FUME HOOD MONITORS

A. General

1. The Fume Hood Monitors to measure and control the face velocity of fresh air entering the hood shall be provided at all locations shown on the prints. Each hood shall have its own monitor capable of stand-alone operation or of complete system integration. Each monitor shall have a local LCD display, hood alarm status indicator, visual and audible alarm enunciators, dual alarm relay outputs, analog output, remote flow velocity sensor, keypad selection of status display, alarm "Silence" keypad used to mute the audible alarm, "Test" keypad, addressable serial communications, and separate power supply. All of these items shall have the characteristics of and meet the specifications shown further herein.

B. Acceptable Manufacturers

1. The Fume Hood Monitor shall be field proven with at least four (4) years of successful operation in hood monitoring or control applications.

2. The Fume Hood Monitor shall be the HMS-1600 Series manufactured by TRIATEK, Inc., 2976 Pacific Drive, Norcross, GA 30071, Telephone (770) 242-1922, Fax (770) 242-1944.

C. Performance Requirements

1. The Fume Hood Monitor shall be capable of measuring the face velocity of fume hood airflows. It shall have standard calibration ranges of 0 - 120 FPM, 0 - 200 FPM, or + 500 FPM. Hood monitor shall be factory calibrated with NIST traceable standards and shall have accuracy as follows:

FACE VELOCITY	ACCURACY @ 72 F ± 5º F
50 - 120 FPM	± 1.2 FPM
50 - 200 FPM	± 2.0 FPM
50 - 500 FPM	± 5.0 FPM

2. The Fume Hood Monitor flow velocity sensor technology shall be thermal anemometry and shall have a small micro-area flow path to provide for high sensitivity and for the precision accuracy shown above. Sensor shall constantly monitor bi-directional flow using the patented flow-through sensor. The flow measuring assembly including necessary fittings and cover shall be provided with the monitor as a complete unit. Systems that depend upon tracking the exhaust damper position with sash position and do not measure face velocity are not acceptable.

3. The Fume Hood Monitor shall provide immediate response to face velocity changes caused by either sash position or other factors. It shall alarm out-of-spec face velocities, either too high or too low, and shall modulate the hood exhaust to maintain the desired face velocity. The monitor shall be capable of producing a correction signal to the hood exhaust control mechanism within one second after a step change in face velocity has occurred. The hood exhaust control mechanism response shall respond fast enough to prevent spilling fumes due to low face velocity. It must be damped sufficiently to avoid producing excessive turbulence inside the hood that would result in fume spillage hazards. Systems using Volumetric Offset to control hood and/or space airflow rates are not acceptable.

4. The Fume Hood Monitor shall have an LCD alphanumeric display capable of showing actual face velocity readings in FPM or in metric units up to five digits. Systems that require the user to multiply the displayed reading by a factor are not acceptable. The monitor shall be capable of displaying both English and Metric readings simultaneously on separate lines of the display. Where other variables are displayed on the additional display lines included with the monitor, each of these shall provide means to include up to an eight-character descriptor. Display update time shall be one second maximum.

5. The Fume Hood Monitor shall have a precision analog output derived from 12-bit conversion and true floating-point math functions. This output shall be field selectable as either a linear signal directly relating to face velocity or as a PID control output. The output shall be selectable as either mADC or voltage. This output shall be field scaleable to provide the exact offset and span required, yielding the best operating results, e.g., compressed span for quick operation. For pneumatic applications this output shall be connected to TRIATEK's CP-3000 Series I/P to provide a pneumatic control signal.

6. The Fume Hood Monitor shall have two precision analog inputs. Both inputs shall 12-bit analog-to-digital conversion and are processed using true floating-point math functions to provide maximum scaling accuracy. One of these shall be dedicated to the face velocity sensor and the other shall be available as an auxiliary or spare input for display of another variable such as hood temperature, humidity, or other process variable. The second analog input shall be selectable for simultaneous display with the hood face velocity. It shall also be field scaleable to standard input signals including 4-20 mADC, 0-5VDC, or

0-10VDC.

