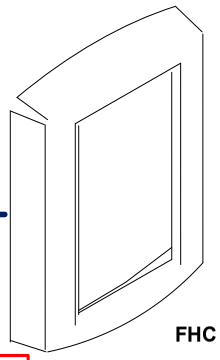
**Connection:** S-485

**Supported Protocol:** BACnet MS/TP: Modbus, Johnson Controls Incorporated N2 & LON with optional card

**Network Debug:** Network communication diagnostics screen

**Network Setup:** Baud rate, MAC address and Instance ID configured via touch screen

# TYPICAL WIRING



RJ45 CABLE (FACTORY PROVIDED- MAX. 25 FEET)

FHC DISPLAY

RJ12

CRC CRITICAL ROOM CONTROL

AUX POWER: V+, GND, +10V, GND, +5V

RELAYS: RLY 4, RLY 3/4, RLY 3, RLY 2, RLY 2, RLY 1, RLY 1

- DIN / DIN — IN USE / STANDBY OPEN = INUSE
- DIN / DIN — SASH ALARM OUT TO BAS CLOSED = ALARM
- DIN / DIN — ALARM OUT TO BAS CLOSED = ALARM

DIGITAL IN: DIN 4, DIN 3, AGND, AGND, DIN 2, DIN 1

- RLY / RLY — PRESENCE SENSOR
- GND / A IN — CASCADE FLOW IN FROM OTHER FHC CONTROLLERS

INPUTS: AIN 4, AIN 3, AGND, AGND, AIN 2, AIN 1

- GND / A IN — HORIZONTAL SASH — V+
- GND / A IN — VERTICAL SASH — V+
- GND / A IN — HOOD VALVE DPT — V+

OUTPUTS: AOUT 4, AOUT 3, AGND, AGND, AOUT 2, AOUT 1

- COMMON / SIGNAL — HEX FLOW OUT (CFM) THIS HOOD ONLY
- COMMON / SIGNAL — HEX FLOW (CFM) INCLUDES ALL HOODS
- COMMON / SIGNAL — HOOD EXHAUST VALVE — 24VAC

BACnet FROM DEVICE: NET +, NET-, SHIELD

BACnet TO DEVICE: NET +, NET-, SHIELD

BACNET: A+, B-, SIG GND

CONTROL TRANSFORMER 24 VAC: 24 VAC, COMMON

ISOLATED POWER

POWER: 24 VAC, Common GND

24 VAC / COMMON — ACTUATOR TRANSFORMER 24 VAC

ISOLATED POWER

# CRC-FHC

**BACnet Point Map (1 of 3)**

| Object Type | Instance ID | Object Name | Description | Active / Inactive Text | Value Type | Purpose |
|---|---|---|---|---|---|---|
| Analog Value | AV 0 | Analog in 1 | Indication of raw voltage signal from CRC-CLV air flow sensor | Percent | Read Only | Diagnostic tool for wiring and raw sensor info |
| Analog Value | AV 1 | Analog in 2 | Indication of raw voltage signal from CRC-CLV air flow sensor | Percent | Read Only | Diagnostic tool for wiring and raw sensor info |
| Analog Value | AV 2 | Analog in 3 | Indication of raw voltage signal from CRC-CLV air flow sensor | Percent | Read Only | Diagnostic tool for wiring and raw sensor info |
| Analog Value | AV 3 | Analog in 4 | Indication of raw voltage signal from CRC-CLV air flow sensor | Percent | Read Only | Diagnostic tool for wiring and raw sensor info |
| Analog Value | AV 4 | In Use Set Point | Current in use set point (FPM or CFM) | FPM/CFM | Read/Write | Allows view of current fume hood in use set point and offers ability to change set point remotely |
| Analog Value | AV 5 | Current Air Flow/Velocity | Displays fume hood current hood face velocity or CFM (Based on | FPM/CFM | Read Only | Remote viewing of hood FPM or CFM (display based on control type) |
| Analog Value | AV 6 | Standby Set Point | Current standby set point (FPM or CFM) | FPM/CFM | Read/Write | Allows view of current fume hood standby set point and offers ability to change set point remotely (Standby = hood not occupied) |
| Analog Value | AV 7 | Current CFM | Displays actual CFM of fume hood exhaust | CFM | Read Only | Monitor current fume hood exhaust CFM |
| Analog Value | AV 8 | Current Sash Area | Indicates the current sash open area | SQFT | Read Only | Monitor sash open area |
| Analog Value | AV 9 | Mode | Indicates the current mode of the fume hood 1 = In use, 2 = Standby, 3 = Emergency Override, 4 = Decommission | 1, 2, 3, 4 | Read/Write | Displays current hood operating mode and allows remote access to change hood control mode |
| Analog Value | AV 10 | Condition | Indicates current hood alarm status 1 = Hood Normal (no alarm), 2 = Caution (hood not maintaining face velocity prior to audible time out), 3 = Alarm | 1, 2, 3 | Read Only | Displays current hood alarm condition |
| Analog Value | AV 11 | Alarm High | Display and allows set point change to alarm set point above fume hood controlled set point | FPM/CFM | Read/Write | Allows remote viewing and adjustment of fume hood alarm set point above controlled set point |
| Analog Value | AV 12 | Alarm Low | Displays and allows set point change to alarm set point below fume hood controlled set point | FPM/CFM | Read/Write | Allows remote viewing and adjustment of fume hood alarm set point below controlled set point |
| Analog Value | AV 13 | Pass through CFM IN | Displays value of CFM from other fume hoods that are being summed through the fume hood controller for volumetric control | CFM | Read Only | When multiple hoods are the FHC allows for flow from other hoods in the space to pass and sum CFM within the fume hood controller and pass on summed CFM to Lab controller for volumetric control |
| Analog Value | AV 14 | Current Sash Open Percent | Displays sash open position in relationship to full open - display in percent (%) open | % | Read Only | Monitor hood sash position and percent open for energy savings and usage |
| Analog Value | AV 15 | K Factor | Displays and allows remote adjustment of the K-factor for CRC-CLV serving the hood exhaust valve | # | Read/Write | Used to check current K-factor and commissioning hood flow (recommended that any changes to hood valve K-factor should be made from hood controller and not remote) |

