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Triatek reserves the right to change product specifications without notice.
## GENERAL SPECIFICATIONS

### Electrical
- **Face Velocity Range**: 0 – 200 ft/min
- **Accuracy of Measurement**: ±2 ft/min*  
  *(NIST Traceable / Individual certification available as option)*
- **Power Supply**: Class 2, 24Vdc ±10% wall adapter provided
- **Recommended Cable Type**: Belden 1325A

### Touchscreen User Interface
- **LCD Size**: 3.2” diagonal
- **LCD Type**: Transmissive
- **Resolution**: 240 x 320 portrait
- **Viewing Area**: 50.60 mm x 66.80 mm
- **Color Depth**: 18-bit or 262K colors
- **Backlight Color**: White
- **Luminous Intensity**: min 2500 cd/m²

### Mechanical
- **HMS-1650 LITE Surface-mount Enclosure**: 3”W x 5”H x 0.75”D
- **External Remote Sensor Housing**: 2”W x 3”H x 2.7”D
- **Stainless Steel Cover Plate for Flow Tube**: 2.7”W x 4.5”H x 0.2”D
- **HMS-1650 LITE with Flow Tube Cover Plate**: approx. 3.5 lb

*Triatek reserves the right to change product specifications without notice.*
**Specifications**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMS-1650 LITE with Sidewall Sensor</td>
<td>approx. 4.0 lb</td>
</tr>
<tr>
<td>Flow Tube Cover Plate Mounting</td>
<td></td>
</tr>
<tr>
<td><strong>Environmental</strong></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>32° to 125° F Operating</td>
</tr>
<tr>
<td>Operating Humidity</td>
<td>10% - 95</td>
</tr>
</tbody>
</table>

**Part Number Guide:** HMS1650-LITE

- Options for Sash Sensor
  - blank = no sash sensor
  - S = included sash position sensor
Overview

The Triatek HMS-1650 LITE Series Fume Hood Monitor is an ultra-sensitive instrument used to monitor the face velocity of fume hoods in laboratories and clean rooms. This unit is a precision measuring system capable of measuring and displaying face velocities as low as 2 ft/min.

Key features of the HMS-1650 LITE include:
- Full-color touchscreen display with programmable display options and adjustable backlight
- Intuitive user interface simplifies setup and configuration of unit
- Display background changes color to indicate hood status at a glance
- Audible and visual alarm annunciation
- Multi-level password protection of touchscreen user interface
- Simple field calibration of sidewall sensor and sash position sensor
- Factory-calibrated analog output available for monitoring face velocity remotely

The HMS-1650 LITE is equipped with a 3.2” diagonal full-color touchscreen and displays in portrait orientation (240 pixels by 320 pixels). The password-protected menu tree is very intuitive and simplifies the setup and configuration of the unit. The menus incorporate touch-based interfaces such as sliders, radio buttons, and dialog popup windows to facilitate the ease-of-use of the HMS-1650 LITE.

The display implements bright background color changes to indicate the three different hood status indications of the monitored fume hood. These background colors indicate “normal” when the face velocity at the sash opening is within defined limits, “warning” when it is nearing an out-of-limits condition, and “alarm” when the face velocity is outside defined acceptable limits. The face velocity ranges for these conditions are easily set by the user for the specific installation when necessary. The background color changes provide an overview of the monitored fume hood face velocity conditions at a glance.

Alarm conditions may be defined by the user, in terms of desired face velocity settings for the fume hood being monitored. When an alarm condition occurs, it may be annunciated in two user-definable ways: 1) on the display, and/or 2) with an audible alarm. The alarm will automatically reset when the unit has sensed to proper limits. The user may easily mute the audible alarm by touching the OK button on the alarm notification message popup window of the touchscreen display.

The HMS-1650 LITE provides an optional analog input that may be used for monitoring the sash position of the fume hood using Triatek’s sash position sensor (POS-100). The sash position sensor allows the HMS-1650 LITE to monitor and display the current sash height in real-time after being field-calibrated following installation.

Multiple multi-level passwords may be configured to prevent the unauthorized or casual access to the HMS-1650 LITE configuration settings. Up to ten passwords of up to eight digits may be stored, with each having one of four associated access levels. Administrators and Facility Management personnel may have unrestricted access, while general staff may be assigned restricted access passwords which limit the functionality of the user menus.

The HMS-1650 LITE fume hood monitor is powered by a supplied wall adapter power supply. This power supply also provides power to the sidewall sensor module which monitors the effective face velocity at the sash opening. A 10-foot length of 4-conductor cable is supplied with the HMS-1650 LITE to interface the sidewall sensor module to the Touchscreen display module.

