

USER MANUAL



Honeywell® FS24X Plus™

Advanced multi-spectrum 3IR Flame detector

Honeywell

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Safety

For additional Cautions and Warnings, see Appendices 1 and 2



DANGER

RISK OF IMPROPER FLAME DETECTION

- Installation, Commissioning, Periodic Testing, Calibration, and all other Maintenance must be performed only by trained professionals.
- Install in accordance with all local codes.
- Follow all warnings, cautions, and instructions.
- The suitability of the system installed is the responsibility of that system's designer and installer.
- Routinely check the system for proper operation and/or damage.
- Replace damaged and/or non-operating devices.



WARNING

RISK OF IMPROPER FLAME DETECTION

- Install only in areas in accordance with the environmental and hazardous area ratings.
- Carefully review mounting area and position in accordance with the FS24X Plus™ FM Performance Appendix and this Manual to ensure optimal flame detection regarding the angle of device and unobstructed view.
- Avoid potential sources of direct or indirect radiation in the flame detector field of view.
- Do not touch the sensors on the front of the electronics module.
- Avoid direct sunlight into the flame detector window – use provided sunshade, aim flame detectors down at 40 degrees or more when possible, and use multiple detectors to cover hazardous areas from different directions.
- Avoid close proximity to rapid modulation/chopping of sunlight (creating moving dark shadows) as optical sensor performance can be reduced, e.g. close trees in the wind, rotating blades.

- Use shielded cable for all wirings and ground the shield at one end as detailed in the Wiring section.
- Keep all devices and wire runs away from mercury vapor lights, variable speed drives, radio repeaters and other sources of electromagnetic interference.
- Follow local cabling and glanding rules.
- Seal all unused conduit entries and install proper drains/taps as required by local codes.
- Do not try to service parts inside the electronics module, there are no field serviceable parts.

 CAUTION

RISK OF PRODUCT DAMAGE

- Protect the detector from physical damage (forklifts, scaffolding, etc.).
- Failure to follow all warnings cautions, and instructions may void the warranty.
- Clean detector body and window with a damp cloth.
- Some regulatory agencies requires the use of hazardous area approved plugs, follow local rules.
- To maintain IP66/67 integrity, seal on conduit entries with thread sealant such as Loctite 565.
- Do not install in an area where there are incidents of high mechanical damage.

 WARNING

RISK OF IMPROPER FLAME DETECTION

- If internal temperatures rise above acceptable levels, the FS24X Plus™ will issue a Warning, and if temperatures rise further, the unit will shut off to protect the internal components.
- The detector may be damaged if external temperatures exceed 75°C.
- Perform a Test Lamp test to assure proper function. The detector must be returned to Honeywell® for service if high-temperature shutdown occurs.

 CAUTION

RISK OF VULNERABILITY IN NETWORKS

The FSX Plus flame detectors may be vulnerable to a cyber-attack on the HART® and RS-485 networks. Thus, a cautious installation requires physically protecting the 4-20mA loop and the RS-485 wiring.

Disclaimer

In no event shall Honeywell® be liable for any damages or injury of any nature or kind, no matter how caused, that arise from the use of the equipment referred to in this manual.

Strict compliance with the safety procedures set out and referred to in this manual, and extreme care in the use of the equipment, are essential to avoid or minimize the chance of personal injury or damage to the equipment.

The information, figures, illustrations, tables, specifications, and schematics contained in this manual are believed to be correct and accurate as at the date of publication or revision. However, no representation or warranty with respect to such correctness or accuracy is given or implied and FS24X Plus™ will not, under any circumstances, be liable to any person or corporation for any loss or damages incurred in connection with the use of this manual.

The information, figures, illustrations, tables, specifications, and schematics contained in this manual are subject to change without notice. Unauthorized modifications to the gas detection system or its installation are not permitted, as these may give rise to unacceptable health and safety hazards.

Any software forming part of this equipment should be used only for the purposes for which FS24X Plus™ supplied it. The user shall undertake no changes, modifications, conversions, translations into another computer language, or copies (except for a necessary backup copy).

In no event shall Honeywell® be liable for any equipment malfunction or damages whatsoever, including (without limitation) incidental, direct, indirect, special, and consequential damages, damages for loss of business profits, business interruption, loss of business information, or other pecuniary loss, resulting from any violation of the above prohibitions.

Warranty

Honeywell® warrants the FS24X Plus™ system against defective parts and workmanship, and will repair or (at its discretion) replace any components that are or may become defective under proper usage within 3 years from shipment from Honeywell®.

This warranty does not cover consumables, batteries, fuses, normal wear and tear, or damage caused by accident, abuse, improper installation, unauthorized use, modification or repair, ambient environment, contaminants or abnormal operating conditions.

This warranty does not apply to sensors or components that are covered under separate warranties, or to any 3rd-party cables and components.

Any claim under the Honeywell® Product Warranty must be made within the warranty period and as soon as reasonably practicable after a defect is discovered. Please contact your local Honeywell® Service representative to register your claim.

This is a summary. For full warranty terms please refer to the Honeywell General Statement of Limited Product Warranty, which is available on request.

* A Honeywell® approved representative is a qualified person trained or employed by Honeywell Analytics, or a qualified person trained in accordance with this manual.

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Applications

Refineries	Gas Processing Plants	Offshore Drilling and Production Platforms
Co-generation Plants	Gas Collection Facilities	Petroleum Product Pipelines & Pumping Stations
Petrochemical Plants	Gas Turbine Enclosures	Commercial and Military Aircraft Hangars
Airport Terminals	LPG Storage/Distribution	Rail and Truck Loading/Unloading Terminals
Engine Test Cells	General Warehouses	Gasoline Loading Terminals
Power Plants	Aerosol Filling Facilities	Product Storage Terminals
Marine Terminals	Paint and Solvent Storage	Crude & Product Tank Farms
Cold Storage Warehouses	Marine Engine Rooms	Gas Compressor Buildings

Advanced Multi-Spectrum Electro-Optical Flame Detector.

FS24X Plus™: Triple IR

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Security Guide

The construction of a reliable flame detection system requires protecting the equipment from unauthorized changes. The installer should comprehensively consider all types of tampering, including over digital networks. The FS24X Plus™ is not vulnerable to traditional cyberattacks because it does not contain any type of radio or routable communications protocol such as internet protocol (IP). Security is usually achieved by listing and then limiting the attack vectors. An “attack vector” is an approach that a malicious operator might try to exploit to harm the target. Possible attack vectors are listed below. This has been made as comprehensive as possible to aid analysis. Some of the attack vectors may be dismissed as trivial.

Cybersecurity traditionally has three goals – integrity, availability, and confidentiality. However, confidentiality is excluded from the table below because it has lower importance in most flame detection applications.

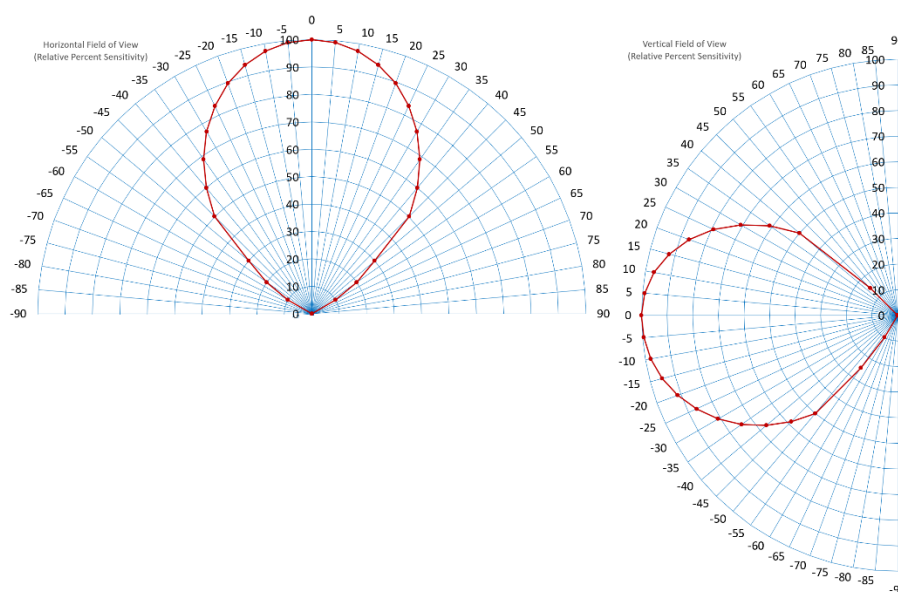
Note that the HART® interface is disabled by default. If desired, it can be enabled using *FlameManager*.

