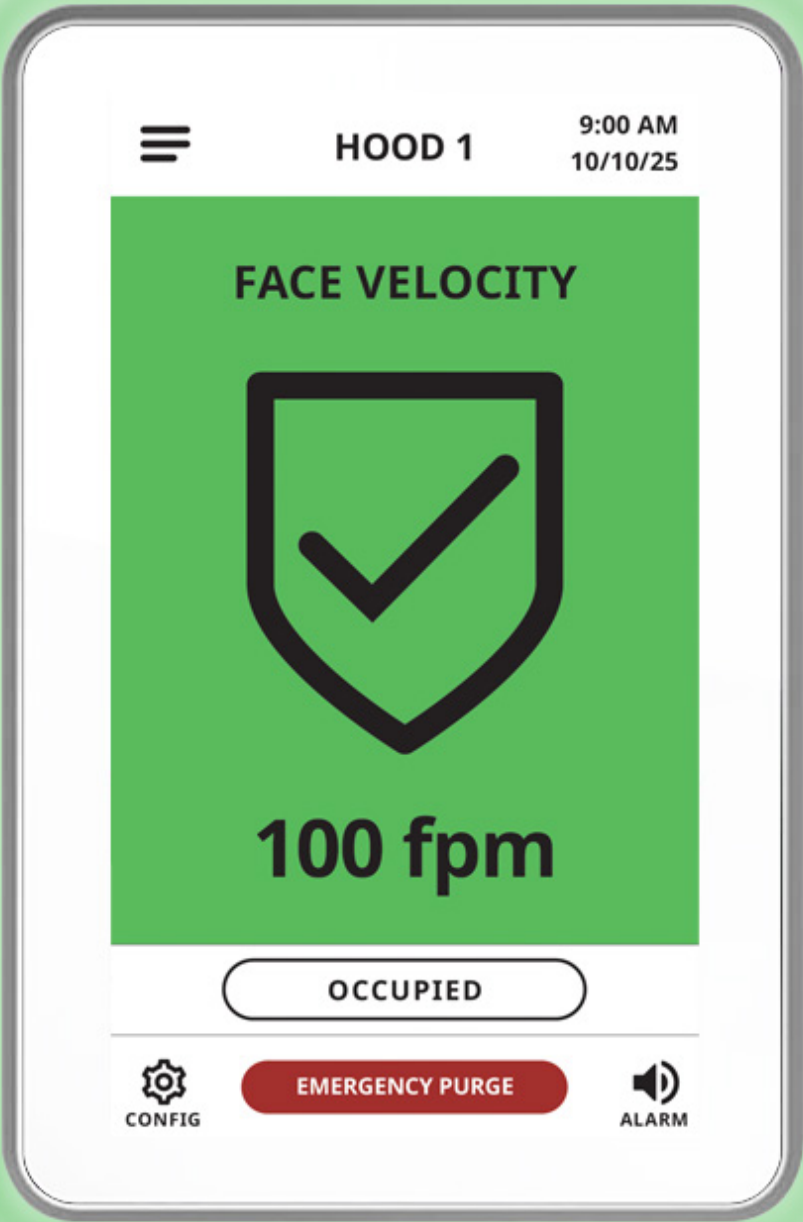


HMS-2000

Fume Hood Controller

User Guide

LIT-12014488
August 2026



⚠ WARNING**Risk of Electric Shock.**

Disconnect the power supply before making electrical connections. Contact with components carrying hazardous voltage can cause electric shock and may result in severe personal injury or death.

Risk of Electric Shock.

Disconnect all electric power sources from the HMS-2000 Fume Hood Controller before removing the HMS-2000 controller cover. Contact with internal components carrying hazardous voltage can cause electric shock and may result in severe personal injury or death.

⚠ CAUTION**Risk of Personal Injury or Property Damage.**

For use in a controlled environment only. Refer to installation instructions for environmental conditions.

NOTICE**Risk of Property Damage.**

Do not apply power to the system before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

Risk of Property Damage.

Do not run low-voltage cable in the same conduit or wiring troughs with high-voltage wires. Running low- and high-voltage wires in the same conduit or wiring troughs may damage the equipment or cause system malfunction.

Risk of Property Damage.

Ensure that the power source conforms to the requirements of the equipment. Failure to use a correct power source may result in permanent damage to the equipment.

Risk of Property Damage.

Do not run network communication cables in the same conduit, raceway, or panel with any high-voltage (greater than 30 VAC) wiring. Isolate all network wiring and all network devices from high-voltage wiring and equipment. Failure to isolate network wiring and network devices from high-voltage wiring and equipment can result in damage to network devices or poor network performance.

Risk of Property Damage.

Label all wires prior to disconnecting the equipment. Failure to label the wires may cause improper equipment operation after reconnecting the equipment.

Risk of Property Damage

Do not use a single transformer to power both the actuator and the controller. Use a 24 VAC minimum 30 VA Class 2, Limited Energy, or LPS for the controller, and a separate 24 VAC 20 VA Class 2, Limited Energy, or LPS for the actuator. Failure to follow the wiring diagrams may result in damage to the actuator, the transformer, the controller, or all devices and could void your warranty.

IMPORTANT: Do not install or use this HMS-2000 Fume Hood Controller in or near environments where corrosive substances or vapors could be present. Exposure of the HMS-2000 Fume Hood Controller to corrosive environments may damage the device's internal components and will void the warranty.

IMPORTANT: Do not install this HMS-2000 Fume Hood Controller in condensing, wet, or damp environments. Moisture may cause damage to the HMS-2000 controller.

IMPORTANT: Only qualified personnel should install or service Johnson Controls products. These instructions are a guide for such personnel. Carefully follow all instructions in this document and all instructions for the HMS-2000 Fume Hood Controller.

IMPORTANT: Use copper conductors only. Make all wiring connections in accordance with local, national, and regional regulations. Do not exceed the HMS-2000 Fume Hood Controller's electrical ratings.

IMPORTANT: Do not install the HMS-2000 Fume Hood Controller where the maximum temperature exceeds 125°F (52°C). Installing the device where maximum temperatures exceed 125°F (52°C) may cause damage to the HMS-2000 Fume Hood Controller and may void the warranty.

IMPORTANT: Make all wiring connections in accordance with the National Electrical Code and local regulations. Use proper Electrostatic Discharge (ESD) precautions during installation and servicing to avoid damaging the electronic circuits of the HMS-2000 Critical Environment Controller.

IMPORTANT: Maintain proper polarity and voltage or current ratings. Improper polarity or exceeding the voltage or current ratings will void the warranty.

IMPORTANT: Failure to follow the wiring diagrams could result in damage to your equipment and could void your warranty. Under no circumstances should a single transformer be split between actuator and controller. Doing so will damage the actuator, the transformer, the controller or all units. A single 120/24 V 30 VA transformer is required for the controller and a separate 120/24 V 20 VA transformer is required for the actuator.

AVERTISSEMENT

Risque de décharge électrique.

Débrancher l'alimentation avant de réaliser tout branchement électrique. Tout contact avec des composants conducteurs de tensions dangereuses risque d'entraîner une décharge électrique et de provoquer des blessures graves, voire mortelles.

Risque de décharge électrique.

Déconnecter toutes les sources d'alimentation électrique du HMS-2000 Fume Hood Controller avant de ouvrir le capot du HMS-2000 controller. Tout contact avec des composants internes conducteurs de tensions dangereuses risque d'entraîner une décharge électrique et de provoquer des blessures graves, voire mortelles.

ATTENTION

Risque de blessure corporelle ou de dommages matériels.

Pour utilisation dans un environnement contrôlé uniquement. Consulter le guide d'installation pour les conditions environnementales.

AVIS

Risque de dégâts matériels.

Ne pas mettre le système sous tension avant d'avoir vérifié tous les raccords de câblage. Des fils formant un court-circuit ou connectés de façon incorrecte risquent d'endommager irrémédiablement l'équipement.

Risque de dégâts matériels.

Ne pas faire courir un câble basse tension dans les mêmes gaines ou goulottes électriques que des câbles haute tension. L'installation de fils basse tension et haute tension dans les mêmes gaines ou goulottes électriques risque d'endommager l'équipement ou de provoquer des dysfonctionnements du système.

Risque de dégâts matériels.

S'assurer que la source d'alimentation électrique est conforme aux spécifications de l'équipement. L'utilisation d'une source d'alimentation électrique inappropriée risque d'endommager irrémédiablement l'équipement.

Risque de dégâts matériels.

Ne passez pas les câbles de communication réseau dans les mêmes gaines, chemins de câbles ou panneaux que les câbles à haute tension (supérieure à 30 Vca). Isolez tous les câbles et appareils réseau des câbles et appareils à haute tension. Un défaut d'isolement des câbles et appareils à haute tension peut provoquer des dommages aux appareils réseau et réduire les performances du réseau.

Risque de dégâts matériels.

Étiquetez tous les câbles avant de débrancher l'équipement. Le non-respect de cette précaution peut amener un fonctionnement anormal après redémarrage de l'équipement.

Risque de dommage à la propriété

N'utilisez pas un seul transformateur pour alimenter à la fois l'actionneur et le régulateur. Utilisez un transformateur de classe 2 à 24 V CA minimum 30 VA, à limitation d'alimentation ou LPS pour le régulateur et un transformateur de classe 2 à 24 V CA 20 VA à limitation d'alimentation ou LPS séparé pour l'actionneur. Ne pas respecter les schémas de câblage peut causer des dommages à l'actionneur, le transformateur, le régulateur ou tous les appareils et peut annuler votre garantie.

IMPORTANT : N'installez ou n'utilisez pas HMS-2000 Fume Hood Controller dans, ou près, d'environnements où des substances ou vapeurs corrosives peuvent être présentes. L'exposition du contrôleur HMS-2000 à des environnements corrosifs peut endommager les composants internes de l'appareil et annulera la garantie.

IMPORTANT : N'installez pas HMS-2000 Fume Hood Controller dans un environnement humide, mouillé ou il se produit de la condensation. L'humidité peut causer des dommages au contrôleur HMS-2000.

IMPORTANT : Seul le personnel qualifié peut installer et entretenir les produits Johnson Controls. Ces instructions constituent un guide pour ce type de personnel. Suivez attentivement toutes les instructions de ce document et toutes les instructions du HMS-2000 Fume Hood Controller.

IMPORTANT : N'utilisez que des conducteurs en cuivre. Assurez-vous que tous les branchements de câbles sont effectués selon les réglementations locales, nationales et régionales. Ne dépassez pas les spécifications électriques du HMS-2000 Fume Hood Controller.

IMPORTANT : N'installez pas le contrôleur d'environnement critique HMS-2000 où la température maximum dépasse 52 °C (125 °F). Installer l'appareil dans un environnement où la température maximum dépasse 52 °C (125 °F) peut endommager HMS-2000 Fume Hood Controller et peut annuler la garantie.

IMPORTANT : Assurez-vous que tous les branchements de câbles sont effectués selon le Code national de l'électricité et les réglementations locales. Utilisez une bonne protection contre les décharges électrostatiques (ESD) pendant l'installation et l'entretien pour éviter d'endommager les circuits électroniques du HMS-2000 Fume Hood Controller.

IMPORTANT : Conservez la bonne polarité et la bonne tension ou le bon courant. Une mauvaise polarité ou le dépassement de la tension ou du courant annulera la garantie.

IMPORTANT: Le non-respect des schémas de câblage pourrait endommager votre équipement et annuler votre garantie. En aucun cas, un seul transformateur ne doit être divisé entre actionneur et contrôleur. Cela endommagera l'actionneur, le transformateur, le contrôleur ou toutes les unités. Un seul transformateur 120/24 V 30 VA est nécessaire pour le contrôleur et un transformateur séparé 120/24 V 20 VA est requis pour l'actionneur.

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Introduction

The HMS-2000 Fume Hood Controller controls and monitors the airflow and exhaust of fume hoods to protect scientists from toxic vapors and dusts during experiments. It utilizes a closed-loop system to regulate air entering and exiting the fume hood and communicates with a sidewall sensor and sash position sensor to monitor the airflow with a higher degree of reliability. You can use the emergency purge button to instantly force the exhaust damper to the maximum open position in the event of a chemical spill or other unsafe condition in the fume hood work space.

The HMS-2000 provides maximum fume hood status awareness with color coded visual alarms both on screen and with the 360° Safety Halo illuminated edge. When the 360° Safety Halo is enabled, staff can easily monitor fume hoods in large laboratory spaces. You can put the audible alarm into snooze mode with one tap to the screen. There are two password protected access levels, one for administrators and one for restricted level users, such as laboratory technicians.