**BACnet Point Map (2 of 3)**

| Object Type | Instance ID | Object Name | Description | Active / Inactive Text | Value Type | Purpose |
|---|---|---|---|---|---|---|
| Analog Value | AV 16 | Valve Sensor High | Fume hood air valve flow transducer range (High) | "WC | Read/Write | Allows user to view the current fume hood valve differential pressure transducer and allows for remote commissioning |
| Analog Value | AV 17 | Valve Sensor Low | Fume hood air valve flow transducer range (Low) | "WC | Read/Write | Allows user to view the current fume hood valve differential pressure transducer and allows for remote commissioning |
| Analog Value | AV 18 | P Gain | Displays and allows remote change to current proportional value for fume hood control (PI) loop. Increase in proportion-al value will speed the rate of change in damper movement based on error between controlled set point and actual flow. Direct relationship with Integral (I). Proportional (P) set point must be higher than integral (I) | # | Read/Write | Allows for user to view current PI loop settings and make remote changes to settings |
| Analog Value | AV 19 | I Gain | Displays and allows remote change to current integral value for fume hood control (PI) loop. Increase in integral value will speed the rate of change in damper movement based on error between controlled set point and actual flow. Direct relationship with proportional (P). Integral (I) set point must be lower than Proportional (P) | # | Read/Write | Allows for user to view current PI loop settings and make remote changes to settings |
| Analog Value | AV 20 | Min Flow | Displays and allows remote viewing and changes to the fume hoods minimum flow rate. This set point indicates the minimum CFM the hood can operate at regardless of sash position or face velocity. | CFM | Read/Write | Allows viewing of hood minimum flow - capable of adjustment of setting |
| Analog Value | AV 21 | Max Flow | Displays and allows remote viewing and changes to the fume hoods maximum flow rate. This set point indicates the maximum CFM the hood can operate at regardless of sash position or face velocity. | CFM | Read/Write | Allows viewing of hood minimum flow - capable of adjustment of setting |