Attack Vector	Integrity, Reliable detection of fire	Availability, Uptime, No nuisance alarms	Mitigation, Defense Measures
Disrupt the front window	Yes – Foreign material could block the infrared energy and prevent detection of fire.	Yes – Flashing light from malicious use of the test lamp.	Limit access by unauthorized personnel.
Analog signal wires Power, 20 mA, relay	Yes – The detector could be replaced with a resistor in the mA loop. Relay wiring could be cut or shorted.	Yes – Resistance could be added in series to generate a fault report or in parallel to generate an alarm report. Relay wiring could be cut or shorted. The power wiring could be cut, causing a fault report.	Limit access by unauthorized personnel. Regularly perform end-to-end testing.
HART®	Yes – The detector could be inhibited, or the sensitivity could be mis-set low.	Yes – the outputs can be driven to alarm state or the sensitivity could be mis-set high.	Leave the HART® interface in the default disabled state unless used. Protect the cabling from unauthorized access.
USB-FP2			Secure the enclosure with the supplied set screw.
RS-485 FP2			Protect cabling or leave RS-485 terminals unconnected.
RS-485 Modbus®	No – interface is read only.		No defense needed.

Note that by default the RS-485 interface is configured for FP2, not Modbus. It can be switched between these protocols using *FlameManager*.

Cybercriminals frequently display astonishing creativity. A flame detection system should be configured to resist attacks years in the future, during the equipment’s entire life cycle. The system should be regularly tested end-to-end.

Specifications

Temperature:	Operating Temperature (ATEX/IECEX): -55°C to +75°C Storage Temperature (ATEX/IECEX): -55°C to +85°C Operating Temperature (North America): -50°C to +75°C Storage Temperature (North America): -50°C to +85°C
Humidity:	0 to 99% relative humidity, can withstand 100% condensing humidity for short periods of time.
Field of View (Conical) for Standard Mount:	The detector has a cone of view for all standard mounts of 90° (left 45°, right 45°, up 40°, down 50°) horizontal and vertical with the very high sensitivity on the central axis. Note: At 50% of on-axis distance horizontally and indoors at very high sensitivity the FoV can extend to 120° (+/-60°).  Note: See Appendix 2: FS24X Plus™ FM Performance Appendix for FM 3260 FoV performance.
EN 54-10 Field of View:	EN 54-10 Field of View approved to symmetrical 90° (45° off axis horizontal and vertical rotation).
Test Lamp:	FSX Plus flame detectors are compatible with the Honeywell® TL-1055 and TL-2055 FSX test lamps. Verification test distance: 3 to 8m (10 – 25 ft) at high sensitivity. Recommended test every 3 months.
Operating Voltage:	24 VDC nominal (18-32 VDC) - Regulated
Power Consumption:	1.8 Watts (nominal) 2.4 Watts (Alarm) 12 Watts (max) = 0.50 A @ 24 V with heater ON 100% duty cycle.

	Notes: • Heater turns ON at -13°F [-25°C] in Normal Operation) • Heaters are used during extreme cold to bring the internal electronics up to a minimum temperature. During this time, which can last up to 30 minutes when the environment has a temperature of -55°C, the internal microcontrollers are not running, halo will be off and the current loop will report less than 1.5 mA. • 12W = 0.67 A at 18 V or 0.5 A at 24 V worst case. Inrush Current is 0.75A for a maximum duration of less than 5ms.
Weight:	Aluminum 3 lbs. 11 oz. (1.7 kg) Stainless Steel 7 lbs. 7 oz. (3.4 kg)
Flame Detection Performance:	See Appendix 2: FS24X Plus™ FM Performance Appendix for details of specific fuels, detection distances, and false alarm immunity. Note that fire is random and chaotic. The Flame detector will typically respond in less than 10 seconds.
Housing material:	Low Copper (less than 0.25%) marine grade Painted casted Aluminum of ASTM A356.0 grade. Polished cast Stainless Steel of ASTM CF8M grade.
Outputs:	Fault, Alarm and Auxiliary SPDT relays Max. 32 Vdc/ac, max. 2 A, min 10 mA at 12 V resistive load. 4-20 mA source, sink or isolated current output. Uncertainty is 1% of reading. FP2 over RS-485 and USB (USB is accessible through Detector Module electronic device only). Modbus over RS-485.
HART	The FS24X Plus™ Flame detector has HART® 7 communication; registered with FieldComm Group. EDD and DTM files are available.
Local notification indicator:	LEDs HALO Light ring. Shows instrument status. HALO is visible at 50 ft. in daylight conditions. Suitable for indoor and night applications.

	HALO flash patterns during operation:			
	Illustration	State	Default Pattern	Optional (settable) Pattern
		Off or de-energized	Off	Same
		Normal Operation, No fire	Mostly off, flashing Green every 5 seconds	Off
		Inhibited	Solid Yellow	Same
		Fault	Flashing Yellow every second	Same
		Alarm	Solid Red	Flashing Red
	 	Warning	Flashing Yellow and Green Alternate	Same
Mean Time Before Failure:	>10 year MTBF with a commonly used database (e.g. MIL-217, MIL-217D, or Siemens SN29500). Two calculations - All components and only safety critical components.			
Mounting Bracket:	Compatible with SM4 which has 10 degree increments of adjustment in horizontal and vertical directions. SM4-M – marine version available.			
Enclosure:	Diameter: 125 mm (4.92 in) x 115 mm (4.52 in) deep; Two M25 X 1.5P or two ¾ ” NPT conduit entries. Window size diameter: 79 mm (3.11 in)			

Product Overview

Honeywell® FS24X Plus™ is an advanced multi-spectrum electro-optical flame detector based on the WideBand IR™ technology which responds quickly to radiant energy created by flaming fires. It is suitable for operation in hazardous areas.

The FS24X Plus™ flame detectors are factory calibrated and robust. There is no need of a field calibration. The sealed design with no moving parts allows for mounting in any orientation even in harsh environments. These flame detectors are available in either 316 Stainless Steel or Painted Low Copper Aluminum along with a choice of either two M25 or two ¾ " NPT conduit entries.

These flame detectors operate under adverse weather conditions such as rain, mist, fog and in dirty environments such as smoke. Please, note that the presence of environmental inhibitors, e.g. smoke, rain, mist, and fog, can absorb IR radiation and reduce the sensitivity of the detector although FS24X Plus™ is less affected than other available detection technologies.

What's in the Box

- 1 Certified Flame Detector with stopping plug
- 1 Standard Mount (SM4) or Marine Mount (SM4-M)
- 1 Sunshade (SH-001)
- 1 FS24X Plus™ FM Performance Appendix
- 1 Certificate of Conformity

Features and Benefits

3IR sensor technology

- Superior performance in adverse weather conditions (through smoke, rain, mist and fog)
- Able to operate in harsh and corrosive environments
- Hazloc, Performance, SIL 2, and Safety approvals
- Pending marine certifications
- Built-in test diagnostics
- Robust false alarm avoidance

Ease of Installation

- Small and light weight
- Comes with mount as standard; one person mounting onto varied infrastructure
- Comes with sunshade as standard
- Simple wiring with 2 entries and pluggable connections

Ease of Commissioning

- Easy aiming with graduated mount
- Easy guided setup via HART®, RS-485 or USB / PC Application
- Simple test with test lamp

Ease of Maintenance

- Simple bump test with Honeywell® long range test lamps (simply test at height)
- Built-in test diagnostics certified to IEC61508
- Advanced window monitoring
- No need to calibrate
- Plug and Play design for ease of installation and maintenance

Self-Test

The FS24X Plus™ executes a self-test sequence every minute. All optical sensor channels and the related processing of sensor data are evaluated to ensure that analog circuits, processors, and memory are functional. Depending on the function, tests are repeated several times to confirm device status prior to declaring a fault. In the case of the optical self-test, which evaluates the optical system by flashing an IR LED and monitoring the reflection from the window, a fault is not declared until a total of 5 consecutive test attempts have failed. This takes a total of five minutes to complete.

Additional self-tests are conducted on a continuing basis to ensure the continuity of relay coils.

Available Spares/Accessories

- SM4 Swivel Mounting Bracket
- SM4-M Marine Swivel Mounting Bracket
- SH-001 Sunshade
- FVR-01 Field of View Restrictor
- TL-1055 safe area test lamp
- TL-2055 hazardous area test lamp
- Electronics module replacement
- NFPA 72 Connector Kit p/n FS24XP-NFPA-KIT

Read this manual before starting the installation and commissioning.

Mounting

The FS24X Plus™ IR3 Flame detector is mounted to a structure which may be indoors or outdoors. The detector is oriented to aim the detector to cover the desired area. Overlapping fields of view and voting are recommended to deliver the required safety case.

Note: Must only be installed by appropriately trained and accredited personnel.

1. Mount the SM4 or SM4-M bracket.

Note: Select a location with a low chance of mechanical damage and low vibration.