Display overview

Figure 1: HMS-2000 Fume Hood Controller display

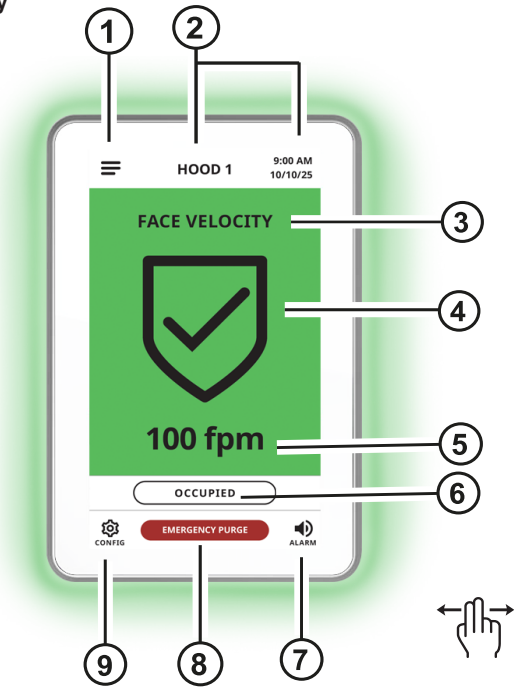


Table 1: HMS-2000 Fume Hood Controller display and icons

Number	Description
1	Menu
2	Hood name and date
3	Parameter name
4	Parameter status icon
5	Sensor reading
6	Hood operating mode
7	Quick access to alarm mode: audible or muted
8	Emergency purge icon
9	CONFIG menu

Figure 2: Alarm screen

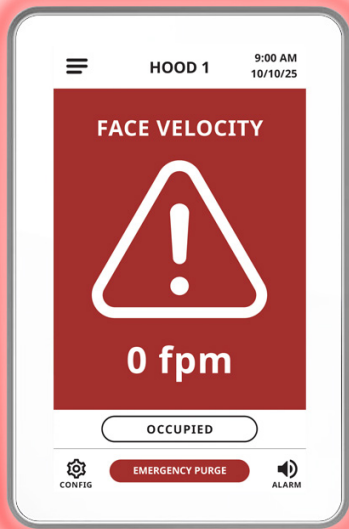


Figure 3: Standby mode

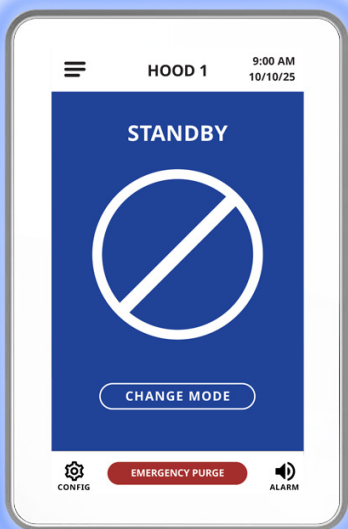


Figure 4: Emergency Purge mode

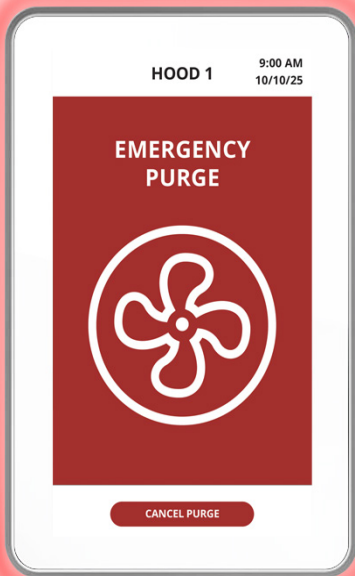


Figure 5: Normal occupied

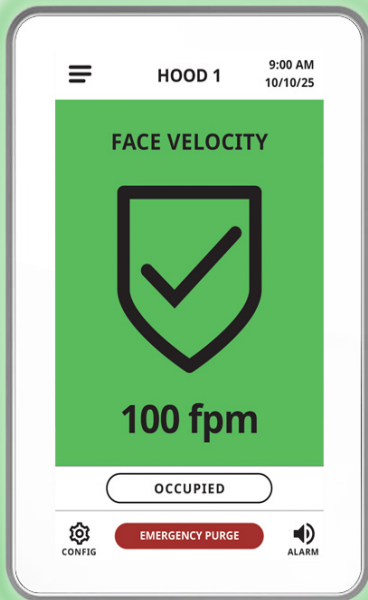
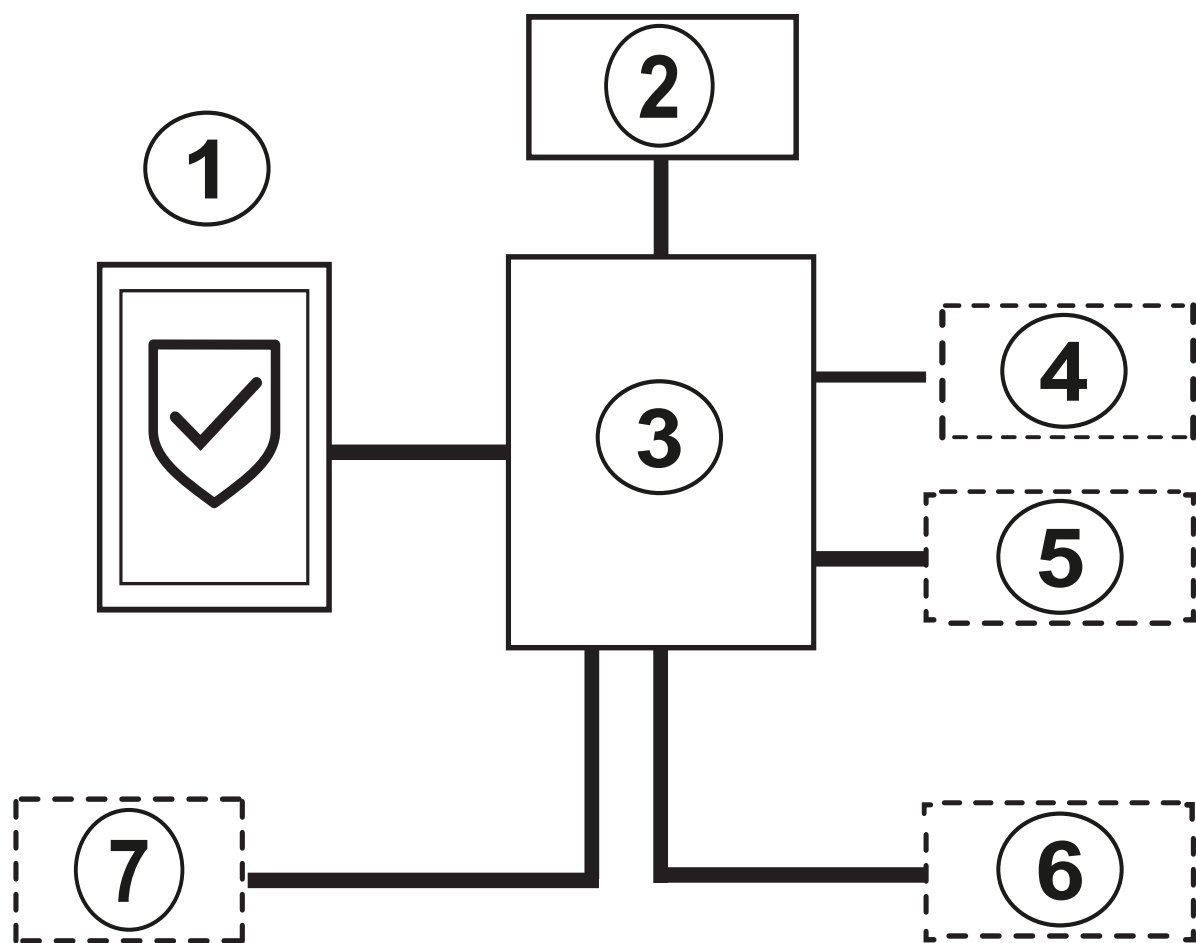


Figure 6: HMS-2000 Fume Hood Controller overview



Note: Purchase of the HMS-2000 includes the display, controller, and a sidewall sensor with an optional sash position sensor.

Table 2: HMS-2000 system diagram

Item	Component
1	HMS-2000 Display
2	Power supply
3	Controller
4	Optional occupancy switch
5	Sidewall sensor
6	Optional sash position sensor
7	Fume hood exhaust air flow device

Note: The BAS connects the HMS-2000 to other network devices over BACnet MS/TP. The power supply is ordered separately.

Table 3: Icon overview

Icon	Sensor descriptions
	Sensor readings in acceptable range
	Warning or alarm depending on status color
	Neutral isolation mode
	Audible alarm
	Muted alarm
	Night mode
	Home screen
	Start
	Stop
	Revert
	Information
	Switch is off
	Switch is on
	Increase
	Decrease
	Next
	Expand menu
	Collapse menu
	Checkmark to confirm
	Delete or cancel
	Previous page
	Next page
	More options

■ Initial setup

When the HMS-2000 Fume Hood Controller starts for the first time, you can configure the device language, units of measurement, network address, and any required calibration procedures. See Table 4 for definitions of occupied, unoccupied, and standby operating modes. The HMS-2000 Fume Hood Controller includes a Setup Wizard that is an intuitive step-by-step guide that enables you to easily and quickly configure the system for your specific application.

Table 4: Definitions of fume hood operating modes

Operating mode	Definition
Occupied mode	Controls the face velocity to maintain safe conditions when a user stands in front of the fume hood at the sash opening.
Unoccupied mode	Controls the face velocity to maintain safe conditions at a reduced rate to preserve energy.
Standby mode	Decommissions the fume hood and is not available for use when this mode is active.

■ Configuration

After you have completed the initial setup, the configuration menu appears. You can configure the following settings:

- Global
- User Accounts
- Network
- Analog I/O
- Digital Inputs
- Relays
- Proportional integral derivative (PID) Loops
- Display
- Alarms
- Diagnostics
- Documentation

■ Global settings

In Global settings you can change settings that impact the entire HMS-2000 Fume Hood Controller.

Choosing a unit of measure

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view global settings, tap **Global**.
3. On the **GLOBAL** screen, expand **Units** to select whether values display as **Imperial** or **Metric**.
4. To save the settings, collapse **Units**.

Choosing a language

1. On the home screen, tap the **CONFIG** icon.
2. To view global settings, tap **Global**.
3. To view all language options, tap **Language** arrow.
4. To choose a language, scroll to your preferred language.
5. To save your language selection, tap the **Checkmark** icon.

Configuring the Safety Halo bezel

1. On the Home screen, tap the **CONFIG** icon.
2. To view global settings, tap **Global**.
3. To enable the Safety Halo bezel and configure its brightness, expand Safety Halo and tap the switch.

Turn Keyboard clicks on or off

1. On the Home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view global settings, tap **Global**.
3. To turn the Keyboard clicks on or off, tap the toggle button.

Adjusting the screen brightness

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view global settings, tap **Global**.
3. Expand **Screen Brightness** and move the slider to increase or decrease the brightness of the screen.
4. To confirm the settings, collapse **Screen Brightness**.

■ User accounts

Setting up users and passwords restricts the use of the HMS-2000 Fume Hood Controller to specific groups of people. This is not mandatory, but if you do not create users and passwords, anyone can access all functions of the HMS-2000 controller. The following access levels are available:

- Admin level
- Restricted level.

Admin level users have access to the entire device. Restricted users have access to the user menu and the quick access icons on the home screen.

Admin user capabilities

When you create an admin user, follow these guidelines:

- When an admin user account has been created, you cannot delete it without first creating another admin user.
- Only an authenticated admin user can create users.
- An admin user can delete admin users, restricted users, or groups of users.
- An admin user can edit individual and groups of restricted users.
- An admin user can select all users.
- An admin user can delete multiple selected users.

Restricted user capabilities

- A user must authenticate to change set points.
- An individual user or group has to identify themselves before entering a pin.
- There cannot be duplication of user names.

User name and password requirements

To create a user name, follow these minimum requirements:

- English only
- Alphanumeric
- One letter minimum
- Three characters minimum
- 20 characters maximum
- No special characters required but the @ symbol can be used

Note: Do not include any personal information.