7. The Fume Hood Monitor shall have two (2) digital inputs. These may be used for an exhaust detector circuit, for an occupancy detection sensor input to sense lab personnel in front of, or in near proximity to the hood, or for energy saving automatic shutdown used during off-use periods. The monitor shall be capable of displaying these digital inputs simultaneously with the hood face velocity.

8. The Fume Hood Monitor shall have both audible and visual alarms having adjustable setpoints. Alarm sequence shall be such that face velocity readings and alarm status lights have instantaneous response to insufficient and excessive face velocity. Audible alarm shall have a programmable time delay that has a resolution of one second to provide a time lag before the audible alarm is activated. This programmable delay shall be adjustable from instantaneous (no delay) to at least 3600 seconds in one-second increments. An input for an optional switch or personnel sensor shall be provided and can be user selected to activate a second time delay for the audible alarm. The ALARM SILENCE keypad on the face of the monitor shall be used to silence the audible alarm. Dual alarm output relays shall be furnished to transmit alarms to remote monitoring equipment. Both alarm output relays and flow status indicators shall have user adjustable low and high alarm setpoints and shall be individually adjustable. Alarm annunciation shall be menu selectable by the user for Automatic Reset or Manual Reset. Under Automatic Reset any alarm condition sensed after the time delay will be reset automatically when the alarm condition goes away and adequate face velocity has been restored. That is, the alarm is not latched in and the alarms shall be annunciated only as long as the alarm condition exists. Under Manual Reset any alarm condition sensed after the time delay will be latched on and held, even after the face velocity has returned to normal, until someone manually resets it by depressing the Alarm Silence keypad on the face of the monitor. This will allow for logging of the alarm when it is reset. In either Automatic or Manual Reset the audible alarm can be acknowledged, or silenced, at any time, leaving the visual alarm to reflect the actual face velocity status. Dual adjustable alarm output relays shall be SPDT and shall be rated 2.0A @ 30VDC/VAC.

9. The Fume Hood Monitor shall have three LED face velocity status indicators that have adjustable ON and OFF setpoints. These shall have colors of green, amber, and red indicating NORMAL, CAUTION, and ALARM condition. When an alarm condition is detected by the HMS-1600 the red alarm indicator shall blink until the Silence keypad is depressed then goes to a steady on condition if the alarm condition persists.

10. The Fume Hood Monitor shall have all setpoints stored in nonvolatile memory to avoid loss of information when power is removed from the monitor.

11. The Fume Hood Monitor shall be provided with a 110/24 VAC power supply having a fused transformer and mounted in an appropriately rated enclosure, furnished as part of the fume hood monitor. Contractor shall mount the isolation power supply in an appropriate location above or next to the hood being monitored and connect low voltage Class 2 output (24VAC) to the plug-in terminal block on the rear of the monitor. Each monitor will be connected to its own power supply to provide isolation from the power line and between it and the other monitors. The Fume Hood Monitor must be UL Listed.

12. The Fume Hood Monitor shall be capable of operating under temperatures from 32°F to 125°F and relative humidity between 10% to 95% non-condensing.

13. The Fume Hood Monitor shall be self contained and capable of standalone operation in monitoring-only or in monitoring with control modes.

14. The Fume Hood Monitor shall have an isolated RS-485 serial communications port which can support daisy chain connection of up to 255 monitors, and alternatively supports connection to a host computer to be used for monitoring and downloading of all monitor operating parameters. The monitor communications port shall enable connections to the following:

    1. A central remote monitoring and data logging system
    2. A central remote monitoring and data logging system with control capability
    3. An existing automation system

D. Installation

1. The Fume Hood Monitor shall be installed on hoods as directed by the owner or at the locations shown on the drawings. The monitor shall be mounted at eye level on the hood's sash fascia. Face velocity sensor shall be mounted on the sidewall of the hood, approximately six inches back from the front sash frame, and approximately six inches above the bottom of the sash when in its highest position. All details needed for installation and use must be provided in an Installation and Setup Guide supplied with the Fume Hood Monitor.