Ensure that the detector has a line of sight to cover the threat location. Avoid obstructions. Avoid radiant infrared energy sources, which may cause false alarms.

Refer to the sensitivity settings. Note the inverse square law to determine range to a specific fire type and size.

Make sure that the flame detector is weather tight before leaving in position.

Ensure only approved fittings and plugs are used to seal unused openings. Thread lock on conduit entries may be required to ensure sealing in areas with heavy rains or chance of flooding.

Follow all local electrical codes for glands and installation.

Ensure sufficient grease is present on the cover thread before installation. The product can be made tamper resistant by tightening the set screw.

2. Install the detector on the SM4/SM4-M bracket using the two bolts provided.

Note: We recommend angling all detectors down at least 40 degrees from horizontal. The SM4 and SM4-M mounts have marked angle graduations.

Note: SM4-M is more resistant to vibration for marine or high-vibration applications.

Opening the Detector

It is necessary to remove the detector module electronic device from the enclosure to access the field connections.

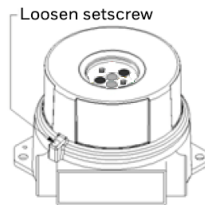


CAUTION

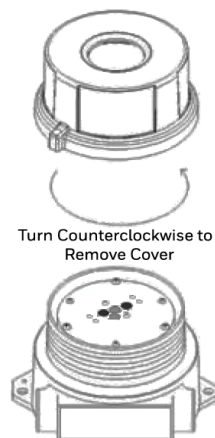
RISK OF ELECTRIC SHOCK

Disconnect power before unscrewing the Housing Lid.

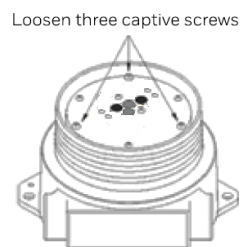
1. Loosen, but do not remove, the set screw on the enclosure lid (see Figure below):



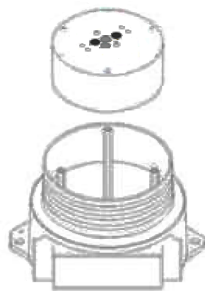
2. Turn counterclockwise (CCW) to unscrew the enclosure lid (see Figure below):



3. Loosen the three captive screws on the detector module electronic device (see Figure below):



- Slide the detector module electronic device out of the enclosure base (see Figure below):



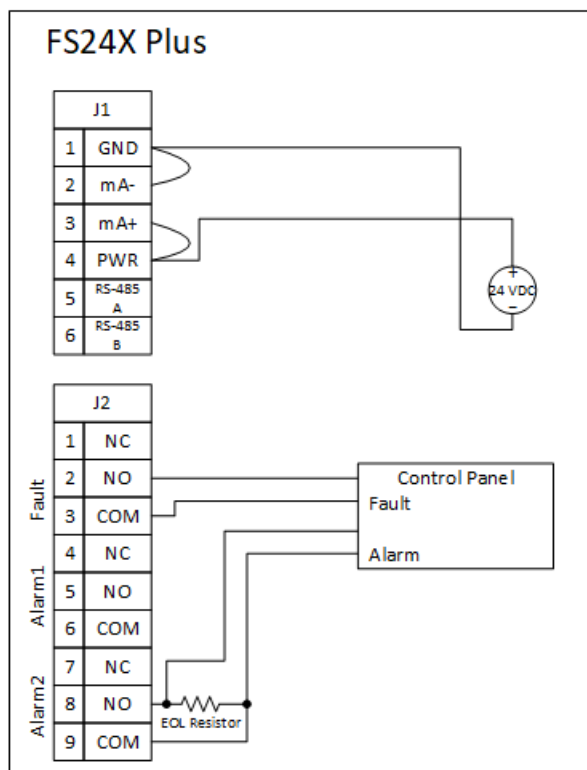
Installation Summary

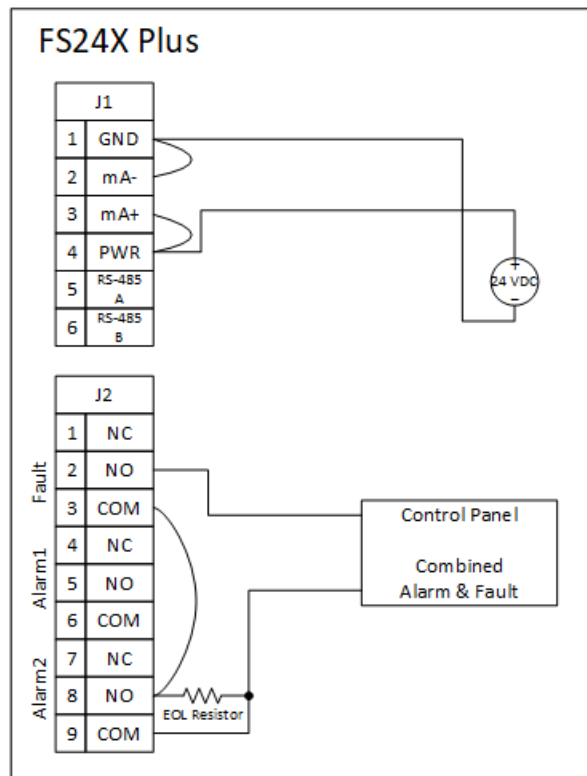
- Loosen, but do not remove the set screw on the cover assembly as shown in Figure 1 in Opening the Detector section.
- Unscrew the lid as shown in Figure 2 in Opening the Detector section.
- Loosen the 3 Philips screws and remove the electro-optical Detector Module and place face up in a safe location as shown in Figures 3 and 4 in Opening the Detector section.
Note: Do not drop the Detector Module and do not touch the sensor array.
- Connect the armoured cable gland/conduit to the detector enclosure via the M25 or 3/4" NPT openings as per national electrical codes for the install location. Connect the appropriate wires to the pluggable terminal block provided as per the wiring diagram on the cover of the electro-optical Detector Module and this manual.
Note: Add thread sealant to conduit and cable entries such as Loctite® 565 or equivalent to ensure that no water or dust ingress is possible.
- Configuration is done by USB or RS-485 with the PC application available from www.sps.honeywell.com. See Appendix 3: Honeywell® *FlameManager* section of this manual. This is easiest done prior to installation.
Note: Refer to the fuel/sensitivity settings table to determine the correct configuration.
- Connect the pluggable terminal block back into the electro-optical Detector Module and secure the captive screws.
⚠ WARNING: Do not touch the sensor array as finger oils interfere with infrared signal transmission.
- Install the cover and ensure the O-ring is secure. Tighten the set screw on the cover assembly. Loosen the bolts on the mounting bracket and make a rough FoV adjustment by aiming the detector at the area you want to cover.
Note: The SM4/SM4-M mounts have 10° incremental graduations on the horizontal and vertical axes.
- Tighten bolts on mounting bracket mount when FoV adjustments are complete.
Note: The ring terminal is tin plated. If the detector is installed in harsh corrosive environments, the ring terminal should be protected with a conductive grease.
Note: Detector functionality and communication to safety system should be tested to confirm correct FoV and configuration.
Note: The FS24X Plus™ runs an initial start-up procedure and is not able to detect flame for the first two minutes after power is applied.

Wiring

The FS24X Plus™ 3IR Flame detector Electro-Optical Detector Module has pluggable terminal blocks for interfaces (Power Supply, RS-485, Relay, etc.) with retention for easy wiring and for plug-in replacement of a module in the field. The terminal block takes 14 AWG to 24 AWG cable with stranded conductors. Typically 16 AWG or 2.5 mm² shielded cable is recommended for all wiring.