**BACnet Point Map (3 of 3)**

| Object Type | Instance ID | Object Name | Description | Active / Inactive Text | Value Type | Purpose |
|---|---|---|---|---|---|---|
| Analog Value | AV 16 | Valve Sensor High | Fume hood air valve flow transducer range (High) | "WC | Read/Write | Allows user to view the current fume hood valve differential pressure transducer and allows for remote commissioning |
| Analog Value | AV 17 | Valve Sensor Low | Fume hood air valve flow transducer range (Low) | "WC | Read/Write | Allows user to view the current fume hood valve differential pressure transducer and allows for remote commissioning |
| Analog Value | AV 18 | P Gain | Displays and allows remote change to current proportional value for fume hood control (PI) loop. Increase in proportional value will speed the rate of change in damper movement based on error between controlled set point and actual flow. Direct relationship with Integral (I). Proportional (P) set point must be higher than integral (I) | # | Read/Write | Allows for user to view current PI loop settings and make remote changes to settings |
| Analog Value | AV 19 | I Gain | Displays and allows remote change to current integral value for fume hood control (PI) loop. Increase in integral value will speed the rate of change in damper movement based on error between controlled set point and actual flow. Direct relationship with proportional (P). Integral (I) set point must be lower than Proportional (P) | # | Read/Write | Allows for user to view current PI loop settings and make remote changes to settings |
| Analog Value | AV 20 | Min Flow | Displays and allows remote viewing and changes to the fume hoods minimum flow rate. This set point indicates the minimum CFM the hood can operate at regardless of sash position or face velocity. | CFM | Read/Write | Allows viewing of hood minimum flow - capable of adjustment of setting |
| Analog Value | AV 21 | Max Flow | Displays and allows remote viewing and changes to the fume hoods maximum flow rate. This set point indicates the maximum CFM the hood can operate at regardless of sash position or face velocity. | CFM | Read/Write | Allows viewing of hood minimum flow - capable of adjustment of setting |

**Typical rough in work consists of the following:**

- Mount 1 single gang electrical box for the LCD screen on fume hood pillar
- Mount controller enclosure (8" x 8" x 4"). **Must be mounted less than 20' from LCD screen.*
- Run power (24VAC) 18AWG to controller enclosure.
- Install Sidewall velocity sensor, Vertical Sash Sensor, Horizontal Sash Sensor or combination Vertical/Horizontal Sash Sensor.
- Run RJ12 cable from controller enclosure to Single gang electrical box for LCD screen.
- Run additional wires as needed (network, signal Integration to other devices, etc.)

**Installation Notes:**

- Power to Fume Hood Monitors/Controllers should be isolated
- Monitors/Controllers should have dedicated circuit
- 22 ga. stranded wire is preferred for installation
- Do not run wiring near electrical interference
- Spare wires and/or shield should be wrapped / insulated to eliminate contact with circuits
- Do not share common supply power and I/O between different manufacturers
- Follow all local and national electrical codes

**Parts included with CRC-FHM and CRC-FHC:**

(1) CRC-FHM (FHC) - LCD w/Faceplate

(1) CRC-FHM (FHC) - Control Unit (CRC-FHM/CONT)

(1) CRC-MB Room Monitor Mounting Bracket

(1) CRC-RJ12 Crossover Cable

**Installer supplied parts (not included):**

(1) Single gang electrical box (LCD mounting pillar of fume hood)

Power (18 AWG recommended)

Signal Wire (22 AWG recommended)

**Optional Equipment:**

(1) CRC-VSS Vertical Sash Sensor

(1) CRC-HSS Horizontal Sash Sensor

(1) CRC-SVS Sidewall Velocity Sensor

(1) CRC-OCC Occupancy Sensor

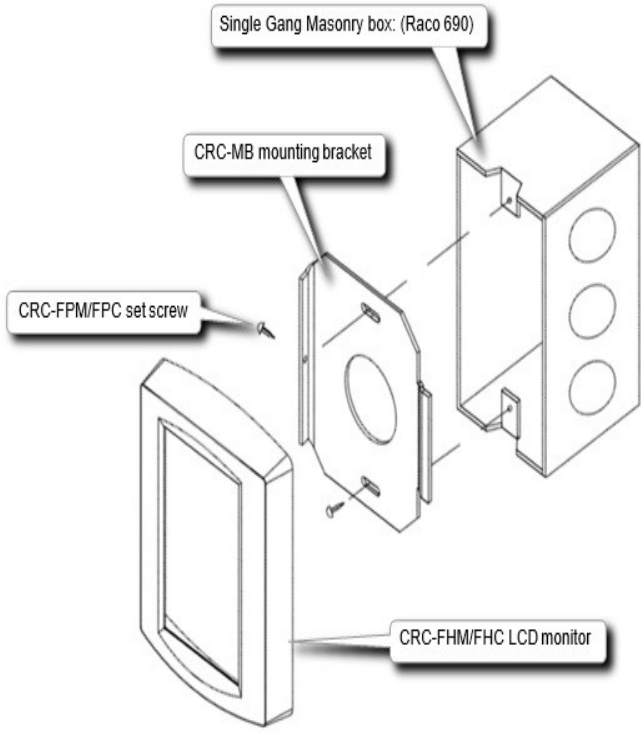
(1) CRC-CLV Closed Loop Valve

**Mounting of the monitor (CRC-FHM/FHC):**

The CRC-FHM/FHC and back plate (CRC-MB) is designed to be mounted directly to the fume hood pillar or a standard electrical box. The electrical box should be mounted flush relative to the face of the fume hood pillar. The mounting bracket (MB) should be attached to the electrical box. The monitor (FHM/FHC) LCD enclosure is then slid across the mounting bracket and fastened from the side.