The HMS-1650 LITE model includes a sidewall velocity sensor for measuring the face velocity of the monitored fume hood. This sensor module must be installed at the sidewall of the monitored fume hood. Tools required for the installation include: drill, ¾” drill bit, 3/8” drill bit, ¼” drill bit, #2 Phillips screwdriver, standard medium blade screwdriver, and silicone sealant. An interface cable is included and pre-wired to the sensor module that connects it to the Touchscreen display module. The system is powered by a plug-in wall adapter power supply. Therefore, a standard 110Vac electrical receptacle must be available nearby. The ideal location for this receptacle is on top of the fume hood cabinet. The loose end of the power supply cable from the wall adapter must be routed down to the location of the sidewall sensor module. Leave the wall adapter power supply unplugged during the installation procedure.

The HMS-1650 LITE incorporates an additional analog output signal that may be used for monitoring the displayed face velocity remotely. This capability allows an existing controller on the BMS to make the face velocity reading available over the network, even though the HMS-1650 LITE itself is not connected to the network. The factory-calibrated analog signal is available as either a voltage output between 0–5 Vdc or as a current output between 0–5 Vdc or as a current output.
between 4–20 mA at the remote sensor connector. Refer to the Installation Detail Views on page 6 for more information.

**NOTE:** While the HMS-1650 LITE model is calibrated and programmed at the factory with default settings for typical fume hood applications, a final calibration of face velocity and sash position (if so equipped) is usually required following installation.

**Installation**

1. Proper location of the sensor is very crucial for obtaining the best possible operation of the HMS-1650 LITE. The system uses through-the-wall sensing to measure the internal negative pressure of the fume hood to accurately determine the face velocity at the sash opening. The sensor must be located in a position that is least affected by turbulent air within the fume hood. See the illustration on page 5. There are two types of fume hood arrangements which need to be considered: **By-Pass** and **Non-By-Pass**.
   - **Front-to-Back Position** – With either type, the sensor is best located approximately 6 inches back from the vertical sash track.
   - **Vertical Position (By-Pass type)** – Locate the sensor vertically in the center of the region between the bottom of the sash in its fully open position and the bottom edge of the by-pass opening.
   - **Vertical Position (Non-By-Pass type)** – Locate the sensor vertically 6” above the bottom of the sash in its fully open position.

2. See pages 5 and 6 for dimensions and suggested mounting arrangements of the Triatek flow sensor on the fume hood wall.

3. Apply silicone sealant around the sensor immediately prior to mounting the assembly to its mounting surface. Be sure to leave red cap on careful to avoid getting sealant in the sensor port.

**NOTE:** Be certain that sensor reference port is in laboratory room air. If necessary to obtain this, use Triatek HMS-1600L-PLATE mounted on exterior panel of the fume hood.

4. See page 7 for mounting details for the HMS-1650 LITE Touchscreen display unit. The preferred location is eye-level, usually on one of the side bezel panels. Please note that the display unit is cable connected to the sidewall sensor module, and provisions must be made to route the cable without interference with the fume hood sash or sash cable.

**NOTE:** Remove red cap from sensor after installation.

5. An optional sash position sensor may be monitored by the HMS-1650 LITE and the real-time sash position may be displayed at the touchscreen. Connect the red lead of the sash position sensor to the +Vs terminal, connect the black lead to GND, and connect the other lead (green or white) to the IN terminal.

6. To remotely monitor the face velocity displayed at the HMS-1650 LITE touchscreen, a factory-calibrated analog output is available as voltage or current at the Vo and Io terminals, respectively. The designated output (Vo or Io) should be connected to the analog input of the remotely located controller and the ground terminal (GND) should be connected to the ground of the remotely located controller.

7. Connect the interface cable between the sidewall sensor module and the Touchscreen display before applying power to the system. Plug the wall adapter power supply into an available electrical receptacle, preferably at the top of the fume hood cabinet.
Sensor Mounting Location

Sensor Placement - Non By-Pass Type

The P1 Port must be referenced to the Laboratory air for proper operation and should be located away from air turbulence.

If the hood is bypassed or in close proximity to items like baffles, deflectors, etc., contact the factory.
Due to continuous improvement, Triatek reserves the right to change product specifications without notice.

**Sensor Mounting Location**

**Interior of Fume Hood**

**FIGURE 1**
Preferred Sensor Mounting

**Exterior of Fume Hood**

Flexible Tubing (3 ft. Supplied)

For Monitoring Displayed Face Velocity

To HMS Display Unit

To Optional Sash Height Sensor

This port must be referenced to laboratory air for proper orientation and should be located away from turbulence.