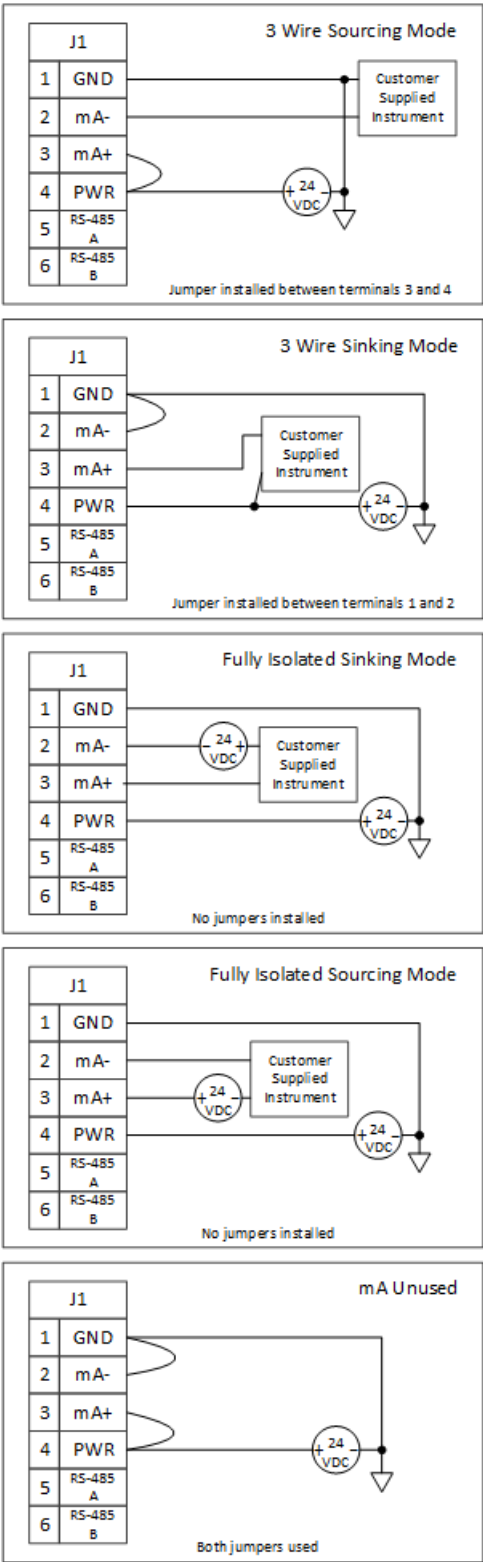
When connecting to a fire panel, follow NFPA 72 standard. For duplicate terminals and leads for supervised relay connections to the fire alarm system, use p/n FS24XP-NFPA-KIT NFPA assembly kit include 6-pin two-row connector as well as 9-pin two-row connector.

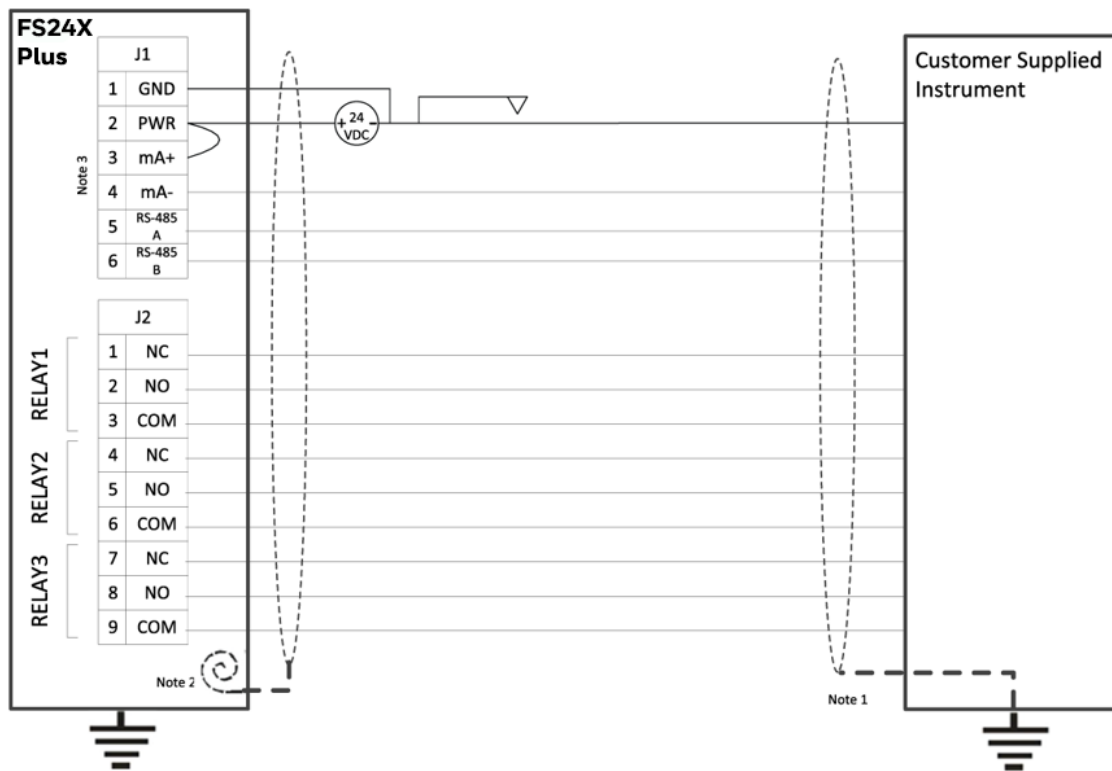




Note: On power-up, the FS24X Plus™ flame detector will run a start-up routine during which current levels maybe not be stable. The controller should also be set to filter milliamp transients of less than 1 millisecond.

The following diagrams show the mA wiring options:





Notes for EN54-10:

1. All Cable Shields must be Earth grounded at the Customer supplied instrument like the Control Panel only.
2. Coil and tape the cable shields at the detector end.
3. The mA Loop Wiring is shown for three wire source mode. Refer to the wiring diagram for details on other modes.

General Notes on Shielding:

- a. Use of Shielded Twisted pairs with shield coverage of more than 80% is recommended.
- b. Open the shields for connection to the equipment or detector with minimum pigtail length possible.

Commissioning the Detector

Apply power to the FS24X Plus™ Flame detector. This can be done in a field workshop before installation.

The HALO flash pattern activates during boot-up: Red, Green, and Blue repeatedly, for about 15 seconds followed by solid Yellow for two minutes indicating inhibit state.

Note: Heaters are used during extreme cold to bring the internal electronics up to a minimum temperature. During this time, which can last up to 30 minutes, the internal microcontrollers are not running, halo will be off, and the current loop will report less than 1.5 mA.

The HALO patterns during operation are shown in the Specifications section.

Analog Output: Flame Detected

The 4-to-20mA current loop is connected on two terminals marked "mA+ " and "mA-".

This output corresponds to the Primary Variable. HART® Communication is supported on this loop.

The FS24X Plus™ is equipped with a 4-20 mA loop output which can operate in source, sink and isolated mode. Source, sink, and isolated modes are configured by Wiring. This output is a safety-related output and is compatible for use in SIL 2 applications. Normal operation and alarm conditions are indicated between 4 to 20 mA.

Operational State	Factory Default	Configurable Range		Configuration Restrictions
		Min	Max	
Power Fault / No Power	0.0 mA	Not Configurable		Loop Current Value will be 0.0 mA in case of non-maskable fault state (safe state)
Instrument Fault State	1.0 mA	1.0 mA	3.6 mA	Not to exceed Inhibit setting - resolution of setting 0.1 mA
Inhibit State	2.0 mA	1.0 mA	3.6 mA	Greater than or equal to a fault and not to exceed Warning - resolution of setting 0.1mA
Instrument Warning State	3.0 mA	1.0 mA	4.0 mA	Greater than or equal to Inhibit - resolution of setting 0.1mA
Normal Operation State	4.0 mA	4.0 mA	4.5 mA	4.5 mA for FMM-420 Module Interface
Fire Alarm State	16.0 mA	4.0 mA	20.0 mA	Configurable Values are either 4.0 mA, 16.0 mA or 20.0 mA
Verified Fire Alarm State	20.0 mA	Not Configurable		

Detector Module Replacement

Note: Check the O-ring is in place on the enclosure base before replacing the detector module.

Note: Take proper precautions to prevent damage from electro-static discharge.

Note: In the event of a fault, the Detector Module can be replaced to enable rapid maintenance.

Note: Use a strap wrench at low temperature if the enclosure binds.

1. Loosen, but do not remove the set screw on the cover assembly. (See Figure 1 in Opening the Detector section)
2. Turn counterclockwise (CCW) to unscrew the enclosure lid (See Figure 2 in Opening the Detector section)
3. Loosen the 3 captive screws (See Figure 3 in Opening the Detector section) and remove the electro-optical Detector Module.
4. Slide the new replacement detector module onto the standoffs in the base enclosure. (See Figure 4 in Opening the Detector section)



WARNING: Do not touch the sensor array as finger oils interfere with infrared signal transmission.

5. Tighten the 3 captive screws.
6. Screw the cover onto the base enclosure.
7. Tighten the set screw.

Test Lamp Operation

Honeywell®, in compliance with NFPA 72 codes, developed portable test lamps for periodic testing.

The function of the test lamp is to quickly and effectively ensure the flame detector's optical path is not blocked, the detector is aimed properly at the fire threat area (that the detector mounting bracket didn't move or was accidentally bumped by someone), and the detectors alarming circuitry and outputs (i.e. relays, 4-to-20 mA, etc.) all function properly.

Note: For detailed information, see Portable Test Lamps User Manual

While a built in through window test can indicate a dirty window, it cannot fully show that a flame detector can see and respond to a fire at specific positions in the field of view. For that reason regular testing (at least quarterly) with the dedicated test lamp is recommended.