The installer shall run a single RJ12 crossover cable (supplied with unit) from the

CRC-FHM/CONT to the CRC-FHM/FHC LCD.




**Mounting of the controller (CRC-FHC):**

The CRC-FHC is designed to be mounted remote from the monitor (typically above the ceiling or on top of the hood.

The CRC-FHC is powered by 24VAC.

Control wiring to exhaust valves, variable frequency drives, dampers, etc. is connected to the controller.

Control wiring from vertical/horizontal/combo sash sensors, occupancy sensors, etc. are connected to the controller. The CRC-FHC will have a single RJ12 crossover cable (supplied with the unit) run to the CRC-FHM.

**Vertical Sash Sensor (CRC-VSS):**

The CRC-VSS is designed to be attached to the vertical rising fume hood sash or counter weight cable. The cable should be aligned within 5° of perpendicular when cable is at full extension. Make sure the sash cable is clear from any obstructions. The Vertical Sash sensor sends voltage signal to fume hood monitor/controller.

**See CRC-VSS data sheet for more information*

**Horizontal Sash Sensor (CRC-HSS):**

The Horizontal Sash Sensor is attached directly to the horizontal moving panes on the sash. Locate sensor bars near the top of the sash panel. As the sashes overlap the magnetic switch assembly measures resistance. Wiring of the HSS must allow full sash movement and must be clear from any moving parts. The Horizontal Sash sensor sends voltage signal to fume hood monitor/controller.

**See CRC-HSS data sheet for more information*

**Combination Sash Sensor (CRC-CSS):**

The combination sash sensor requires both the Vertical and Horizontal Sash Sensors. A circuit board (CRC-HOR-SB) is required to power the assembly.

**See CRC-CSS data sheet for more information*

**Sidewall Velocity Sensor (CRC-SVS):**

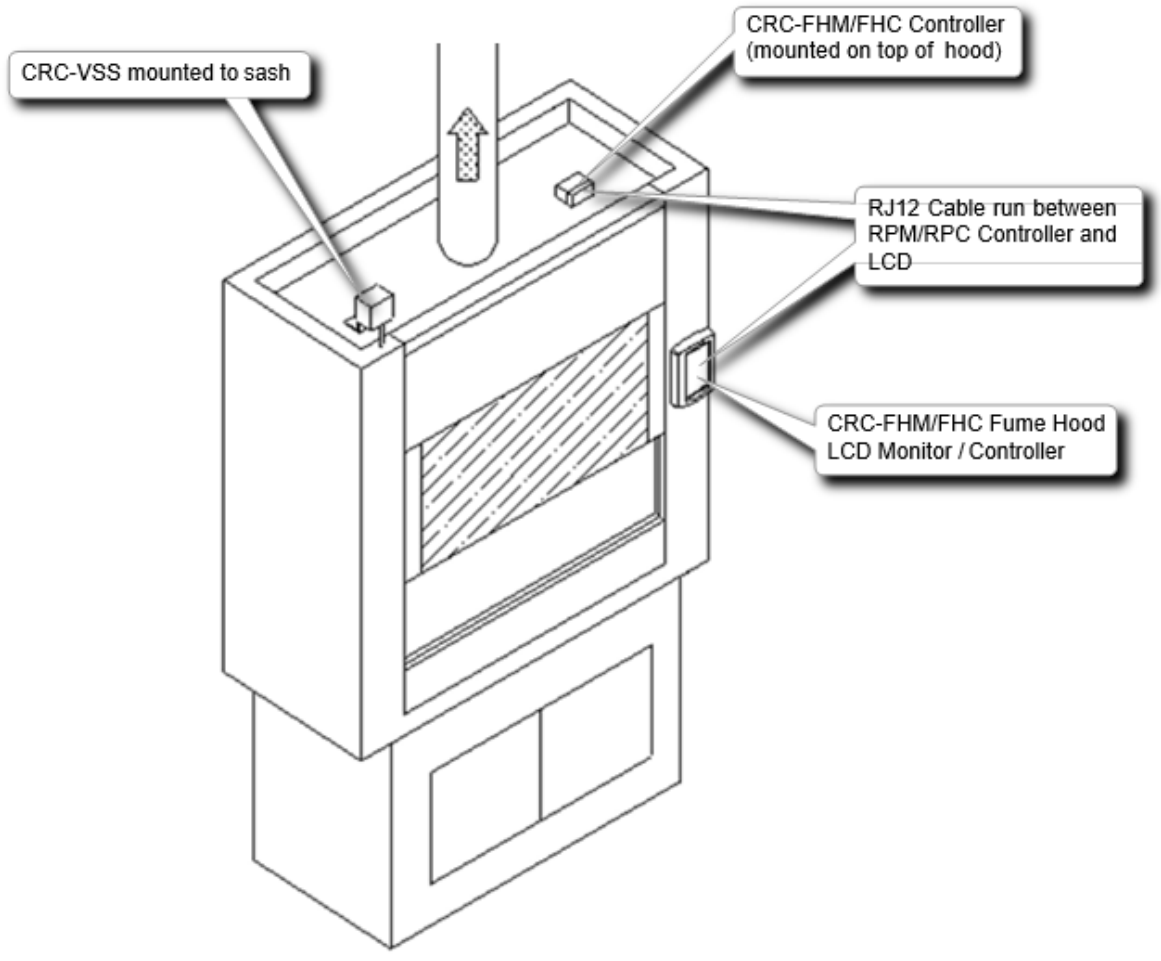
The CRC-SVS is designed to be mounted on the interior sidewall of the hood. One side of the sensor shall reference the inside of the hood and one side shall reference the room.