**Interior of Fume Hood**

**FIGURE 2**
Alternate Sensor Mounting

**Exterior of Fume Hood**

Flexible Tubing (3 ft. Supplied)

To Optional Sash Height Sensor

To HMS Display Unit

For Monitoring Displayed Face Velocity

This port must be referenced to laboratory air for proper orientation and should be located away from turbulence.

Triatek reserves the right to change product specifications without notice.
Display Mounting Hole Pattern

The HMS-1650 LITE display backplate may be mounted directly to a standard single-gang wall box using the two slots along the centerline. Use the backplate as a template to mark the mounting holes and the cable access hole at the center of the backplate.
After the HMS-1650 LITE unit has been properly installed, apply power to the unit by inserting the wall adapter into an available electrical receptacle. On power up, the LED backlighting will cycle through the three unit status colors (green, yellow, red) as part of the power-up initialization sequence, followed by the displaying of the Triatek splash screen indicating serial numbers, firmware version numbers, and sensor calibration date. This splash screen remains displayed for approximately 5 seconds and then disappears to reveal the main display screen. This splash screen information can also be redisplayed using the About This HMS option on the Diagnostics menu.

**Main Display Screen**
All HMS-1650 LITE units come shipped from the factory in the Standby operating mode. If your HMS-1650 LITE order included the custom logo option, then your specified logo will be shown on the main display screen while the unit is in standby operating mode. Otherwise, the standby operating mode will be represented by white text on a blue background (Figure 3). Information displayed on the main screen includes the following:

- Name of monitored fume hood (up to 20 chars)
- Current operating mode (occupied, unoccupied, or standby)
- Current face velocity reading in selected engineering units (default is ft/min)
- Current time and date

While in standby operating mode, the background color of the main display screen is either blue or a custom color that complements the custom logo if installed. However, while in either Occupied or Unoccupied operating modes, the background color actively represents the current status of the monitor. A *green background* indicates that the current face velocity is within allowable limits of the desired setpoint. A *yellow background* indicates current face velocity has drifted outside of the allowable limits of the desired setpoint and are in the caution range. A *red background* indicates that the current face velocity has reached a critical condition and is outside of the allowable limits of the desired setpoint.

The HMS-1650 LITE incorporates a full-color touchscreen and includes an extensive easy-to-use menu system that allows the user to quickly setup the monitor for immediate use. Also integrated into the HMS-1650 LITE display are several hotspots that provide quick access to various settings. See page 12 for details on using these hotspots as display settings shortcuts. Touching the screen anywhere other than one of the reserved hotspots invokes the menu system, unless one or more security passwords have been entered. These hotspots are disabled whenever the specific display option is turned off.

**Configuring the Fume Hood Monitor**
Configuring the HMS-1650 LITE fume hood monitor settings is extremely easy using the intuitive user menus integrated in the touchscreen display. Within minutes, the HMS-1650 LITE may be configured to start displaying the real-time face velocity of the fume hood being monitored. We begin by performing a field calibration of the face velocity in the next section.

**Field Calibrating the Sidewall Sensor**
Selecting the Field Calibration option on the Hood Setup menu invokes the Field Calibration popup screen as shown in Figure 4, where the sidewall-mounted velocity sensor may be calibrated after the installation process has been completed.

Temporarily cap the sidewall velocity sensor to inhibit flow air flow and wait for the reading to stabilize before continuing. Once the face velocity reading stabilizes, click the Next button to advance to the next step of the calibration procedure as shown in Figure 5.
HMS-1650 LITE Basic Programming

**FIELD CALIBRATION**

**Set Zero Input**
Temporarily cap the sidewall sensor to inhibit flow and wait for the reading to stabilize before continuing with the field calibration procedure of this HMS. When ready, click Next to continue.

AI-1: 103 ft/min

**FIELD CALIBRATION**

**Set True Input**
Uncap sidewall sensor. Use flow meter to measure face velocity at 3 locations across 18-in opening. Enter average value & click OK.

100 ft/min

---

At this step, uncap the sidewall sensor, set the sash to a height of approximately 18 inches, and measure the face velocity at three locations across the sash opening using a calibrated flow meter. Enter the average of the three measurements on the Field Calibration popup screen using the slider, and click the OK button to save the new calibration to non-volatile memory. This completes the sidewall-mounted velocity sensor field calibration procedure. If the HMS-1650 LITE fume hood monitor includes a Triatek sash position sensor (POS-100), it must be calibrated following installation. This section discusses the procedure for performing a field calibration of the sash position sensor.