To set up an admin password, follow these minimum requirements:

- English only
- Alphanumeric
- Six characters minimum
- 12 characters maximum
- One letter minimum
- One number minimum
- No restrictions on special characters

To set up a PIN password for a restricted user, use the following criteria:

- Zero to nine numeric only
- Four digit minimum
- Eight digit maximum

Creating the admin user account and password

You must set up an admin user before you can set up a restricted user. An admin level user has access to the entire device.

1. On the home screen, tap the **CONFIG** icon.
2. Tap **User Accounts**.
3. On the **USER ACCOUNTS** screen, tap the **Create User** arrow.
4. To change the admin user name, tap the **User Name** arrow and enter the new user name. See *User name and password requirements* for user name requirements.
5. To select the access level for the new admin user account, expand **Access Level** and tap **Administrator**.
6. To confirm your settings, tap the **Checkmark** icon.
7. On the **Create Password** screen, enter your new password twice. See *User name and password requirements* for password requirements.
8. To complete setting up the admin user account and password, tap the **Checkmark** icon.

Creating a restricted user and PIN

A restricted user can access the user menu and quick access links on the home screen.

1. On the home screen, tap the **CONFIG** icon.
2. Tap **User Accounts**.
3. On the **USER ACCOUNTS** screen, tap the **Create User** arrow.
4. To change the restricted user name, tap the **User Name** arrow and enter the new user name. See *User name and password requirements* for user name requirements.
5. To select the access level for the new restricted user account, expand **Access Level** and tap **Restricted User**.
6. To confirm your settings, tap the **Checkmark** icon.
7. On the **Create PIN** screen, enter your new PIN twice. See *User name and password requirements* for PIN requirements.
8. To complete setting up the restricted user account and PIN, tap the **Checkmark** icon.

Deleting users

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view all user accounts information, tap **User Accounts**.
3. On the **USER ACCOUNTS** screen, expand **Manage Users**.
4. Tap the user names you want to delete and tap **Delete**.
5. **Optional:** If you want to delete all users, tap **Select All** and **Delete**.
6. On the **DELETE USER** screen, tap **Delete** to confirm your selection.

Note: When you choose the optional step of deleting all users, you delete all admin and restricted users except for the admin user account you are logged in with.

Changing a user name

1. On the home screen, tap the **CONFIG** icon.
2. Tap **User Accounts**.
3. To change a user name, tap **Edit** next to a user name.
4. On the **Edit User** screen, tap the **User Name** arrow and enter a different user name.
5. To confirm the new user name, tap the **Checkmark** icon.

Changing the access level of a restricted user to an admin user

1. On the home screen, tap the **CONFIG** icon.
2. Tap **User Accounts**.
3. To change the access level of a restricted user, tap **Edit**.
4. On the **Edit User** screen, tap **Restricted User** and select **Administrator**.
5. Tap **Create Password** and enter a new password twice.
6. To confirm the change, tap the **Checkmark** icon.

Changing the access level of an admin user to a restricted user

1. On the home screen, tap the **CONFIG** icon.
2. Tap **User Accounts**.
3. To change the access level of an admin user, tap **Edit**.
4. On the **Edit User** screen, tap **Administrator** and select **Restricted**.
5. Tap **Create PIN** and enter a new PIN twice.
6. To confirm the change, tap the **Checkmark** icon.

Updating the PIN of a restricted user

1. On the home screen, tap the **CONFIG** icon.
2. Tap **User Accounts**.
3. To reset the pin of a restricted user, tap **Edit**.
4. On the **Edit User** screen, tap the **Reset Pin** arrow.
5. Enter the old PIN and the new PIN twice.
6. Tap the **Checkmark** icon to confirm the reset.

Forgotten password or PIN

If restricted users forget their PIN, they can contact the facility manager to get their new PIN. Admin users can create a new PIN for restricted users.

If admin users forget their password, they have to complete the following procedure:

1. Contact support and provide them with the device identifier listed on the screen of each HMS-2000 Fume Hood Controller. See [Contact information](#) at the end of the User's Guide for more details.
2. Enter the number that support gives you into each controller to erase all user accounts.
3. See *User accounts* for information about how to set up new user accounts.

Note: You do not need to reconfigure the entire HMS-2000 controller.

■ Network setup

In the network menu, you can set up the network communications between the HMS-2000 Fume Hood Controller and the facility building automation system (BAS).

You can also adjust the device ID, MaxMaster, baud rate, and MAC address.

Setting up the device ID

The device ID (or instance number) is a number used to identify a BACnet device object. Each BACnet device on a site must have a unique device ID. The HMS-2000 creates a default device ID of 85,000 plus the current MAC address. For example, if the MAC address is 25, the default device identifier becomes 85,025. This default number can be manually changed to any number between 0 and 4,194,303 to accommodate any device ID scheme used on the site.

Setting up the MaxMaster

This parameter specifies the highest allowable address for a master node on the same network. The default value for this parameter is 127. When you adjust this value, you can prevent the online activation of some devices as bus masters. All devices on the bus must have the same MaxMaster attribute value to prevent the transfer of the token to a device with an address above the MaxMaster attribute value.

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view network settings, tap **Network**.
3. To adjust the **MaxMaster**, move the slider towards the **Plus** or the **Minus** icon. You can also tap the **Plus** or **Minus** icon to make adjustments.
4. **Optional:** Tap the **Revert** icon to revert back to the previous setting.
5. To confirm the new settings, tap the **Checkmark** icon.

Choosing the baud rate

Complete the following steps to set the baud rate when using a BACnet MS/TP configuration:

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view network settings, tap **Network**.
3. To set the **Baud Rate**, expand **Baud Rate**. The default baud rate is 38.4 kbps. The other rate options are 76.8 kbps, 19.2 kbps, or 9600 bps. Select the appropriate rate.
4. To save the new settings, collapse **Baud Rate**.
5. To ensure that the unit rejoins the MS/TP network after the baud rate change or selection, select **Reset Controller** in the **Diagnostics** menu, or power cycle the system.

Note: Only change the baud rate to match an MS/TP trunk already in use. All devices on an MS/TP bus must communicate at the same baud rate.

Setting the MAC address for BACnet MS/TP

On the BACnet MS/TP protocol, you can set up a MAC address within a valid range of 4 to 127 to support master mode.

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view network settings, tap **Network**.
3. On the Network screen, tap **MAC Address**.
4. To adjust the **MAC Address**, move the slider towards the **Plus** icon to increase or the **Minus** icon to decrease the parameter. You can also tap the **Plus** or **Minus** icon to make adjustments.
5. **Optional:** Tap the **Revert** icon to revert back to the previous setting.
6. To confirm the new settings, tap the **Checkmark** icon.
7. To ensure that the unit rejoins the MS/TP network after the MAC address change or selection, select **Reset Controller** in the **Diagnostics** menu, or power cycle the system.

BACnet objects

Table 5: Analog inputs for integration in a BAS

Object	Analog inputs	Read or write
AI-1	Analog input 1, default: face velocity	Read only
AI-2	Analog input 2, default: sash position	Read only
AI-3	Analog input 3, duct static pressure	Read only
AI-4	Analog input 4, exhaust air flow	Read only

Table 6: Analog outputs for integration in a BAS

Object	Analog outputs	Read or write
AO-1	Analog output 1, default: hood exhaust control	Read only
AO-2	Analog output 2	Read only
AO-3	Analog output 3	Read only
AO-4	Analog output 4	Read only

Table 7: Binary inputs for integration in a BAS

Object	Binary inputs	Read or write
BI-1	Digital input 1	Read only
BI-2	Digital input 2, default: emergency purge switch	Read only
BI-3	Digital input 3, default: occupancy switch	Read only
BI-4	Digital input 4, default: flow switch	Read only

Table 8: Binary outputs for integration in a BAS

Object	Binary outputs	Read or write
BO-1	Relay output 1, spare relay output	Read only
BO-2	Relay output 2	Read only
BO-3	Relay output 3	Read only
BO-4	Relay output 4	Read only

Table 9: Analog values for integration in a BAS

Object	Analog values	Read or write
AV-1	AI-1 face velocity setpoint	Read or write
AV-2	AI-2 setpoint	Read or write
AV-3	AI-3 setpoint	Read or write
AV-4	AI-4 setpoint	Read or write
AV-5	Not used	n/a
AV-6	Not used	n/a
AV-7	Not used	n/a
AV-8	Not used	n/a
AV-9	Not used	n/a
AV-10	Not used	n/a
AV-11	Alarm relay 1 high setpoint	Read or write

Table 9: Analog values for integration in a BAS (continued)

Object	Analog values	Read or write
AV-12	Alarm relay 1 low setpoint	Read or write
AV-13	Alarm relay 2 high setpoint	Read or write
AV-14	Alarm relay 2 low setpoint	Read or write
AV-15	Alarm relay 3 high setpoint	Read or write
AV-16	Alarm relay 3 low setpoint	Read or write
AV-17	Alarm relay 4 high setpoint	Read or write
AV-18	Alarm relay 4 low setpoint	Read or write
AV-19	AI-1 low alarm limit for face velocity	Read or write
AV-20	AI-1 low warning limit for face velocity	Read or write
AV-21	AI-1 high warning limit for face velocity	Read or write
AV-22	AI-1 high alarm limit for face velocity	Read or write
AV-23	AI-2 sash high alarm height (unoccupied mode)	Read or write
AV-24	AI-2 sash low alarm mute height	Read or write
AV-25	AI-2 sash high alarm delay	Read or write
AV-26	AI-2 sash high alarm height (occupied mode)	Read or write
AV-27	AI-3 low alarm setpoint	Read or write
AV-28	AI-3 low warning setpoint	Read or write
AV-29	AI-3 high warning setpoint	Read or write
AV-30	AI-3 high alarm setpoint	Read or write
AV-31	AI-4 low alarm setpoint	Read or write
AV-32	AI-4 low warning setpoint	Read or write
AV-33	AI-4 high warning setpoint	Read or write
AV-34	AI-4 high alarm setpoint	Read or write
AV-35	Not used	n/a
AV-36	Not used	n/a
AV-37	Not used	n/a
AV-38	Not used	n/a
AV-39	Not used	n/a
AV-40	Not used	n/a
AV-41	Not used	n/a
AV-42	Not used	n/a
AV-45	Not used	n/a
AV-46	Not used	n/a
AV-48	Not used	n/a
AV-49	Not used	n/a
AV-50	Not used	n/a
AV-51	Not used	n/a
AV-52	Not used	n/a
AV-53	Not used	n/a
AV-54	AO-1 override level	Read or write
AV-55	AO-2 override level	Read or write
AV-56	AO-3 override level	Read or write

Table 9: Analog values for integration in a BAS (continued)

Object	Analog values	Read or write
AV-57	AO-4 override level	Read or write
AV-58	AI-1 deadband setting	Read or write
AV-59	AI-2 deadband setting	Read or write
AV-60	AI-3 deadband setting	Read or write
AV-61	AI-4 deadband setting	Read or write
AV-62	Not used	n/a
AV-63	Not used	n/a
AV-64	AI-1 override value	Read or write
AV-65	AI-2 override value	Read or write
AV-66	AI-3 override value	Read or write
AV-67	AI-4 override value	Read or write

Table 10: Multistate objects for integration in a BAS

Object	Multistate objects	Read or write
MV-1	Fume hood operating mode	Read or write
MV-2	Not used	n/a
MV-3	Fume hood alarm status	Read only
MV-4	Not used	n/a
MV-5	AI-3 alarm status	Read only
MV-6	AI-4 alarm status	Read only
MV-7	Not used	n/a
MV-8	Not used	n/a
MV-9	Not used	n/a

Analog I/O

Admin users can set up analog inputs (AI) AI-1 to AI-4, analog outputs (AO) AO-1 to AO-4, and map analog inputs to any of the four analog outputs.

See Table 11 for more information about which parameter can be configured to which analog input. Refer to the *HMS-2000 Fume Hood Controller Installation Guide* for more information.