The sensor is to be mounted 1/4 of the fume hood depth from the front of the sash opening.

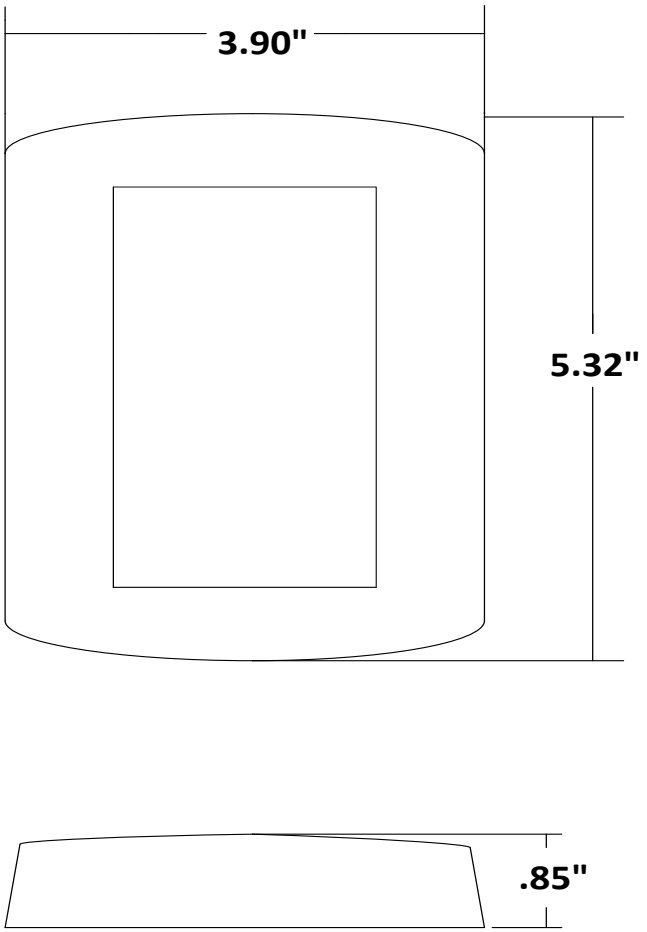
The centerline of the sensor should be even with the bottom of the sash at the full open position.

The Sidewall Velocity Sensor should be mounted in a non-turbulent location.

**See CRC-SVS data sheet for more information*



Dimensions:




Ordering Nomenclature:

**CRC – FHC – 01 – B**

**MONITOR FAMILY**
FHC = Fume Hood Controller

**ENCLOSURE**
01 = ABS

**NETWORK**
B = BACnet
0 = None

Additional Product Information:

Please contact us at:

**Web:** www.criticalroom.com

**Phone**: 414.324.8978