For testing, in compliance with best practice and NFPA 72 Codes for flame detectors, as manufacturers of the FSX Plus product line, tests are made using the Honeywell® TL-2055 Test Lamp with a range of 10-25 ft when fully charged.

See the Appendices for details of FS24X Plus™ configuration.



RISK OF EXPLOSION

Use test lamp model TL-1055 in non-hazardous locations only. For hazardous locations, use model TL-2055.



RISK OF UNINTENTIONAL EMERGENCY RESPONSE

Testing the flame detector will result in an alarm. Ensure all personnel and emergency responders have been appropriately notified of testing and/or disconnect/disable outputs (including RS-485, 4 - 20mA, and relays) prior to testing.

Declaration of Conformity

Declarations of conformity (such as EU or UK Declarations of Conformity) and Product Information are available at: <https://sps.honeywell.com/us/en>.

Maintenance

After the FS24X Plus™ Flame detector is installed and commissioned, the detector's window must be kept clean. To ensure the detector is operating properly at all times, it may be necessary to establish a periodic cleaning schedule. Inspect at least quarterly in dirty environments. Semi-annual or quarterly testing should be performed, using the appropriate Honeywell® Test Lamp, to ensure the integrity of the detector. A complete “end-to-end” test of the entire fire detection system should be performed periodically depending on the application.

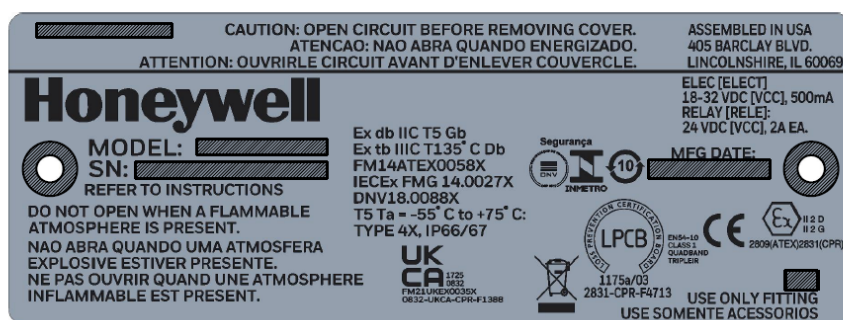
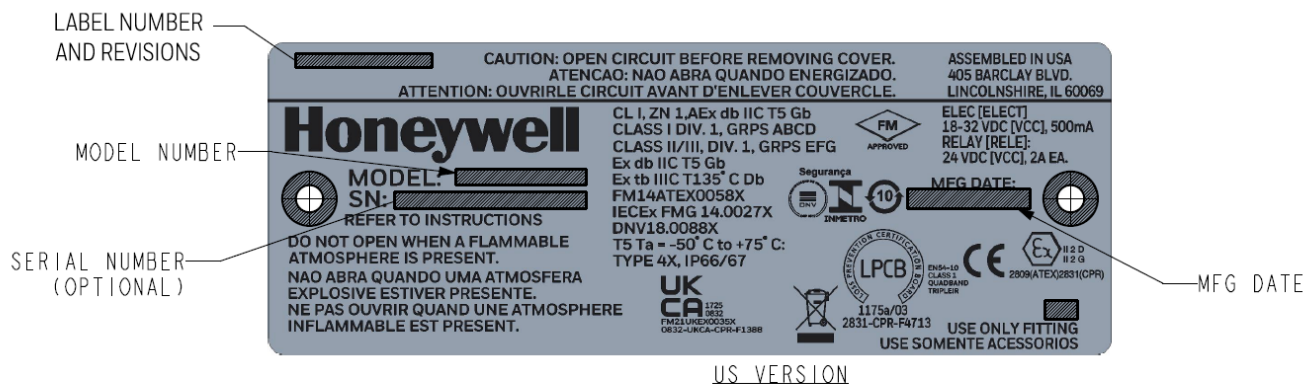
FS24X Plus™ Material Numbers

Product	Material	Entries	Approvals	Reserved	Reserved
FS24XP	A = Aluminum	M = M25	G = Global	X = Standard	X = Standard
	S = Stainless Steel	N = ¾" NPT		D = Demo	M = Marine

FS24XP-ANGXX	FS24X Plus™ -3IR - AL - ¾ NPT kit includes mount and sunshade
FS24XP-AMGXX	FS24X Plus™ - 3IR - AL - M25 kit includes mount and sunshade
FS24XP-SNGXX	FS24X Plus™ - 3IR - SS - ¾ NPT kit includes mount and sunshade
FS24XP-SMGXX	FS24X Plus™ - 3IR - SS - M25 kit includes mount and sunshade

Product Label

FS24X Plus™ Flame detector will include the following label in the back of the electronic device:



Appendix 1: Hazardous Location Installation for FS & SS Series Flame Detectors and Associated Test Lamps

Overview

The Honeywell® Flame Detectors and Test Lamps are hazardous area products. They are factory calibrated, and the robust sealed design with no moving parts allows for mounting in any orientation even in harsh environments. These products are available in either a 316 Stainless Steel or Low Copper Aluminum.

Safety



WARNING

RISK OF IMPROPER FLAME DETECTION

- Install only in areas in accordance with the environmental and hazardous area ratings.
- Carefully review mounting area and position in accordance with the FS24X Plus™ FM Performance Appendix and this Manual to ensure optimal flame detection regarding the angle of device and unobstructed view.
- Avoid potential sources of direct or indirect radiation in the flame detector field of view.
- Do not touch the sensors on the front of the electronics module.
- Avoid direct sunlight into the flame detector window – use provided sunshade, aim flame detectors down at 40 degrees or more when possible, and use multiple detectors to cover hazardous areas from different directions.
- Avoid close proximity to rapid modulation/chopping of sunlight (creating moving dark shadows) as optical sensor performance can be reduced, e.g. close trees in the wind, rotating blades.
- Use shielded cable for all wirings and ground the shield at one end as detailed in the Wiring section.
- Keep all devices and wire runs away from mercury vapor lights, variable speed drives, radio repeaters and other sources of electromagnetic interference.
- Follow local cabling and glanding rules.
- Seal all unused conduit entries and install proper drains/taps as required by local codes.
- Do not try to service parts inside the electronics module, there are no field serviceable parts.



CAUTION

RISK OF PRODUCT DAMAGE

- Protect the detector from physical damage (forklifts, scaffolding, etc.).
- Failure to follow all warnings cautions, and instructions may void the warranty.
- Clean detector body and window with a damp cloth.
- Some regulatory agencies requires the use of hazardous area approved plugs, follow local rules.
- To maintain IP66/67 integrity, seal on conduit entries with thread sealant such as Loctite 565.
- Do not install in an area where there are incidents of high mechanical damage.



WARNING

RISK OF EXPLOSION

- Ensure power is off and no hazardous gasses nor dusts are present before installing the device.
- Use only hazardous location approved plugs M25 or 3/4 " NPT as marked on product.

SPECIFIC CONDITIONS OF USE:



WARNING

ELECTROSTATIC HAZARD, DO NOT RUB WITH DRY CLOTH

- Contact the manufacturer for dimensional information on the flameproof joint specifications if repair is required.

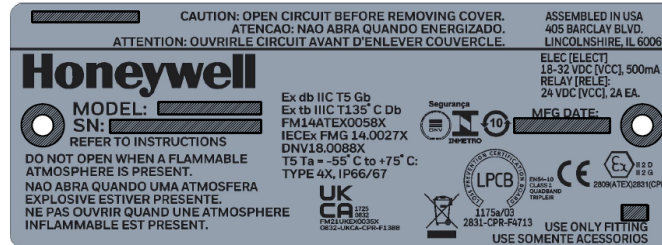
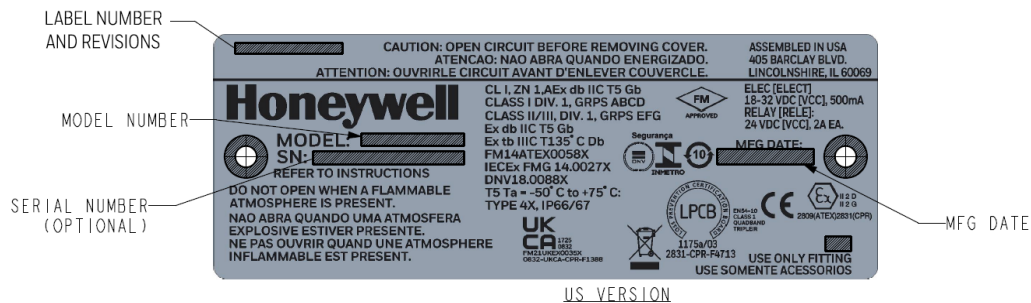
Nameplate Tag

Representative Markings are displayed in the figure below.