Figure 7: Wiring diagram

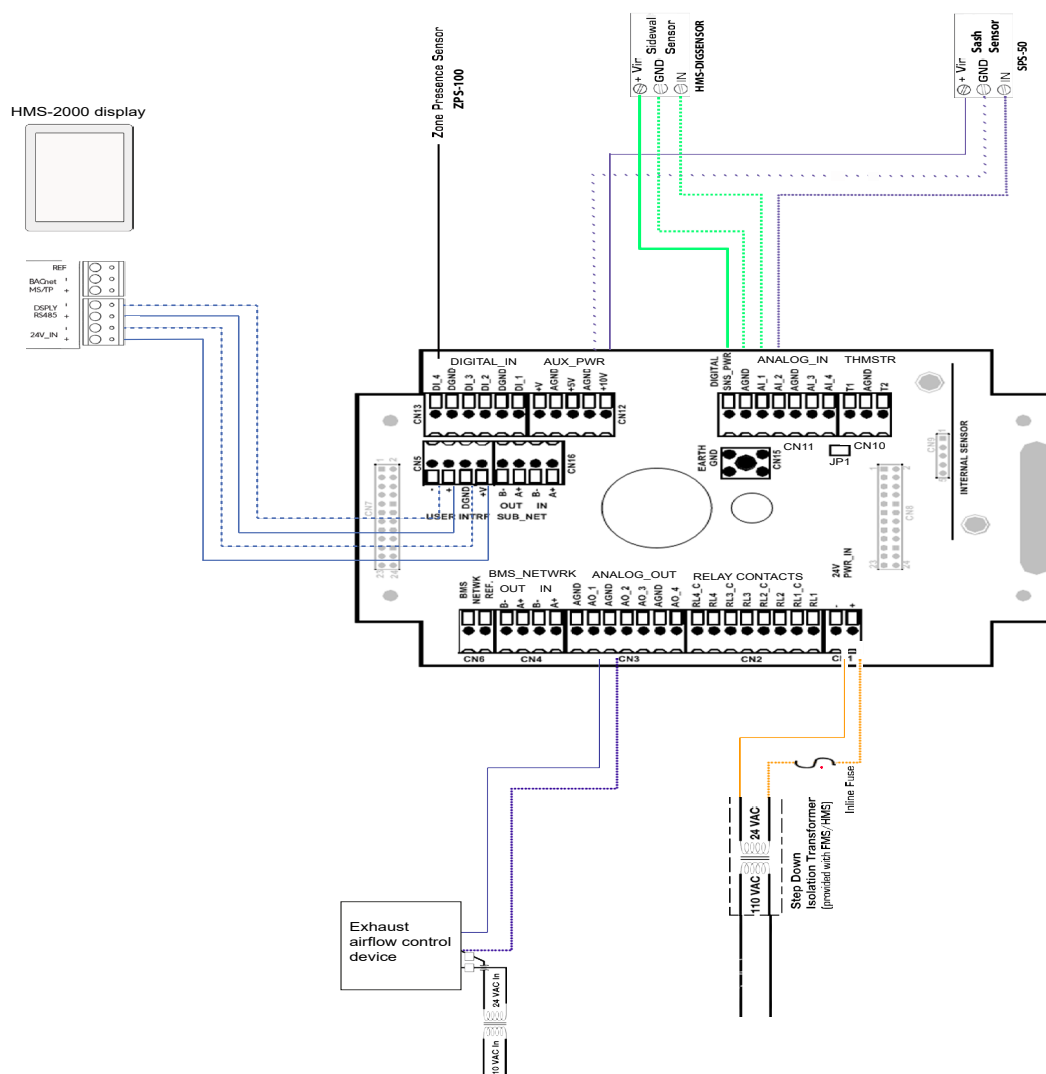


Table 11: Parameter configurations

Parameter	Analog input
face velocity sidewall sensor	AI_1
Sash position	AI_2
Pressure	AI_2, AI_3, AI_4
Air flow	AI_2, AI_3, AI_4

■ Configuring analog inputs to measure pressure

To configure the HMS-2000 controller for pressure, you can use AI-2, AI-3 and AI-4. Analog Input 1 is only configured for monitoring face velocity and is pre-configured by the factory. If you are using a third-party pressure sensor you need to select pressure from the list of input types.

Specifying the parameter type for pressure

1. On the home screen, tap the **CONFIG** icon.
2. Tap **Analog I/O**.
3. On the **ANALOG 1** screen, swipe left to get to the analog input that you want to configure.
4. Tap the **Type** arrow and choose **Pressure**.
5. To confirm the settings, tap the **Checkmark** icon.

Specifying the sensor type

If you purchased a Johnson Controls pressure sensor, the sensor type comes pre-configured as **Remote digital**. If you provide your own pressure sensor, the preset is **Third Party**.

If you are using a remote digital sensor, see *Specifying the sensor location*. If you are using a third party sensor, see *Specifying the maximum pressure input*, *Specifying the minimum pressure input*, and *Specifying the K-Factor* for more information.

Table 12: Signal range requirements for third-party sensors

Analog input	Pressure range	Voltage range
Analog Input 2, 3, 4	Configurable. Both unidirectional & bidirectional pressure ranges supported.	0 Vdc - 5 Vdc, default 0 Vdc - 10 Vdc 0 mA - 20 mA 1 Vdc - 5 Vdc 2 Vdc - 10 Vdc 4 mA - 20 mA

Specifying the maximum pressure input

To specify the maximum pressure input for third-party pressure sensors, complete the following steps:

1. On the home screen, tap the **CONFIG** icon.
2. Tap **Analog I/O**.
3. To find the analog input you want to adjust, swipe left.
4. On the **ANALOG** screen, tap the **Maximum Pressure Input** arrow.
5. Regardless of whether this pressure sensor is **unidirectional** or **bidirectional**, the maximum pressure must be entered as the positive limit of the sensor's specified range. The **Sensor Location** parameter, located in the **Analog Input Setup** menus, determines the polarity of the displayed pressure, regardless of the type of sensor installed. For negative pressure applications, the sign of the displayed pressure is inverted by toggling the **Sensor Location** parameter.
6. To confirm the settings, tap the **Checkmark** icon.

Specifying the minimum pressure input

If the pressure sensor is bidirectional, the minimum pressure input is the negative limit of the differential range. If the sensor is unidirectional, the value is zero. To specify the minimum pressure input for third-party pressure sensors, complete the following steps:

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view analog input settings, tap **Analog I/O**.
3. To find the analog input you want to adjust, swipe left.
4. On the **ANALOG** screen, tap the **Minimum Pressure Input** arrow.
5. If this pressure sensor is **unidirectional**, the minimum pressure must be entered as zero. If the pressure sensor is **bidirectional**, the minimum pressure must be entered as the negative limit of the sensor's specified range. The **Sensor Location** parameter determines the polarity of the displayed pressure, regardless of the type of sensor installed. For negative pressure applications, the sign of the displayed pressure can be inverted by toggling the **Sensor Location** parameter.
6. To confirm the new settings, tap the **Checkmark** icon.

Specifying the K-Factor

The default value for the K-Factor is 1.0, but the manufacturer of the sensor can provide a different K-Factor to serve as a correction factor for the actual output of the sensor. If you do not receive a different K-Factor from the manufacturer, leave the K-Factor at its default value. If you need to specify a different K-Factor, complete the following steps:

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view analog input settings, tap **Analog I/O**.
3. To find the analog input you want to adjust, swipe left.
4. On the **ANALOG** screen, tap **K-Factor**.
5. Enter the **K-Factor** that the manufacturer provided with the sensor.
6. To confirm the settings, tap the **Checkmark** icon.

Specifying the sensor location

Specify the location of the differential pressure (DP) sensor. You can select the location within the monitored space or within the reference space.

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view analog input settings, tap **Analog I/O**.
3. To find the analog input you want to adjust, swipe left.
4. To configure the location of the sensor, expand **Sensor Location** and choose from the following options:
 - **Reference Space**
 - **Monitored Space**
5. If the sign of the pressure reading is opposite of the actual measured pressure, the **Sensor Location** setting must be toggled. This effectively inverts the sign of the measured pressure for display purposes.
6. To confirm your settings, collapse **Sensor Location**.

Adjusting the setpoint

Specify the mode setpoint based on your application. You can find this value in the project specifications.

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATIONS** menu.
2. To view analog input settings, tap **Analog I/O**.
3. To find the analog input you want to adjust, swipe left.
4. On the **ANALOG** screen, tap the **Setpoint** arrow.
5. Enter the **Setpoint** value.
6. To confirm the new settings, tap the **Checkmark** icon.
7. Depending on the configuration of the controlled air flow device, Venturi, VAV box, EcoAir, the action mode or polarity of the corresponding control output (AO) may need to be inverted for proper control to maintain the setpoint. The default action mode is **Direct**.

Setting up the analog input signal range

If you are using a remote digital pressure sensor, the range defaults to 4 mA to 20 mA. If you are using a third-party sensor, complete the following steps to configure the signal range:

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view analog input settings, tap **Analog I/O**.
3. To find the analog input you want to adjust, swipe left.
4. On the **ANALOG** screen, expand **Range** and choose from the following:
 - **0-5V, 0-10V, 0-20mA**
 - **1-5V, 2-10V, 4-20mA**
5. To save the new settings, collapse **Range**.
6. Adjust the DIP switches on the backplane to match the setting.

Adjusting deadband

This parameter specifies the deadband applied to the pressure input signal for control purposes. When the input signal is within the deadband, the corresponding PID control output remains constant.

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view analog input settings, tap **Analog I/O**.
3. To find the analog input you want to adjust, swipe left.
4. On the **ANALOG** screen, tap the **Deadband** arrow.
5. Enter the **Deadband** value.
6. To confirm the new settings, tap the **Checkmark** icon.

Zero Calibration

The **Zero Calibration** and **Reset Zero Offset** options are used to reset the zero pressure reading for a specific installation. Once the HMS-2000 controller is installed completely with any peripheral remote sensor modules, this feature calibrates the sensor's zero reading to read accurately with the door to the monitored space left open.

With the door to the monitored space open, the differential pressure measured by the HMS-2000 controller usually approaches zero. However, due to imperfections in the sealing of the remote sensor enclosure and pressure accumulation in the wall dividing the monitored space and the adjacent space, the pressure reading does not reach zero. It is common for the differential pressure reading to be up to 0.0010 in. W.C. or 0.2490 Pa with the door to the monitored space left open to allow pressure to equalize.

Creating a zero offset

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view analog input settings, tap **Analog I/O**.
3. On the **ANALOG** screen, tap the **Zero Calibration** arrow.
4. On the **ZERO CALIBRATION** screen, tap the **Create Zero Offset** arrow.
5. Follow the instructions on screen and wait for the real-time view reading on the screen to stabilize for at least 10 seconds.
6. To create a zero offset, tap **Proceed**.
7. To create a zero offset for respective rooms, swipe left to select AI-2, AI-3, or AI -4 and repeat steps 1 to 6.

Resetting the zero offset

If a zero offset is created and does not result in a reduction of the differential pressure reading to zero, you can reset any existing offset using the **Reset Zero Offset** option. Use this option before you repeat *Creating a zero offset*.

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view analog input settings, tap **Analog I/O**.
3. On the **ANALOG** screen, tap the **Zero Calibration** arrow.
4. On the **ZERO CALIBRATION** screen, tap **Reset Zero Offset**.
5. On the **RESET ZERO OFFSET** screen, tap **Proceed**.
6. To confirm the new settings, tap the **Checkmark** icon.
7. To create a zero offset for respective rooms, swipe left to select AI-2, AI-3, or AI -4 and repeat steps 1 to 6.

Setting the alarms

The HMS-2000 Fume Hood Controller supports alarming across all four analog inputs, including the face velocity input. You can disable the alarms for AI-2, AI-3, and AI-4 if required. For users' safety, you cannot disable the alarms for the face velocity input.

The HMS-2000 comes with adjustable default alarm settings based on the specific application. To adjust the default alarm settings, see *Modifying the default alarm limits* for more information.

Modifying the default alarm limits

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menus.
2. Scroll down and select the **ALARMS** option to enter the alarms configuration options.
3. On this screen, you can configure the preferred Alarm Mode. Specify the Audible Alarm Delay and Snooze settings, and modify the any of the default Alarm Limits for the four analog inputs.
4. To change the **Alarm Mode**, tap **+** to expand the option and select the icon that corresponds to the preferred mode. To save the selection, tap **-** to collapse the option.
5. To adjust the **Audible Alarm Delay**, tap **+** to expand the option and adjust the delay time with the slider, or use the **+** and **-**. To specify the time units, tap either **Seconds** or **Minutes**. To save the changes, tap **-** to collapse the option.
6. To adjust the **Audible Alarm Snooze** settings, tap **+** to expand the option and adjust the snooze time with the slider, or use the **+** or **-**. To save the changes, tap **-** to collapse the option.
7. To adjust the **Alarm Limits** for any of the four analog inputs, tap **>** to open the alarm configuration screen for the selected analog input.
8. To enable the selected analog input, slide the toggle switch at the top of each alarm configuration screen to the right. To disable the selected analog input, slide the toggle switch to the left.
9. There are four alarm limits for the selected analog input. If you selected the **Sidewall Sensor** input there are eight alarm limits, four for **Occupied mode** and four for **Unoccupied mode**.
10. The current setting for each alarm limit is displayed to the right of the description, with a **>** to the right of the setting.
11. Tap **>** to open the numeric entry keypad to enter the alarm limit value. Tap the **blue checkmark** to save the new value and return to the previous screen. To cancel and return to the previous screen and not enter a new value, tap the **X** at the left corner.
12. Repeat steps 7 to 11 for each analog input you want to modify alarm limits for.