**Field Calibrating the Sash Position Sensor**
Selecting the Field Calibration option on the Sash Setup menu invokes the popup calibration screen as shown in Figure 6, where the sash position sensor may be calibrated once it has been installed at the fume hood.

To begin the calibration procedure, set the sash to its minimum opening and measure the height. If the sash opening is completely closed, then enter zero. If the sash opening is partially open, then measure and enter the height at the calibration screen using the slider and click the Next button to advance to the next step of the sash calibration procedure (Figure 7).

Move the sash to its maximum opening, measure the height, and enter it using the slider on the Field Calibration popup screen. Click the OK button to save the new calibration to non-volatile memory. This completes the field calibration procedure for the sash position sensor.

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Fig 4. Sidewall sensor must be recalibrated once installed at the monitored fume hood.

Fig 5. The average of three face velocity measurements must be entered here to complete the calibration procedure.

Fig 6. If sash position sensor is connected, it must be recalibrated following installation.

Fig 7. Set sash to maximum position and enter the height to complete the calibration procedure.
Setting Up Alarm Limits
To determine the various setpoints at which the unit status changes from normal to warning, and from warning to alarm, the alarm limits must be configured accordingly. Alarm limits are only in effect while the unit is in either occupied or unoccupied operating mode, as the alarms are disabled while standby mode is active. In order to specify the alarm limits for occupied or unoccupied operating mode, set the operating mode accordingly by selecting the Hood Setup option from the Unit Setup menu, and then select the Operating Mode option from the Hood Setup menu. Select the desired operating mode from the resulting configuration popup window.

alarm limits, in that order. For example, if occupied operating mode was selected above, then the configuration popup shown in Figure 8 will be displayed, prompting the user to enter the Occupied Mode High Alarm Setpoint using the keypad. These limits should be specified to identify the face velocity range which is considered normal, as well as the range which indicates a warning condition, and the range which is considered critical and indicates an alarm condition.

Configuring Alarm Buzzer
The HMS1650 alarm resources provide support for both visual and audible alerts. The Audible Alert option on the Unit Setup menu allows the alarm buzzer settings to be easily configured. Selecting this option invokes the configuration screen shown in Figure 9.

To begin specifying the alarm and warning setpoints, select the Alarm Limits option from the Unit Setup menu. The user is prompted to sequentially enter the high alarm and warning limits, followed by the low warning and alarm limits, in that order. For example, if occupied operating mode was selected above, then the configuration popup shown in Figure 8 will be displayed, prompting the user to enter the Occupied Mode High Alarm Setpoint using the keypad. These limits should be specified to identify the face velocity range which is considered normal, as well as the range which indicates a warning condition, and the range which is considered critical and indicates an alarm condition.

Configuring Alarm Buzzer
The HMS1650 alarm resources provide support for both visual and audible alerts. The Audible Alert option on the Unit Setup menu allows the alarm buzzer settings to be easily configured. Selecting this option invokes the configuration screen shown in Figure 9.

selecting the unit to be selected by the user. Selecting this option invokes the Select Engineering Units selection screen. If the engineering units selection is changed, the corresponding alarm setpoints are automatically converted to the newly selected units.

Configuring Display Options
The Display Setup menu provides support for configuring all of the display settings on the HMS-1650 LITE. Options are available for configuring the main display, selecting an alternate language for the user interface menus, setting the system time and date, and adjusting the display brightness.

The Display Options menu item allows the main display to be configured as required by the specific application. If so desired, the user may individually enable or disable the display of the fume hood status and the time/date at the bottom of the screen.

Selecting Displayed Units
The HMS-1650 LITE displays face velocity readings in one of two units: ft/min or m/sec. The Engineering Units option on the Unit Setup menu allows the displayed units to be selected by the user. Selecting this option invokes the Select Engineering Units selection screen. If the engineering units selection is changed, the corresponding alarm setpoints are automatically converted to the newly selected units.

_configuring Display Options
The Display Setup menu provides support for configuring all of the display settings on the HMS-1650 LITE. Options are available for configuring the main display, selecting an alternate language for the user interface menus, setting the system time and date, and adjusting the display brightness.

The Display Options menu item allows the main display to be configured as required by the specific application. If so desired, the user may individually enable or disable the display of the fume hood status and the time/date at the bottom of the screen.
HMS-1650 LITE Basic Programming

The **Set Time & Date** option on the **Display Setup** menu allows the user to specify the current time and date that may be displayed at the bottom of the main display. The HMS-1650 LITE will maintain the time and date as long as the unit is not powered down.