Additional regional marks (such as South Korea and Russia) and installation specific marks (such as ABS) may also be present. See individual nameplates for specific approvals applicable to each product.

Note: Some products require 18 in. of conduit. (See individual nameplate for specifics).

Generic Nameplate View



Electrical Ratings

- Test Lamps (battery powered): 12 VDC, 600 mA
- SS Series: Max 32 VDC, 75 mA; Relay 24 VDC, 1 A
- FS10: 12 VDC; 60 mA
- FS10-R-A: Max 29 VDC, 120 mA; Relay 24 VDC, 1 A
- FS20X and FS24X Series: Max 32 VDC, 150 mA; Relay 24 VDC, 1 A
- FS20XP and FS24XP: Consumption 18 - 32 VDC, 500 mA max; Relay 24 VDC/AC, 2 A maximum

Installing the Flame Detector

All products are provided with a flameproof and explosion-proof enclosure and have been approved for use in Class 1 and Zone 1 environments as specified on the individual product nameplate tag.

Note: NFPA 72 and other local codes have specific requirements for flame detectors installations and must be consulted as necessary.

Must only be installed by appropriately trained and accredited personnel.

1. Securely mount the detector using minimum 1/4-20 or M6 sized fasteners.

Note: We recommend angling all detectors down at least 40 degrees from horizontal.

2. Loosen, but do not remove the set screw on the cover assembly.
3. Loosen the 3 Philips screws and remove the electro-optical Detector Module and place face up in a safe location.

Note: Do not drop the Detector Module and do not touch the sensor array.

4. Connect the cable gland or conduit to the detector enclosure via the 3/4 " NPT or M25 openings, as per national electrical codes for the install location. Connect the appropriate wires rated for minimum 85°C to the field connectors provided as per the wiring diagram on the cover of the electro-optical detector module.

Ensure the enclosure is properly grounded in accordance with all local codes.

Use shielded cable for all communications connections and ground one end of the shield following the product manual.

5. Configure following this guide.

Note: Refer to the fuel and sensitivity settings table to determine the correct configuration.

6. Connect the field connectors back onto the electro-optical Detector Module and secure the module into the enclosure with the Philips screws.
7. Install the cover and ensure the O-ring is compressed. Tighten the cap screw on the cover assembly. Make a rough Field of View (FoV) adjustment by aiming the detector at the area you want to cover.
8. Tighten all bolts when product has been fully configured and tested accordance with the product manual.

Note: Detector functionality and communication should be tested to confirm correct FoV and configuration in the final system.



WARNING

RISK OF EXPLOSION

Do not connect test lamps to external power sources. Test lamps are battery operated only. Do not open when explosive gases are present. Charging permitted in safe environment only.

Product Overview

The Honeywell FS24X Plus® is a hazardous area flame detector that uses 3IR sensors to respond quickly to a flaming fire.

It is factory calibrated, and the robust sealed design with no moving parts allows for mounting in harsh environments. These flame detectors are available in either a 316 Stainless Steel or Low Copper Aluminum.

Safety



WARNING

RISK OF IMPROPER FLAME DETECTION

- Install only in areas in accordance with the environmental and hazardous area ratings.
- Carefully review mounting area and position in accordance with the FS24X Plus™ FM Performance Appendix and this Manual to ensure optimal flame detection regarding the angle of device and unobstructed view.
- Avoid potential sources of direct or indirect radiation in the flame detector field of view.
- Do not touch the sensors on the front of the electronics module.
- Avoid direct sunlight into the flame detector window – use provided sunshade, aim flame detectors down at 40 degrees or more when possible, and use multiple detectors to cover hazardous areas from different directions.
- Avoid close proximity to rapid modulation/chopping of sunlight (creating moving dark shadows) as optical sensor performance can be reduced, e.g. close trees in the wind, rotating blades.
- Use shielded cable for all wirings and ground the shield at one end as detailed in the Wiring section.
- Keep all devices and wire runs away from mercury vapor lights, variable speed drives, radio repeaters and other sources of electromagnetic interference.
- Follow local cabling and glanding rules.
- Seal all unused conduit entries and install proper drains/taps as required by local codes.
- Do not try to service parts inside the electronics module, there are no field serviceable parts.

Hazardous Classifications

Class I, Zone 1, AEx db IIC T5 Gb; Class I, Div. 1, Groups A, B, C, & D; Class II/III, Div. 1, Groups E, F, & G; Ex db IIC T5 Gb; Ex tb IIIC T135°C Db; FM14ATEX0058X; IECEx FMG14.0027X; T5 Ta = -50°C to +85°C; Type 4X, IP66/67;  II 2 D; II 2 G

Performance Specifications

Operating Temperature (ATEX/IECEX): -55°C to +75°C

Storage Temperature (ATEX/IECEX): -55°C to +85°C

Operating Temperature (North America): -50°C to +75°C

Storage Temperature (North America): -50°C to +85°C

Tested Fuels: n-heptane, methane, butane, propane, ethanol, methanol, hydrogen, diesel, kerosene, JP-4, and IPA

Sensitivity for Test: Low, Medium, High, and Very High Sensitivities (indoors/outdoors)

Software System & Safety: 5.01 identified on the label on electronics

Humidity: 0 to 99% relative humidity, can withstand 100% condensing humidity for short periods of time.

Field of View (FoV): The detector has a cone of view for all standard mounts of 90° (left 45°, right 45°, up 40°, down 50°) horizontal and vertical with the highest sensitivity on the central axis. (to EN54-10 70% of on-axis range).

- With Tank Mount: The detector has a FoV of left 50°, right 50°, up 50°, and down 50°.
- With FoV Restrictor: The detector has a FoV of left 35°, right 35°, up 30°, and down 35°.
- With Sunshade: The detector has a FoV of left 45°, right 45°, up 40°, and down 45°.

Operating Voltage: 24 VDC nominal (18-32 VDC) - Regulated.

Power Consumption: 1.8 watts (nominal); 2.4 watts (Alarm); 12 Watts (max) = 0.50A @ 24V with heater ON 100% duty cycle.

Note: Heater turns ON at -13°F [-25°C] in Normal Operation). Heaters are used during extreme cold to bring the internal electronics up to a minimum temperature. During this time, which can last up to 30 minutes, the internal microcontrollers are not running, halo will be off, and the current loop will report less than 1.5 mA.

Inrush Current is 0.75A for a maximum duration of less than 5ms

Weight: Aluminum 3 lbs. 11 oz. (1.7 kg); Stainless Steel 7 lbs. 7 oz. (3.4 kg)

Housing material: Low Copper (less than 0.25%) marine grade Painted casted Aluminum of ASTM A356.0 grade.

Polished cast Stainless Steel of ASTM CF8M grade.

Outputs: Fault, Alarm and Auxiliary SPDT relays Max. 32 Vdc/ac, max. 2 A, min 10mA at 12 V resistive load.

4-20 mA Source, sink or isolated current output.

FP2 over RS-485 and USB (USB is accessible through Detector Module electronic device only).

Modbus over RS-485.

HART®: The FS24X Plus™ Flame detector has HART® 7 communication; registered with FieldComm Group, EDD/DTM.

Mean Time Before Failure: >10-year MTBF with a commonly used database (e.g. MIL-217, MIL-217D, or Siemens SN29500). Two calculations - All components and only safety critical components.

Mounting Bracket: There are 3 mounts available: SM4 (standard), SM4-M (marine), and Tank Mount.

Enclosure: Diameter: 125 mm (4.92 in) x 115 mm (4.52 in) deep; Two M25 X 1.5P or two ¾" NPT conduit entries.

Window size diameter: 79 mm (3.11 in)

Local notification indicator: LEDs HALO Light ring. Shows instrument status.

HALO is visible at 50 ft. in daylight conditions. Suitable for indoor and night applications.

HALO flash patterns during operation:

Illustration	State	Default Pattern	Optional (settable) Pattern
	Off or de-energized	Off	Same
	Normal Operation, No fire	Mostly off, flashing Green every 5 seconds	Off
	Inhibited	Solid Yellow	Same
	Fault	Flashing Yellow every second	Same
	Alarm	Solid Red	Flashing Red
	Warning	Flashing Yellow and Green Alternate	Same

Available Accessories/Spares

- SM4 Mounting Bracket
- FVR-01 FoV Restrictor
- SH-001 Sunshade
- SM4-M Marine Mounting Bracket
- NFPA 72 Connector Kit p/n FS24XP-NFPA-KIT
- Tank Mount

What's in the box?

- 1 Flame detector
- 1 FS24X Plus™ FM Performance Appendix
- 1 Standard Mount (SM4) or Marine Mount (SM4-M)
- 1 Threaded Stopping plug
- 1 Sunshade (SH-001)

Installation

Note: Must only be installed by appropriately trained and accredited personnel. Read all instructions and warnings before installing.