■ Configuring the analog input to measure air flow

You can display room cfm in AI-2, AI-3 and AI-4 with either a DP transmitter or a flow sensor.

Configuring the analog input to measure air flow

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view analog input settings, tap **Analog I/O**.
3. To find the analog input you want to adjust, swipe left.
4. To configure the analog input type for flow, tap the **Type** arrow.
5. On the **Type** screen, scroll to **Flow**.
6. To confirm the settings, tap the **Checkmark** icon.

Specifying the sensor type to measure air flow

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view analog input settings, tap **Analog I/O**.
3. To find the analog input you want to adjust, swipe left.
4. Expand the **Sensor Type** and tap one of the following options:
 - **DP Transmitter**
 - **Flow Sensor**
5. To confirm the new settings, collapse **Sensor Type**.

Specifying the maximum input setting to measure air flow

If you are using a DP transmitter, set the maximum pressure input. If you are using a flow sensor, set the maximum flow input.

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view analog input settings, tap **Analog I/O**.
3. To find the analog input you want to adjust, swipe left.
4. To change the maximum pressure input, tap the **Maximum Pressure Input** arrow.
5. To confirm the settings, tap the **Checkmark** icon.

Specifying the minimum input setting to measure air flow

If you are using a DP transmitter, set the minimum pressure input. If you are using a flow sensor, set the minimum flow input.

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view analog input settings, tap **Analog I/O**.
3. To find the analog input you want to adjust, swipe left.
4. To change the minimum pressure input, tap the **Minimum Pressure Input** arrow.
5. To confirm the settings, tap the **Checkmark** icon.

Setting up the duct area to measure air flow

If you are using a DP transmitter, specify the cross-sectional duct area in square inches. This duct area converts a differential pressure or a velocity to a real-time volumetric flow. For round ducts, the cross-sectional area is determined by multiplying the square of the radius by pi. As an example, the cross-sectional area of a round 12 in. (304.8 mm) duct, which has a radius of 6 in. (152.4 mm), is calculated as follows:

$$\text{Area}_{\text{round duct}} = \pi * r^2 \text{ (For example: } 3.1416 * (6 \text{ in.})^2 = 113.09 \text{ in.}^2\text{)}$$

For rectangular ducts, the cross-sectional area is determined by multiplying the length and width. As an example, the cross-sectional area of a duct that measures 24 in. (609.6 mm) by 12 in. (304.8 mm) is calculated as follows:

$$\text{Area}_{\text{rectangular duct}} = L * W \text{ (For example: } 24 \text{ in.} * 12 \text{ in.} = 288 \text{ in.}^2\text{)}$$

To specify the duct area for flow, complete the following steps:

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view analog input settings, tap **Analog I/O**.
3. To find the analog input you want to adjust, swipe left.
4. To specify the duct area, tap the **Duct Area** arrow and enter the result of your calculation.
5. To confirm the settings, tap the **Checkmark** icon.

Specifying the K-Factor to measure air flow

The default value for the K-Factor is 1.0, but the manufacturer of the sensor can provide a different K-Factor to serve as a correction factor for the actual output of the sensor. If you do not receive a different K-Factor from the manufacturer, leave the K-Factor at its default value. If you need to specify a different K-Factor, complete the following steps:

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view analog input settings, tap **Analog I/O**.
3. To find the analog input you want to adjust, swipe left.
4. On the **ANALOG** screen, tap K-Factor.
5. Enter the **K-Factor** that the manufacturer provided with the sensor.
6. To confirm the settings, tap the **Checkmark** icon.

Specifying the output signal range for air flow

When you select the 0-5V, 0-10V, 0-20mA range, the analog output swings from zero to the maximum specified by the hardware dipswitch selection. The 1-5V, 2-10V, 4-20mA range includes an offset from zero. To specify the output range, complete the following steps:

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view analog input settings, tap **Analog I/O**.
3. To find the analog input you want to adjust, swipe left.
4. To specify the output range, expand **Range**.
5. To select a range, tap one of the following:
 - **0-5V, 0-10V, 0-20mA**
 - **1-5V, 2-10V, 4-20mA**
6. Collapse **Range** to save the new settings.

Adjusting deadband for air flow

This parameter specifies the deadband applied to the differential pressure input signal for control purposes. When the input signal is within the deadband, the corresponding PID control output remains constant.

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view analog input settings, tap **Analog I/O**.
3. To find the analog input you want to adjust, swipe left.
4. On the **ANALOG** screen, tap the **Deadband** arrow.
5. Enter the **Deadband** value.
6. To confirm the new settings, tap the **Checkmark** icon.

Enabling the alarm and changing the alarm limits for air flow

1. On the home screen, tap the **CONFIG** icon.
2. On the **CONFIGURATION** screen, tap **Analog I/O**.
3. To find the analog input you want to set up the alarm for, swipe left.
4. Scroll down and tap the **Alarm Setup** arrow.
5. Switch **Alarm Enabled** on.
6. Tap the **High Alarm Setpoint** arrow.
7. Enter the **High Alarm Setpoint** and tap the **Checkmark** to confirm your settings.
8. Tap the **High Warning Limit** arrow.
9. Enter the **High Warning Limit** and tap the **Checkmark** to confirm your settings.
10. Tap the **Low Warning Limit** arrow.
11. Enter the **Low Warning Limit** and tap the **Checkmark** to confirm your settings.

Naming the air flow input

Set up a name for the analog that input you want to appear on the home screen. If your HMS-2000 controller is in portrait mode, you can have up to 16 characters. If your HMS-2000 controller is in landscape mode, you can have up to 12 characters.

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view analog input settings, tap **Analog I/O**.
3. To find the analog input you want to set up a new name for, swipe left.
4. On the **ANALOG** screen, scroll down and tap the **Name** arrow.
5. On the **Name** screen enter a new name.
6. To confirm the new name, tap the **Checkmark** icon.

Digital inputs

You can use digital inputs to configure the following:

- Occupancy switch
- Flow switch
- Emergency purge switch

Configuring digital inputs for Occupancy switch mode

Configure one of the secondary digital inputs for occupancy switch mode. In this mode an external signal from an occupancy switch or sensor, a physical wall-mounted button, or a relay output automatically switches the occupancy mode.

When the digital input, configured as an occupancy switch returns to the inactive state, the occupancy mode automatically switches back to the unoccupied mode.

To configure the digital input for an occupancy switch, complete the following steps:

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view digital input settings, tap **Digital Input**.
3. To find the digital input you want to configure the override switch to, swipe left.
4. On the **DIGITAL INPUT** screen, tap **Input Type** and scroll to **Occupancy Switch**.
5. To confirm the settings, tap the **Checkmark** icon.

Configuring the switch type

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view digital input settings, tap **Digital Input**.
3. To find the digital input you want to configure the override switch to, swipe left.
4. On the **DIGITAL INPUT** screen, expand **Switch Type** and choose from the following options:
 - **Normally Open**
 - **Normally Closed**
5. To confirm the settings, collapse **Switch Type**.

Setting up a delay

You can set up a delay of up to 240 minutes for the occupancy switch mode.

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view digital input settings, tap **Digital Input**.
3. To find the digital input you want to configure the override switch to, swipe left.
4. On the **DIGITAL INPUT** screen, expand **Delay** and move the slider to adjust for how many seconds you want to set up the delay.
5. To confirm the settings, collapse **Digital Input**.

■ Configuring digital inputs for flow switch mode

Configure one of the secondary digital inputs for flow switch mode. In this mode an external signal from a flow switch can trigger the alarm to indicate insufficient air flow in the exhaust duct.

To configure the digital input for a flow switch, complete the following steps:

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view digital input settings, tap **Digital Input**.
3. To find the digital input you want to configure the flow switch to, swipe left.
4. On the **DIGITAL INPUT** screen, tap the **Input Type** arrow and scroll to **Flow Switch**.
5. To confirm the settings, tap the **Checkmark** icon.

Configuring the switch type

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view digital input settings, tap **Digital Input**.
3. To find the digital input you want to configure the override switch to, swipe left.
4. On the **DIGITAL INPUT** screen, expand **Switch Type** and choose from the following options:
 - **Normally Open**
 - **Normally Closed**
5. To confirm the settings, collapse **Switch Type**.

Setting up a delay

You can set up a delay of up to 240 minutes for the flow switch mode.

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view digital input settings, tap **Digital Input**.
3. To find the digital input you want to configure the override switch to, swipe left.
4. On the **DIGITAL INPUT** screen, expand **Delay** and move the slider to adjust for how many seconds you want to set up the delay.
5. To confirm the settings, collapse **Digital Input**.

■ Relays

The relay output is used for the following applications:

- Alarm annunciator
- Operating mode indication
- Occupancy mode indication
- Triggering pilot relay for high-current devices based on setpoints, operating mode, or occupancy mode
- Operating mode or occupancy mode to other controllers
- Activating bypass dampers
- Activating area lighting through the pilot relay based on occupancy mode

Table 13: Relay output trigger configuration

Trigger mode	Description
Setpoint mode	Configure this mode to trigger a pair of setpoints to determine when to activate or deactivate the alarm relay.
Operating mode	Configure this mode to trigger the alarm relay based on the operating mode selected.
Safety-Halo Tracking mode	Use this mode to configure relays 1, 2, and 3 to trigger three discrete indicators (green, yellow, red) and track the alarm status displayed on the Safety Halo illuminated bezel.

■ Configuring the trigger mode for setpoint

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view the relay settings, tap **Relay**.
3. To find the relay that you want to configure the trigger mode for, swipe left.
4. On the **RELAY** screen, expand **Trigger Mode** and tap **Setpoint**. See Table 13 for more information.
5. To confirm the settings, collapse **Trigger Mode**.

Configuring the input channel

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view relay settings, tap **Relay**.
3. To find the relay you want to configure the input channel for, swipe left.
4. On the **RELAY** screen, tap the **Input Channel** arrow and scroll to the analog input that you want to configure the relay to.
5. To confirm the settings, tap the **Checkmark** icon.

Note: Relay 1 uses AI-1 by default, but you can map it to one of the four analog inputs.

Configuring the high and low setpoints

When using the setpoint trigger mode, the HMS-2000 controller has to be in either occupied or unoccupied mode to enter the high and low relay setpoints. If the system is in standby operating mode, then setpoint entry is not available. The high setpoint determines the threshold that the relay is activated if in direct acting mode, or gets deactivated if in reverse acting mode. The low setpoint determines the threshold at which the alarm relay gets deactivated if in direct acting mode, or gets activated if in reverse acting mode.

To configure the high and low setpoint for the occupied mode, complete the following steps:

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view relay settings, tap **Relay**.
3. Swipe left to find the preferred relay.
4. On the **RELAY** screen, tap the **Occupied High Point** arrow and enter the high setpoint value for the occupied mode.
5. To confirm the new setting, tap the **Checkmark** icon.
6. Tap the **Occupied Low Point** arrow and enter the low setpoint value for the occupied mode.
7. To confirm the new setting, tap the **Checkmark** icon.

To configure the high and low Setpoint for the unoccupied mode, complete the following steps:

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view relay settings, tap **Relay**.
3. Swipe left to find the preferred relay.
4. On the **RELAY** screen, tap the **Unoccupied High Point** arrow and enter the high setpoint value for the unoccupied mode.
5. To confirm the new setting, tap the **Checkmark** icon.
6. Tap the **Unoccupied Low Point** arrow and enter the low setpoint value for the unoccupied mode.
7. To confirm the new setting, tap the **Checkmark** icon.

Configuring the action mode

In direct acting mode, the alarm relay activates when the input signal exceeds the high setpoint and deactivates when the input signal falls below the low setpoint. In reverse acting mode, the alarm relay activates when the input signal falls below the low setpoint and deactivates when the input signal exceeds the high setpoint.