The final option available on the **Display Setup** menu allows the intensity of the display backlighting to be adjusted from very dim to very bright. The **Brightness** settings are saved in nonvolatile memory and remain in effect through a power cycle.

**Adding Password Security**

Access to the HMS-1650 LITE menu system can be protected from unauthorized tampering through the use of multi-level security passwords. Up to ten individual passwords may be entered in the system, each with a specific access level.

A password entry may be created by selecting the **Passwords Setup** option from the **System Setup** menu, and then selecting the **Add Password** option. The user is prompted to enter a minimum of four and up to eight numeric digits.

Once a password has been specified, the user is prompted to specify one of four access levels: **Unrestricted**, **Standard**, **Basic**, and **Restricted**. All password entries are saved to non-volatile memory, and remain in effect through a power failure. In the event that a password has been forgotten, there is a factory-default “back door” password that will provide unrestricted access to the user menu system. Please consult with the factory for more information regarding this password.

**Remotely Monitoring Face Velocity Reading**

The HMS-1650 LITE provides a factory-calibrated analog output signal linearly that represents the face velocity displayed at the touchscreen. This output may be connected to an available analog input on a controller that is connected to the building management system (BMS), thereby allowing the HMS-1650 LITE’s face velocity to be monitored from the BMS front-end. There are two factory-calibrated analog output signals available at the terminal strip on the remote sensor module: Vo and Io. The voltage output signal spans from 0 to 5 Vdc and linearly represents the face velocity range from 0 fpm to 200 fpm. The current output spans from 4 to 20 mA and linearly represents the same face velocity range.
CLEANING THE DISPLAY

- The cloth may be used dry, or lightly dampened with a mild cleaner or Ethanol.
- Be sure the cloth is only lightly dampened, not wet. Never apply cleaner directly to touch panel surface; if cleaner is spilled onto touch panel, soak it up immediately with absorbent cloth.
- Cleaner must be neither acid nor alkali (neutral pH).
- Wipe the surface gently; if there is a directional surface texture, wipe in the same direction as the texture.
- Never use acidic or alkaline cleaners, or organic chemicals such as: paint thinner, acetone, toluene, xylene, propyl or isopropyl alcohol, or kerosene.

Touching the current hood name text brings up an alphanumeric keyboard to quickly change the name of the monitored fume hood.

Touching anywhere else on the screen brings up the Main Setup Menu if no password is stored. Otherwise, a password must be entered before the Main Setup Menu can be accessed.

Touching the date brings up the Date Entry popup to quickly change the current displayed date.

Touching the engineering units selection brings up a popup to quickly change velocity measurement units.

Touching the time brings up Time Entry popup to quickly change the current displayed time.

Hotspot Features of HMS-1650 LITE Touchscreen Display
Due to continuous improvement, Triatek reserves the right to change product specifications without notice.

SETUP MENU TREE

Unit Setup

Hood Setup

- Field Calibration
  - Set Zero Input
  - Set True Input
- Operating Mode
  - Select Occupied / Unoccupied / Standby
- Filter Factor
  - Adjust Filter Factor (1-30)
- Alarm Limits
  - High Alarm SP
  - High Warn SP
  - Low Warn SP
  - Low Alarm SP

Unit Setup Back

Hood Setup

- Field Calibration
  - Set Sash Minimum
  - Set Sash Maximum
- Operating Mode
  - Set Sash Alarm Mode
- Sash Heights
  - Set Sash High Position
  - Set Sash Low Alarm Mute Pos

Audible Alert

- Audible / Silent Delay Time
- Alarm Quiet Period

Engineering Units

- Imperial / Metric

System Setup

Passwords Setup

- Add Password
  - Enter Password
  - Select User Access Level
- Edit Password
  - Edit Access Level
- Delete Password
  - Confirm Deletion
- Purge All
  - Confirm Purge All

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**HMS-1650 LITE**

**SETUP MENU TREE**

- **Display Setup**
  - Display Options
  - Select Display Options
  - Screensaver
  - Set Frequency
  - Set Display Time
  - Set Time & Date
  - Enter Time
  - Enter Date
  - Set Brightness
  - Set Backlight Level

- **Diagnostics**
  - About This HMS
    - Displays model no., serial nos., firmware versions, selected protocol, & address
  - Run Self-Test
    - Cycles thru Normal, Warning, Alarm screens while sounding alarm buzzer
  - Reset Monitor
    - Software reset of monitor
  - Reset Gain/Offset
    - Reset Gain & Offset settings to factory defaults (unity gain, zero offset)
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