Location – Indoor or outdoor. Select a site with a low chance of mechanical damage and low vibration. Ensure that the detector has a line of sight to the threat location. Avoid false alarm sources. Orient the detector such that the Field of View covers the desired area. It is recommended to angle all detectors down at least 40 degrees from horizontal. Use the SH-001 Sunshade as needed to avoid direct sunlight hitting the detector window.

Wiring

FS24X Plus™ must be connected with suitable cabling/conduit for the environment in terms of temperature, current and protection against damage.

Note: Use appropriate ESD protection when handling electronics. Do not touch sensors or lenses. Fingerprints will inhibit performance.

Cable/Wiring – Shielded cable with twisted pairs and shield coverage of more than 80% with minimum pigtail lengths outside of the shield. Specifications as follows:

14 – 24 AWG rated 85°C minimum:

- One 14 – 24 AWG Cu stranded wire (16 AWG recommended); or
- Two 16 – 24 AWG Cu stranded wires

per terminal. Terminal block should be torqued to 5 lb in. (0.56 Nm) on each wire(s).

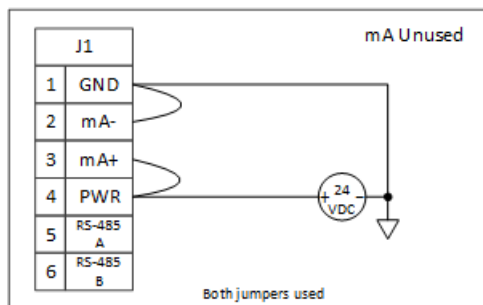
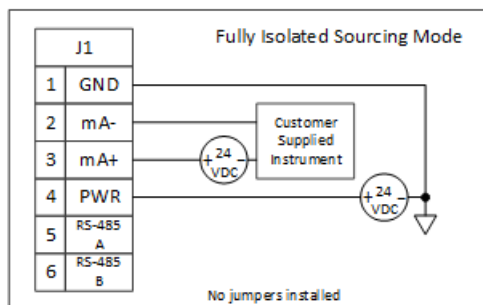
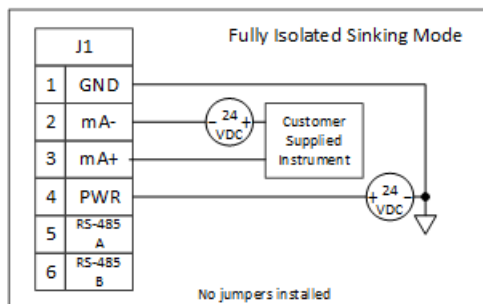
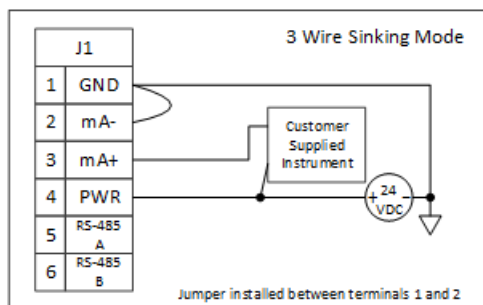
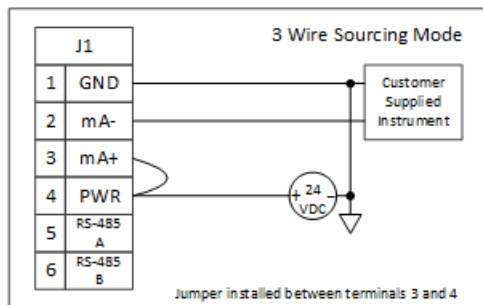
EMC - To ensure proper EMC protection, coil, and tape the cable shields at the control panel or power supply. Tie the other end of the shields together and terminate inside the detector enclosure, ensuring earth ground to the cabinet.

Terminal Blocks - The Flame detector Electro-Optical Detector Module has pluggable terminal blocks for interfaces (Power Supply, RS-485, Relay, etc.) with retention for easy plug-in replacement of the product in the field.

NFPA 72 Terminal Blocks - When connecting to a fire panel, compliance with NFPA 72 is obtained by using the terminal blocks in NFPA 72 Connection Kit p/n FS24XP-NFPA-KIT. Instructions are provided with the kit and online (see QR code on the back of this appendix).

Wiring Configurations

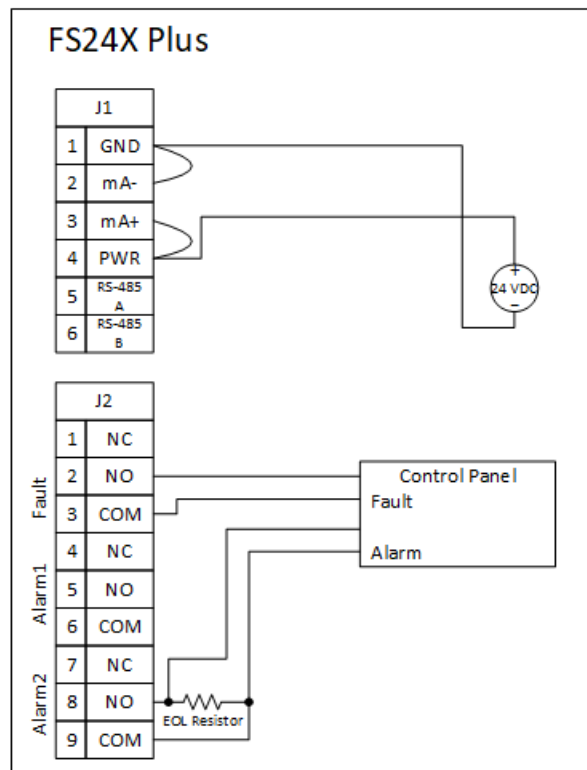
There are multiple ways to configure the current loop on the detector. Consult the User Manual for specifics on each of the methods shown below.



Communication Wiring

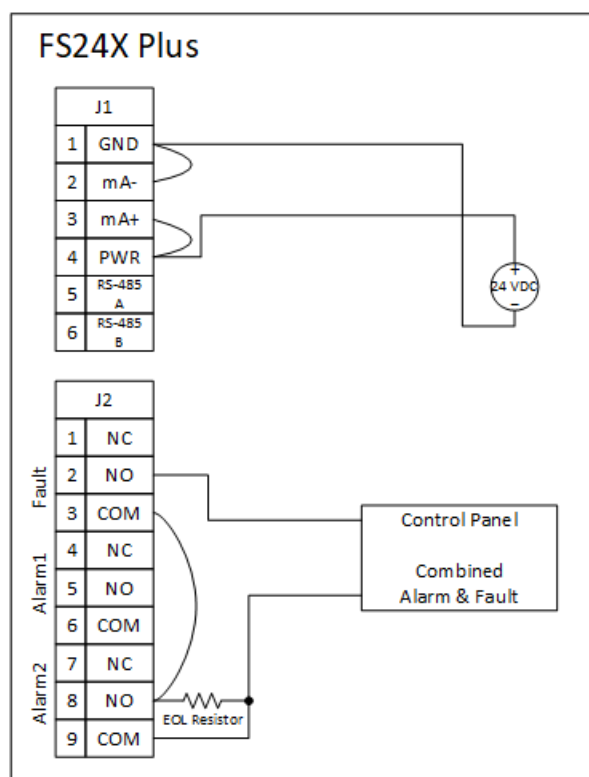
Independent Alarm and Fault Relay Interface Circuits

- Fault relay configured normally energized and wired using ordinarily open contact. i.e., continuity of the fault circuit will break if relay de-energized.
- Any loss of continuity in the power circuit will result in fault relay being de-energized and fault condition being signaled to the controller.
- Alarm relay typically configured de-energized and wired using the normally open circuit. i.e., the alarm circuit is shorted in the event of an alarm.
- The EOL resistor (selected following control panel specification) enables the signal circuit to be monitored by the control panel for continuity.
- Any loss of continuity in the alarm circuit, including the disconnect of either the signal conductor, or the EOL resistor, or both will be detected by the controller and signal as a fault.
- The termination of the alarm circuit conductor and the EOL resistor (or the next unit in a daisy chain of units) must be inserted into separate openings on the duplicate terminal block of the NFPA 72 Connection Kit to comply with NFPA 72 requirements.



Combined Alarm and Fault Relay Interface Circuits

- Fault relay configured normally energized and wired using ordinarily open contact. i.e., continuity of signal circuit will be broken if relay de-energized.
- Any loss of continuity in the power circuit will result in fault relay being de-energized and fault condition being signaled to the controller.
- Alarm relay usually configured de-energized and wired using the normally open circuit. i.e., the signal circuit is shorted in the event of an alarm.
- The EOL resistor (selected following control panel specification) enables the signal circuit to be monitored by the control panel for continuity.
- Any loss of continuity in the signal circuit, including the disconnect of either the signal conductor, or the EOL resistor, or both will be detected by the controller and signal as a fault.
- The termination of the alarm circuit conductor and the EOL resistor (or the next unit in a daisy chain of units) must be inserted into separate openings on the duplicate terminal block of the NFPA 72 Connection Kit to comply with NFPA 72 requirements.