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view relay settings, tap **Relay**.
3. To find the relay you want to configure the action mode for, swipe left.
4. On the **RELAY** screen, expand **Action Mode** and choose from the following options:
 - **Direct Acting**
 - **Reverse Acting**
5. To confirm the new setting, collapse **Action Mode**.

Setting a delay

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view relay settings, tap **Relay**.
3. To find the relay you want to set up a delay for, swipe left.
4. On the **RELAY** screen, expand **Action Mode** and move the slider to set a delay time of up to 180 seconds.
5. **Optional:** Tap the **Revert** icon to revert back to the previous delay time.
6. To confirm the new setting, collapse **Action Mode**.

■ Configuring the trigger mode for Operating Mode

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view relay settings, tap **Relay**.
3. To find the relay you want to configure the trigger mode for, swipe left.
4. On the **RELAY** screen, expand **Trigger Mode** and tap **Operating Mode**. See Table 13 for more information.
5. To confirm the new setting, collapse **Trigger Mode**.

Adjusting the type of operating mode

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view relay settings, tap **Relay**.
3. To find the relay you want to adjust the type of operating mode for, swipe left.
4. On the **RELAY** screen, expand **Operating Mode** and choose from the following options:
 - **Occupied**
 - **Unoccupied**
5. To confirm the new setting, collapse **Operating Mode**.

Setting a delay

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view relay settings, tap **Relay**.
3. To find the relay you want to set up a delay for, swipe left.
4. On the **RELAY** screen, expand **Action Mode** and move the slider to set a delay time of up to 240 seconds.
5. **Optional:** Tap the **Revert** icon to revert back to the previous delay time.
6. To confirm the new setting, collapse **Action Mode**.

■ Configuring the PID Loop

If you configure any of the analog outputs in PID mode, you can use the **PID Loop Setup** menu to fine-tune the PID constants that the closed-loop control scheme uses. See Table 14 for information on default values.

Setting up the proportional gain

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view the PID settings, tap **PID Loop**.
3. To find the PID Loop Setup you want to adjust the proportional gain for, swipe left.
4. On the **PID LOOP SETUP** screen, expand **Proportional** and move the slider to set the proportional gain.
5. **Optional:** Use the **Revert** icon to revert back to the previous setting.
6. To confirm the settings, collapse **Proportional**.

Setting up the integral gain

1. To view the PID settings, tap **PID Loop**.
2. To find the PID loop setup you want to adjust the integral gain for, swipe left.
3. On the **PID LOOP SETUP** screen, expand **Integral** and move the slider to set the integral gain.
4. **Optional:** Use the **Revert** icon to revert back to the previous setting.
5. To confirm the settings, collapse **Integral**.

Setting up the derivative constant

1. To view the PID settings, tap **PID Loop**.
2. To find the PID loop setup you want to adjust the derivative gain for, swipe left.
3. On the **PID LOOP SETUP** screen, expand **Derivative** and move the slider to set the derivative gain. Set the derivative constant to a default of zero for most applications.
4. **Optional:** Use the **Revert** icon to revert back to the previous setting.
5. To confirm the settings, collapse **Derivative**.

Table 14: PID default

PID constant	Default value
Proportional	20
Integral	5
Derivative	0

■ Display settings

On the Display screen you can adjust the following:

- 360° Safety Halo
- Viewing mode
- Screen brightness
- Device name

Switching on and adjusting the brightness of the 360° Safety Halo

Once you have set up the 360° Safety Halo, restricted users can adjust the settings from both the user menu and the quick access the 360° Safety Halo icon on the home screen.

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view display settings, tap **Display**.
3. To adjust settings for the **Safety Halo**, tap the **Safety Halo** arrow.
4. To turn on the 360° Safety Halo, turn on **Enabled** and expand to view the **Brightness** slider.
5. To adjust the **Brightness**, move the slider to increase or decrease the level.
6. To confirm the new settings, tap the **Checkmark** icon.

Adjusting the screen brightness

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view display settings, tap **Display**.
3. Expand **Screen Brightness** and move the slider to increase or decrease the brightness of the screen.
4. To confirm the settings, collapse **Screen Brightness**.

Changing the device name

1. On the home screen, tap the **CONFIG** icon to enter the **CONFIGURATION** menu.
2. To view display settings, tap **Display**.
3. On the **Display** screen, tap the **Device Name** arrow.
4. Enter a device name. It can be up to fourteen characters in portrait mode and up to sixteen characters in landscape mode.
5. To confirm the new device name, tap the **Checkmark** icon.

■ Home screen viewing modes

The viewing mode controls how the home screen looks and what parameter triggers the 360° Safety Halo.

Figure 8: Main status screen monitoring face velocity

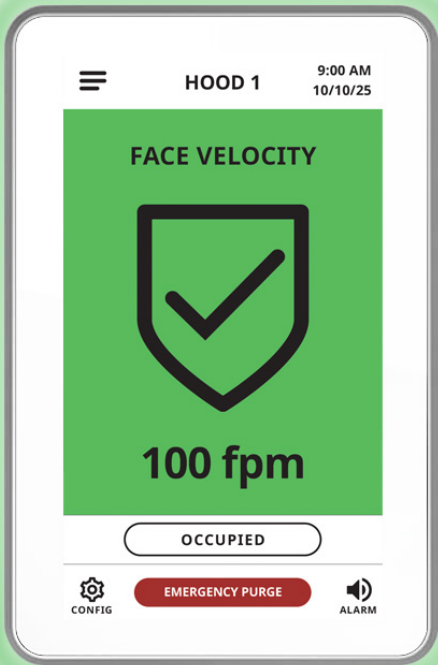


Figure 9: Monitoring face velocity and exhaust air flow

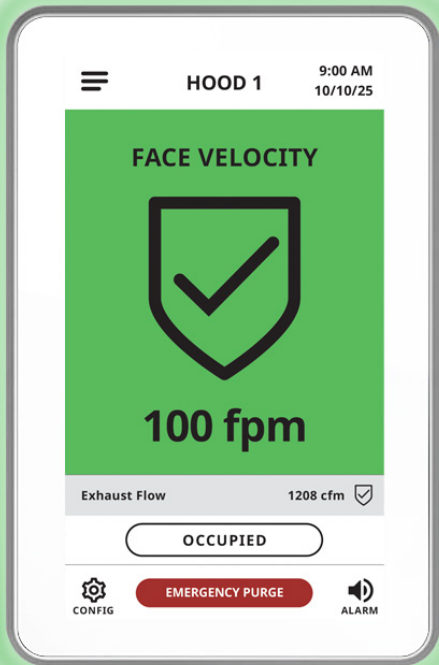
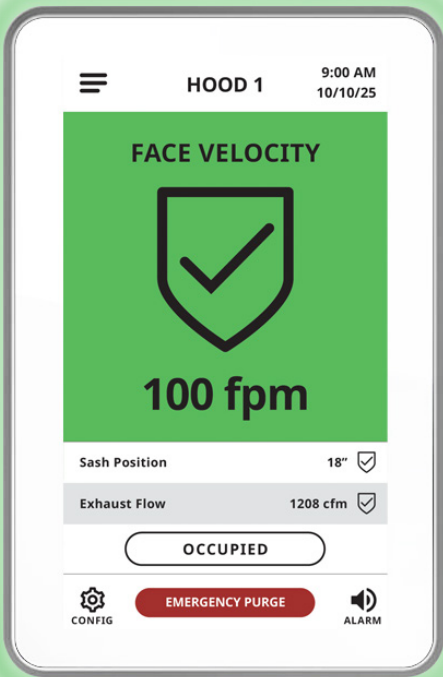


Figure 10: Monitoring face velocity, sash position, and exhaust air flow



Diagnostics

On the Diagnostics screens, you can find information about your particular HMS-2000 Fume Hood Controller model. You can also find more information to help with troubleshooting during the installation process.

Viewing the About This HMS information

When you contact technical support, use the About this HMS section to reference specific details about your controller. You can also view the present value, setpoint, deadband, and alarm settings for each of the analog inputs you have configured.

To view the device information, complete the following steps

1. On the home screen, tap the **CONFIG** icon.
2. On the **CONFIGURATION** screen, scroll down and tap **Diagnostics**.
3. On the **DIAGNOSTICS** screen, tap the **About This HMS** arrow.
4. On the **About This HMS** screen, tap the **Device Info** arrow.
5. To view the analog input settings, tap the **Arrow** icon.
6. To return to the **About This HMS** screen, tap the **Checkmark** icon.

Accessing the real-time view

To help with troubleshooting, use the real-time view screens to see real-time conditions. In this view, you can see the real-time conditions of each of the resources configured to the HMS-2000 controller. This includes the analog input values and their actual voltages, the analog outputs in percentage and their actual voltages, the analog input and output pairs along with the corresponding setpoints, the digital inputs, the digital outputs, and the alarm statuses.

1. On the home screen, tap the **CONFIG** icon.
2. On the **CONFIGURATION** screen, scroll down and tap **Diagnostics**.
3. On the **DIAGNOSTICS** screen, tap the **Real-Time View** arrow.
4. On the **Real-Time View** screen, you can choose the following options:
 - **Analog Inputs**
 - **Analog Outputs**
 - **Analog I/O Pairs**
 - **Digital Inputs**
 - **Relay Outputs**
 - **Alarm Status**
5. Tap one of the options and tap the **Arrow** icon to toggle through to the other options.
6. To return to the **DIAGNOSTICS** screen, tap the **Checkmark** icon.

Changing the setpoints and deadband from the real-time view

On the Analog I/O Pairs screen, you can view the analog inputs alongside their associated analog outputs and their corresponding target setpoints. To change the quick isolation setpoint, complete the following steps:

1. On the home screen, tap the **CONFIG** icon.
2. On the **CONFIGURATION** screen, scroll down and tap **Diagnostics**.
3. On the **DIAGNOSTICS** screen, tap the **Real-Time View** arrow.
4. On the **Real-Time View** screen, tap the **Analog I/O Pairs** arrow.
5. To adjust the **Setpoint**, tap the setpoint arrow of the analog input you want to change.
6. On the **Quick Setpoint** screen, enter the new value for the setpoint and tap the **Arrow** icon.
7. On the **Quick Deadband** screen, enter the new value.
8. To confirm the new settings, tap the **Checkmark** icon.

Adjusting the PID loop for analog output 1 in the real-time view

1. On the home screen, tap the **CONFIG** icon.
2. On the **CONFIGURATION** screen, scroll down and tap **Diagnostics**.
3. On the **DIAGNOSTICS** screen, tap the **Real-Time View** arrow.
4. On the **Real-Time View** screen, tap the **Analog I/O Pairs** arrow.
5. On the **Analog I/O Pairs** screen, tap the **AO-1** arrow.
6. On the **QUICK PID LOOP 1 SETUP**, expand **Proportional**, **Integral**, or **Derivative**.
7. Move the slider towards the **Plus** icon to increase or towards the **Minus** icon to decrease the proportional or integral gain, or the derivative constant.
8. **Optional:** Tap the **Revert** icon to revert back to the previous setting.
9. Expand **Action Mode** and choose from the following options:
 - **Direct Acting**
 - **Reverse Acting**
10. To confirm the new settings, tap the **Checkmark** icon.

Adjusting the PID loop for analog outputs 2, 3, and 4 in the real-time view

1. On the home screen, tap the **CONFIG** icon.
2. On the **CONFIGURATION** screen, scroll down and tap **Diagnostics**.
3. On the **DIAGNOSTICS** screen, tap the **Real-Time View** arrow.
4. On the **Real-Time View** screen, tap the **Analog I/O Pairs** arrow.
5. On the **Analog I/O Pairs** screen, tap the **AO-2** arrow.
6. On the **QUICK PID LOOP 1 SETUP**, expand **Proportional**, **Integral**, or **Derivative**.
7. Move the slider towards the **Plus** icon to increase or towards the **Minus** icon to decrease the proportional or integral gain, or the derivative constant.
8. **Optional:** Tap the **Revert** icon to revert back to the previous setting.
9. Expand **Time Constant** and move the slider towards the **Plus** icon to increase or towards the **Minus** icon to decrease the time constant.
10. **Optional:** Tap the **Revert** icon to revert back to the previous setting.
11. Expand **Action Mode** and choose from the following options:
 - **Direct Acting**
 - **Reverse Acting**
12. To confirm the new settings, tap the **Checkmark** icon.
13. Repeat steps 5 to 12 for **AO3** and **AO4**.

Viewing digital inputs in the real-time view

1. On the home screen, tap the **CONFIG** icon.
2. On the **CONFIGURATION** screen, scroll down and tap **Diagnostics**.
3. On the **DIAGNOSTICS** screen, tap the **Real-Time View** arrow.
4. On the **Real-Time View** screen, tap the **Digital Input** arrow.
5. To close the **Digital Input** screen, tap the **Checkmark** icon.

Viewing relay outputs in the real-time view

1. On the home screen, tap the **CONFIG** icon.
2. On the **CONFIGURATION** screen, scroll down and tap **Diagnostics**.
3. On the **DIAGNOSTICS** screen, tap the **Real-Time View** arrow.
4. On the **Real-Time View** screen, tap the **Relay Output** arrow.
5. To close the **Relay Output** screen, tap the **Checkmark** icon.

Viewing the alarm status in the real-time view

1. On the home screen, tap the **CONFIG** icon.
2. On the **CONFIGURATION** screen, scroll down and tap **Diagnostics**.
3. On the **DIAGNOSTICS** screen, tap the **Real-Time View** arrow.
4. On the **Real-Time View** screen, tap the **Alarm Status** arrow.
5. To close the **Alarm Status** screen, tap the **Checkmark** icon.

Overriding and locking analog outputs

Control the analog outputs manually to help verify the correct operation or allocation of the controller resources. For example, set an analog output used to control an air flow damper to a specific percentage while you manually adjust the damper. Any analog output you override remains locked until you unlock it. A yellow icon appears on the home screen as a reminder that analog outputs are locked. To lock an analog output, complete the following steps:

1. On the home screen, tap the **CONFIG** icon.
2. On the **CONFIGURATION** screen, scroll down and tap **Diagnostics**.
3. On the **DIAGNOSTICS** screen, tap the **Overrides** arrow.
4. To adjust analog outputs, tap the **Analog Outputs** arrow.
5. On the **Analog Outputs** screen, choose the analog output you want to override and expand it.
6. Move the slider to set the analog output to a specific percentage.
7. Tap **Lock Output**.
8. To save the new settings, collapse the **ANALOG** output and tap the **Checkmark** icon.

Unlocking the overridden analog output

To unlock the analog output and revert to its original setting, complete the following steps:

1. On the home screen, tap the **Yellow** icon.
2. On the **Analog Outputs** screen, choose the analog output you want to unlock and expand it.
3. To unlock the analog output, tap **Unlock Output**.
4. To save the new settings, collapse the **ANALOG** Output and tap the **Checkmark** icon.

Setting the actuator to auto-stroke

To determine which analog output is connected to which valve, you can set the actuator to stroke automatically.

1. On the home screen, tap the **CONFIG** icon.
2. On the **CONFIGURATION** screen, scroll down and tap **Diagnostics**.
3. On the **DIAGNOSTICS** screen, tap the **Overrides** arrow.
4. To adjust analog outputs, tap the **Analog Outputs** arrow.
5. On the **Analog Outputs** screen, choose an analog output you want to override.
6. To determine the valve that is connected to the analog output, tap **Auto-stroke**.
7. Once you determine which valve is connected to which analog output, tap **Unlock**.
8. To confirm the new settings, tap the **Checkmark** icon.

Overriding relay outputs

Control relay outputs manually to help verify the correct operation or allocation of the controller resources. Relay outputs remain in the override state only while the **Relay Outputs** screen displays. All relay outputs return to their original states within 60 seconds once you exit the screen. For example, use the override as a verification test and trigger remote annunciators to alert users of an alarm condition at the controller.

To switch on an override for relay outputs, complete the following steps:

1. On the home screen, tap the **CONFIG** icon.
2. On the **CONFIGURATION** screen, scroll down and tap **Diagnostics**.
3. On the **DIAGNOSTICS** screen, tap the **Overrides** arrow.
4. To adjust the relay outputs, tap the **Relay Outputs** arrow.
5. Switch on the **RELAY** that you want to override.
6. To leave the **Relay Outputs** screen, tap the **Checkmark** or **Cancel** icon.

Saving settings

Once you have completed your configuration, save the settings for later recall if needed. Saving your settings erases any previously saved settings. To save your settings, complete the following steps:

1. On the home screen, tap the **CONFIG** icon.
2. On the **CONFIGURATION** screen, scroll down and tap **Diagnostics**.
3. On the **DIAGNOSTICS** screen, tap the **Settings** arrow.
4. On the **CONFIGURATION** screen, tap the **Save Settings** arrow.
5. On the **SAVE SETTINGS** screen, tap **Proceed** and enter your password.
6. To confirm, tap the **Checkmark** icon twice.

Restoring settings

You can either restore your previously saved user settings or revert back to factory settings.

1. On the home screen, tap the **CONFIG** icon.
2. On the **CONFIGURATION** screen, scroll down and tap **Diagnostics**.
3. On the **DIAGNOSTICS** screen, tap the **Settings** arrow.
4. On the **CONFIGURATION** screen, tap the **Restore Settings** arrow and choose from the following options:
 - **Factory Settings**
 - **User Settings**
5. To confirm your choice, tap the **Checkmark** icon.

Resetting the HMS-2000 controller and display

To perform a soft reset of both the controller and the display, complete the following steps:

1. On the home screen, tap the **CONFIG** icon.
2. On the **CONFIGURATION** screen, scroll down and tap **Diagnostics**.
3. On the **DIAGNOSTICS** screen, tap the **Reset Controller** arrow.
4. On the **RESET CONTROLLER** screen, tap **Proceed**. The HMS-2000 controller reboots.

Troubleshooting Guide

Table 15: Troubleshooting guide

Problem	Explanation	Solution
After the MAC address is changed at the display, the unit does not come back online on the MS/TP bus or it is not discoverable.	A change to the MAC address can cause the device to not respond to the MS/TP token at its new address.	Reboot the display through the appropriate menu option or cycle power to the display.
After the baud rate of the MS/TP bus is changed at the display, the unit does not come back online or it is not discoverable.	A change to the baud rate at the display can cause the device not to respond to the MS/TP token at the new baud rate. It also does not communicate at the old baud rate. The trunk still has good communication, but the display may not rejoin the token loop.	Reboot the display through the appropriate menu option or cycle power to the display.
The display and the BACnet alarm status does not show when the present value of the analog input is outside of the alarm setpoints.	The alarm limits have probably been entered incorrectly.	For the alarm logic to function properly, enter the alarm limits in descending order with the High Alarm limit as the largest in magnitude. The High Alarm must be greater than or equal to the High Warning, which must be greater than or equal to the Low Warning, which must be greater than or equal to the Low Alarm. For instructions to set the alarm and warning setpoints, see Modifying the default alarm limits.
The binary inputs and binary outputs do not show present values at the building automation system (BAS).	The binary points do not have values for the BACnet attributes of ActiveText and InactiveText. The Metasys BAS has a proprietary attribute called "States Text" that defaults to Inactive or Active and masks this issue, but if the HMS-2000 is mapped to a non-Metasys supervisory device then the binary points may not show the present value.	Some building automation systems have the option to set these values from the front end. For example, the Tridium JACE has a Facets feature for the mapper object of each point and the binary point mappers have TrueText and FalseText attributes that can be edited after mapping the points. It is also possible to write the ActiveText and InactiveText values using a BACnet exploring tool such as VTS.
The MAC address changed back to the factory default of 127 after the unit was rebooted.	The controller has two memory partitions to store settings. During startup, the controller attempts to boot with the most recent database of configuration settings. The factory default MAC address is 127.	After you configure or make changes to any configuration settings or the MAC address, select Reboot System to save a new MAC address to flash. For more information, see Saving settings.
The air flow device is controlled in the opposite direction to maintain my face velocity setpoint.	The direction of control for an analog output configured for PID control is dependent on three factors: 1) the action mode of the analog output, 2) the sign of the associated set point, 3) the rotation of the actuator on the air flow device. These three settings must be configured correctly to allow the unit to properly control the air flow device.	The default action mode for the face velocity setpoint configurations is Reverse. If the action mode for the associated PID control output is set to Reverse, but the air flow device is not correctly controlling to maintain setpoint, then you can reverse the direction of control by switching the action mode from Reverse to Direct . You can do this directly at the display and it does not require the unit to be reset.

■ Restricted user access

Restricted level users have access to the user menu and the quick links on the home screen for operating mode, emergency purge mode, and alarm mode. In the user menu, restricted level users can make basic adjustments on the following features:

- Time and date
- Alarms
- 360° Safety Halo
- Screen brightness
- Operating mode

Setting the time and date

The time and date function is not connected to the BAS. If there is a power outage, you need to update the time and date at the display. You can turn the time and date on or off at the display.

1. On the **Home** screen, in the upper-left corner, tap the **User Menu** icon.
2. On the **MENU** screen, tap **TIME and DATE**.
3. On the **TIME and DATE** screen, tap the switch to turn on the time and date function and scroll to adjust the time.
Optional: To turn on the 24-hour clock, tap the 24 Hour switch.
4. To adjust the date, tap **Date**.
5. To choose a date format, expand **Format** and tap one of the following options:
 - **Month/Day/Year**
 - **Day/Month/Year**
 - **Year/Month/Day**
6. To change the date, scroll through the months, days and years.
7. To confirm your settings, tap the **Checkmark** icon.

Adjusting the alarm mode

When a measured parameter goes out of range, the display goes into alarm state. When you adjust the alarm mode, you can control how the display responds. You cannot disable the alarm for face velocity monitoring. See Table 16 for more information.

1. On the home screen, tap the **User Menu** icon.
2. On the **MENU** screen, tap **Alarm**.
3. On the **ALARM** screen, expand **Alarm Mode** and choose from the following options:
 - **Audible**
 - **Mute**
4. To confirm your settings, tap the **Checkmark** icon.

Table 16: Alarm modes

Alarm mode	Display response
Audible	Screen color and action icon change to red, 360° Safety Halo flashes red, audible alarm sounds
Mute	Screen color and action icon change to red, 360° Safety Halo flashes red, audible alarm is mute

Setting the audible alarm delay

Set up a delay for the audible alarm to reduce nuisance alarms when you open the sash. With the audible alarm delay, the screen and the 360° Safety Halo flash red but the alarm does not sound for the period of time you set. To set an audible alarm delay, complete the following steps:

1. On the home screen, tap the **User Menu** icon.
2. On the **MENU** screen, tap **Alarm**.
3. On the **ALARM** screen, tap the **Audible Alarm Delay** arrow.
4. To adjust the alarm delay period up to 60 seconds, move the slider.
5. To confirm the new settings, tap the **Checkmark** icon.

Changing the audible alarm snooze

The audible alarm snooze temporarily mutes the alarm by the duration you specify. To snooze the audible alarm, tap anywhere on the home screen. While the alarm is in snooze, a timer displays over the alarm icon counting down until the alarm sounds again. To set up the audible alarm snooze time, complete the following steps:

1. On the home screen, tap the **User Menu** icon.
2. On the **MENU** screen, tap **Alarm**.
3. On the **ALARM** screen, tap the **Audible Alarm Snooze** arrow and use the slider to change the snooze time to up to 60 minutes.

Switching on and adjusting the brightness of the 360° Safety Halo

1. On the home screen, tap the **User Menu** icon.
2. To adjust settings for the **Safety Halo**, tap the **Safety Halo Setup** arrow.
3. To turn on the 360° Safety Halo, switch on **Enabled** and expand the **Brightness** slider which appears.
4. To adjust the **Brightness**, move the slider to increase or decrease the level.
5. To confirm the new settings, tap the **Checkmark** icon.

Adjusting the screen brightness

1. On the home screen, tap the **User Menu** icon.
2. On the **MENU** screen, tap **Screen Brightness**.
3. Move the slider to increase or decrease the screen brightness.
4. To confirm the new screen brightness setting, tap the **Checkmark** icon.

Changing the operating mode for the fume hood

The operating mode can be set at the display or written from the BAS. To change the operating mode at the display, complete the following steps:

1. On the home screen, tap the **Occupied** or **Unoccupied** operating button, or tap **CHANGE MODE** on the Standby mode screen.
2. Select one of the three displayed options: Occupied, Unoccupied, or Standby.
3. To confirm the **Operating Mode** settings, tap the **Checkmark** icon.

Note: To change the operating mode quickly, tap the operating mode quick link on the **Home** screen.

Accessing the user guide demonstration video

The short demonstration video is aimed at the end user and highlights the basic functionality of the HMS-2000.

1. On the Home screen, tap the **User Menu** icon.
2. Tap the **User Guide** button.
3. To watch the video, scan the QR code with a smart phone.

■ Quick links

Use the quick link icons on the home screen to quickly access the isolation mode, cleaning mode, 360° Safety Halo, and alarm mode.

Activating and deactivating the emergency purge mode

On the home screen, tap **Emergency Purge** to initiate the purge process.

Adjusting the 360° Safety Halo and brightness

1. On the home screen, tap the **Halo** icon.
2. On the **Safety Halo** screen, switch **Enabled** on and expand the Brightness slider which appears.
3. To adjust the **Brightness**, move the slider to increase or decrease the level.
4. To confirm the new settings, tap the **Checkmark** icon.

Adjusting the alarm mode quick link

1. On the home screen, tap the **Alarm** icon. A pop-up appears and you can choose from the following alarm modes:
 - **Audible Alarm**
 - **Muted Alarm**
2. To change the setting, tap one of the alarm modes.

Adjusting the operating mode quick link

1. On the home screen, tap the **Operating Mode** quick link.
2. To change the operating mode, tap **Occupied**, **Unoccupied**, or **Standby**.
3. To confirm the new settings, tap the **Checkmark** icon.

■ Upgrading an existing HMS-1655 Fume Hood Controller display

If you upgrade an existing HMS-1655 Fume Hood Controller display and want to take advantage of the full HMS-2000 controller improvements, contact service@triatek.com to assist with the following:

- Update the controller firmware
- Reconfigure the back plane board to regain the use of relay 4 and restore continuous power at the display interface terminal block. This can be accomplished by re-configuring the three jumper options JP2, JP3, and JP4 on the bottom of the back plane board.
- If the BACnet MS/TP is moved to the new display, it is necessary to remove the old device and its associated points from the BAS and remap the new device and its associated points. See the HMS-2000 Fume Hood Controller Installation Guide (*LIT-12013508*) for more information.

If you upgrade an existing HMS-1655 Fume Hood Controller display with the HMS-2000 controller display and do not plan to update the original HMS-1655 controller, the following considerations apply:

- Relay 4 continues to be unavailable to the end user
- Power for the HMS-2000 controller display needs to be moved to +V terminal on the CN5 USER INTRF terminal block to disable the display watchdog that was originally designed for HMS-1655 controller display. See the HMS-2000 Fume Hood Controller Installation Guide (*LIT-12013508*) for more information.

■ Hardware resource functionality

Table 17: AI functionality

AI Functionality	AI_1	AI_2	AI_3	AI_4
Face velocity	X			
Sash position		X		
Pressure		X	X	X
Air flow		X	X	X

Table 18: AO functionality

AO Functionality	AO_1	AO_2	AO_3	AO_4
Direct Mode	X	X	X	X
PID Mode	X	X	X	X

Table 19: DI functionality

DI Functionality	DI-1	DI-2	DI-3	DI-4
Occupancy switch		X	X	X
Emergency purge switch		X	X	X
Flow switch		X	X	X

Table 20: DO functionality

DO Functionality	DO-1	DO-2	DO-3	DO-4
Setpoints trigger	X	X	X	X
Operating mode	X	X	X	X
Safety-Halo Tracking mode	X	X	X	X

■ Configuring the Setup Wizard

When the HMS-2000 finishes the initialization process at first power up, complete the following steps to configure the Setup Wizard:

1. Select the preferred language for the UI, and in the upper-right corner, click the blue check mark.
2. On the Setup Wizard welcome screen, choose one of the following options:
 - To bypass the Setup Wizard and go directly to the Settings menu, click **SKIP**
 - To use the Setup Wizard for the configuration process, click **START**

Selection of the **START** button option displays the **SETUP OVERVIEW** screen with the following stages of the Setup Wizard:

1. Hood Identification
2. Hardware Selection
3. Control Settings
4. Sensor Calibration(s)
5. Display Setup

Hood identification

For hood identification, complete the following steps:

1. To return to the previous screen, click **BACK** or to go to the next screen, click **NEXT**.
2. The next screen displays the current name of the fume hood that you want to configure. To edit the name, click the display name and use the keyboard to make changes.

Note: You can enter up to 14 characters for the fume hood name.

3. To save the edits and go to the next screen, click **NEXT**.
4. The next screen displays the current MAC address and a slider to adjust the value. Use the slider to specify the required MAC address, from 4 to 127.
5. Click **NEXT**.

Hardware selection

For the current application, you can enable the following hardware components from the hardware selection screen:

- Sidewall velocity sensor
- Sash position sensor
- Universal valve module
- Occupancy sensor
- Exhaust flow switch
- Exhaust static DP sensor

Note: Selected hardware displays in blue text and unselected hardware displays in black text. To toggle the selection status, click any of the hardware components.

1. Select the required hardware and click **NEXT**.
2. The next screen displays the real-time view and status of the selected hardware components as a status icon to the right of each selected component.

Note: A blue **Not Used** status icon indicates any unselected hardware components.

3. Confirm that each selected hardware component is connected and click **NEXT**.

Control settings

The Setup Wizard guides you through a series of configuration screens to specify control settings for the various parameters required for the application. For each of the control settings, the current value displays. Use the onscreen keypad to modify the values.

1. Specify all the control settings as required by the current application.
 - The Setup Wizard sets AO-1 to 100% to determine the proportional-integral-derivative (PID) output polarity and monitors the face velocity input to record its real-time value.
 - The Setup Wizard then sets AO-1 to 0% and monitors the face velocity input.
 - The calculated PID output polarity displays at the bottom of the screen.

2. Click **NEXT**.

Note: After you complete the Setup Wizard, the unit is setup for use in the configured control mode. This is sash only control if you configured a sash sensor, or sidewall/sash control if you configured both.

Sensor calibrations

The Setup Wizard guides you through the calibration of the sensor you select at hardware selection. For example:

- If you select the sidewall velocity sensor, the Setup Wizard guides you through the calibration process for the sidewall sensor.
- If you select the sash position sensor, the Setup Wizard guides you through the 2-step calibration process for the sash position sensor.
- If you select both the sidewall velocity sensor and the sash position sensor, the Setup Wizard guides you through the third and final calibration process for the sash control response.

Display setup

At the final stage of the Setup Wizard, specify the display parameters for the home screen of the HMS-2000 UI. The **Face Velocity** and **Operating Mode** are mandatory display parameters. The **Sash Position** and the **Exhaust Flow** are optional display parameters.

1. Click **Sash Position** or **Exhaust Flow**.
2. To complete the display setup, click **PROCEED**.

Note: You can access the Setup Wizard at any time from the **Configuration** menu.

■ Technical specifications

Table 21: Technical specifications

Intended use		Indoor use
Overvoltage category		II
Altitude		Up to 2000 m (6562 ft)
Face velocity range		0 fpm to 200 fpm (1.016 mps)
Alarm range		0 fpm to 200 fpm (1.016 mps)
Display range		0 fpm to 200 fpm (1.016 mps)
Accuracy		± 2 fpm at 60 fpm - 140 fpm, ± 5 fpm outside this range
Air flow sensor type		Digital differential pressure features no offset, zero drift and is hysteresis free
Control resolution		± 2 fpm
Control capability		Single or double-side fume hood
I/O Resources		4 universal inputs (0 mA to 20 mA, 4 mA to 20 mA, 0 V to 5 V, 0 V to 10 V, 1 V to 5 V, 2 V to 10 V) 4 digital inputs (active-high or active-low) 4 universal outputs (0 mA to 20 mA, 4 mA to 20 mA, 0 V to 5 V, 0 V to 10 V, 1 V to 5 V, 2 V to 10 V) 4 relay outputs (NO or NC contacts 1A at 24 VDC)
Operating temperature		32°F to 104°F (0°C to 40°C)
Operating humidity		10% RH to 95% RH, noncondensing
Mounting		Surface mount
Alarm indication		Safety Halo color coded visual, 90 dB audible alarm
Alarm silence		Touchscreen, auto-reset
Password protection		Up to 50 user passwords with two access levels to prevent unauthorized access (Restricted and Admin)
Communications protocol		BACnet MS/TP (to BAS) 76.8k, 38.4k, 19.2k, 9600 baud
Power requirement		24 VAC (nominal, 21.6 VAC minimum/26.4 VAC maximum), 50/60 Hz 30 VA power supply, Class 2, Limited Energy, LPS, or minimum power 30 VA transformer.
Power consumption		30 VA maximum
Pollution degree		2
Display resolution		720 pixels x 1280 pixels
Pluggable screw terminal blocks		18 AWG to 22 AWG (1.0 mm to 0.6 mm diameter)
Sidewall sensor tubing		3/32 in. I.D., 5/32 in. O.D., 1/32 in. wall thickness, clear polyurethane Only use specified tubing Do not extend the tubing more than 72 in. (1823 mm) between the sensor and the reference port
Display dimensions, H x W x D		5.3 in. x 3.5 in. x 1.17 in. (134.62 mm x 88.9 mm x 29.72 mm)
Mounted depth		0.58 in. (14.73 mm)
Controller dimensions, H x W x D		6.56 in. x 5.5 in. x 1.88 in. (166.62 mm x 139.7 mm x 47.75 mm)
Compliance   	United States	UL Listed (E515759) to UL 61010-1; FCC 47CFR Part 15; BTL Listed (BTL-30774)
	Canada	cUL Listed (E515759) to CAN/CSA C22.2 NO. 61010-1; ICES-003
	Europe	Low Voltage Directive [2014/35/EU] per EN 61010-1 EMC Directive [2014/30/EU] per EN 61326-1 + EN 55011
	United Kingdom	Electrical Equipment (Safety) Regulations per EN 61010-1 EMC Regulations per EN 61326-1 + EN 55011
	International Standards	Product fulfills the requirements of IEC 61010-1 as recognized by national or regional authorities.
	BACnet International	BACnet Testing Laboratories (BTL) 135-2021 Listed BACnet Application Specific Controller (B-ASC)

Cleaning the display

IMPORTANT:

- Do not apply cleaner directly to the touch panel surface. If cleaner spills onto the touch panel, soak up the cleaner immediately with an absorbent cloth.
- Do not use cleaner that is either acid or alkali. Use neutral pH cleaner.
- Do not use organic chemicals such as: paint thinner, acetone, toluene, xylene, propyl or isopropyl alcohol, or kerosene.

IMPORTANT:

- N'appliquez pas de nettoyeur directement sur la surface du panneau tactile. Si du nettoyeur pénètre dans le panneau tactile, essuyez immédiatement le nettoyeur à l'aide d'un chiffon absorbant.
- N'utilisez aucun nettoyeur qui est acide ou alcalin. Utilisez un nettoyeur dont le pH est neutre.
- N'utilisez pas de produits chimiques organiques comme le diluant pour peinture, l'acétone, le toluène, le xylène, l'alcool propylique ou isopropylique, ou le kérosène.

To clean the display, complete the following steps:

1. Use a dry or lightly dampened cloth with a mild cleaner or ethanol.
2. Make sure the cloth is only lightly dampened, not wet.
3. Wipe the surface gently. If there is a directional surface texture, wipe in the same direction as the texture.

North American Emissions Compliance

United States

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause harmful interference, in which case users will be required to correct the interference at their own expense.

Canada

This Class (A) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.
Cet appareil numérique de la Classe (A) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

Software terms

Use of the software that is in (or constitutes) this product, or access to the cloud, or hosted services applicable to this product, if any, is subject to applicable end-user license, open-source software information and other terms set forth at www.johnsoncontrols.com/techterms. Your use of this product constitutes an agreement to such terms.

Patents

Patents: <https://jciapat.com>

Single point of contact

APAC	Europe	NA/SA	UK
JOHNSON CONTROLS C/O CONTROLS PRODUCT MANAGEMENT NO. 32 CHANGJIANG RD NEW DISTRICT WUXI JIANGSU PROVINCE 214028 - CHINA	JOHNSON CONTROLS WESTENDHOF 3 45143 ESSEN GERMANY	JOHNSON CONTROLS 5757 N GREEN BAY AVE. GLENDALE, WI 53209 USA	JOHNSON CONTROLS TYCO PARK GRIMSHAW LANE MANCHESTER M40 2WL UNITED KINGDOM

Contact information

Contact your local branch office: www.johnsoncontrols.com/locations

Contact Johnson Controls: www.johnsoncontrols.com/contact-us



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Building Technologies & Solutions
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