Configure the Detector (Safe Area)

1. Connect to the detector by using either a USB cable or through a twisted pair of wires via RS-485 converter to the PC or Laptop.
2. Run the Honeywell *FlameManager* Application.
3. In the Communication Parameters window, check the Connect port is USB if you are using a USB cable, or select a port from the Port Name list if connected with a twisted pair of wires RS-485 to the PC or laptop.
4. Click Connect.
5. From the Main window, select the Configure tab.
6. From the Configure window, you can perform any of the following operations:

Operation	Description
Flame Sensitivity	Select from four sensor's sensitivity values from low to very high. Be sure to comply with the site required Agency approvals.
Alarm Verification Time	The time the detector should wait before sending an alarm sign after detecting a possible flame source. This waiting time is to prevent false alarms.
Read	Read the detector flame sensitivity and alarm verification time current values.
Write	Apply new values selected for the flame sensitivity and the alarm verification time.
Latch Alarms	Holds the info when the detector is alarmed. To unlatch it, turn the detector off. Be sure to comply with NFPA 72 if required.
Relay Options	1 = Fault; 2 = Alarm; 3 = Auxiliary
4-20mA Output options	Set current levels for the faults, warning, Inhibit, alarm, and verified alarm notifications.

Commissioning the Detector

After set-up and installation, test the flame detector with the test lamp. Confirm coverage area is correct.

States & Outputs

The FS24X Plus™ Flame detector communicates status using a variety of output methods, including the LED, 4-20 mA current loop, Relays, RS-485 Modbus, and HART® EDD over 4-20mA current loop.

Test Lamps

The Honeywell® TL-1055 and TL-2055 test lamps are compatible with the FS24X Plus™ flame detectors. Note that the test lamps will alarm the detector, so we recommend inhibiting the safety system before testing.



WARNING

RISK OF EXPLOSION

USE TEST LAMP MODEL TL-1055 IN NON-HAZARDOUS LOCATIONS ONLY.

FOR HAZARDOUS LOCATIONS, USE MODEL TL-2055

Some of the most important functions of the remote test lamp ensure:

- The detector's optical path is not blocked.
- The detector is appropriately aimed at the fire threat area.
- The detector's alarming circuitry and outputs (i.e., relays, 4-to-20 mA, etc.) function properly.

Tests are made using the Honeywell® TL-2055 Test Lamp with a range of 10-25 ft when fully charged.

Wait a minimum of thirty (30) seconds between tests (i.e., test lamp or test fires) to allow the Detector's sensors to normalize to the spectral background conditions fully.



WARNING: The following conditions may have a detrimental effect on detector performance or increase the change of nuisance alarms and therefore should be avoided:

1. Locations where the detector is aimed directly at the sun.
2. Situations where the detector is continuously subjected to modulated sunlight.

Maintenance

After the FS24X Plus™ Flame detector is installed and commissioned, the detector's window must be kept clean. To ensure the detector is operating properly at all times, it may be necessary to establish a periodic cleaning schedule. Inspect at least quarterly in dirty environments. Semi-annual or quarterly testing should be performed, using the appropriate Honeywell® Test Lamp, to ensure the integrity of the detector. A complete "end-to-end" test of the entire fire detection system should be performed periodically depending on the application.

Flame Response Sensitivity

The following table provide FS24X Plus™ response times and distance to various fuels. The relative ratio among Very High, High, Medium, and Low sensitivities are about 100%, 75%, 50%, and 25%.

FM witness testing included verifying all sensitivities for indoor/outdoor heptane.

The Inverse Square Law is applicable to define the relationship on the radiant power reaching a detector versus the distance between the detector and the fire. The radiant power reaching a detector is reduced by a factor of square of the distance between the detector and the fire. For example, The radiant power reaching a detector is reduced by a factor of 4 if the distance between the detector and the fire is doubled (e.g., the radiant energy from 30cm by 30cm fire at 60m is equivalent to that from 15cm by 15cm fire at 30m).

Fuel	FS24X Plus™ 3IR				Target Sensitivity	Alarm Response Time			
	Fire Size		Fire Distance			Typical	Maximum		
	Indoor	Outdoor	Indoor	Outdoor					
Heptane	6 in X 6 in (0.15m X 0.15m)	12 in X 12 in (0.3m X 0.3m)	90 ft (27m)	200 ft (60m)	Very High	5 Seconds	10 Seconds		
			67 ft (20m)	150 ft (45m)	High				
			45 ft (13m)	100 ft (30m)	Medium				
			22 ft (6m)	50 ft (15m)	Low				
IPA	6 in X 6 in (0.15m X 0.15m)	12 in X 12 in (0.3m X 0.3m)	90 ft (27m)	135 ft (41m)	Very High				
Methane	3/8 in (9.5mm) Dia. Orifice, 15 in (0.38m) Plume	3/8 in (9.5mm) Dia. Orifice, 32 in (0.81m)Plume	45 ft (13m)	90 ft (27m)	Very High				
Butane	N/A*1	3/8 in (9.5mm) Dia. Orifice, 32 in (0.81m) Plume	N/A*1	98 ft (29m)	Very High				
Ethanol	N/A*1	12 in X 12 in (0.3m X 0.3m)	N/A*1	135 ft (41m)	Very High				
Methanol	N/A*1	12 in X 12 in (0.3m X 0.3m)	N/A*1	105 ft (32m)	Very High				
Hydrogen	N/A*1	3/8 in (9.5mm) Dia. Orifice, 32 in (0.81m) Plume	N/A*1	61 ft (18m)	Very High				
Diesel	N/A*1	12 in X 12 in (0.3m X 0.3m)	N/A*1	150 ft (45m)	Very High				
Kerosene	N/A*1	12 in X 12 in (0.3m X 0.3m)	N/A*1	75 ft (22m)	Very High				
JP-4	N/A*1	6 in X 6 in (0.15m X 0.15m)	N/A*1	100 ft (30m)	Very High				

Note: *1: Indoor testing not FM witnessed.

False Alarm Stimuli Response

The following table represents the minimum distance for false alarm source immunity in order to ensure that nuisance radiation sources are avoided. Additionally, the sensitivity to a one square foot n-Heptane reference pan fire in the presence of the false fire source is listed. Typical distances for other sensitivities are metric, i.e. the ratios for Very High, High, Medium, and Low sensitivities are 100%, 75%, 50%, and 25%. FM witness testing included verifying all sensitivities for indoor/outdoor heptane.

⚠️WARNING: The following conditions may have a detrimental effect on detector performance or increase the change of nuisance alarms and therefore should be avoided:

1. Locations where the detector is aimed directly at the sun.
2. Situations where the detector is continuously subjected to modulated sunlight.

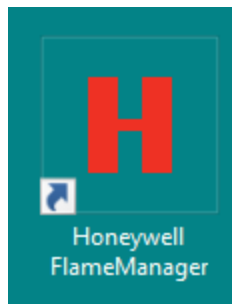
False Alarm Source	FS24X Plus™ 3IR					Product Sensitivity	Alarm Response Time
	False Alarm Source Immunity Distance	False Alarm Stimuli					
		False Alarm Source Distance	Fire Size and Fuel	Fire Distance	Equivalent Fire Distance for 12 in X 12 in (0.3m X 0.3m)		
Direct Sunlight (Modulated)	>= 10 ft (3.1m)	>= 9 ft (2.8m)	12 in X 12 in (0.3m X 0.3m) n-Heptane	36 ft (10m)	36 ft (10m)	Very High	5 Seconds (Typical) 10 Seconds (Maximum)
Direct Sunlight (Un-Modulated)	N/A	N/A		65 ft (19m)	65 ft (19m)		
Reflected Sunlight (Modulated)	>= 10 ft (3.1m)	>= 25 ft (7.7m)	12 in X 12 in (0.3m X 0.3m) n-Heptane	18 ft (5m)	18 ft (5m)		
Reflected Sunlight (Un-Modulated)	>= 10 ft (3.1m)	>= 10 ft (3.1m)		70 ft (21m)	70 ft (21m)		
Electric Arc welding (7014) (Modulated)	>= 5 ft (1.6m)	>= 15 ft (4.6m)	12 in X 12 in (0.3m X 0.3m) n-Heptane	30 ft (9m)	30 ft (9m)		
Electric Arc welding (7014) (Un-Modulated)							
Electric Heater, 1500W (Modulated)	>= 5 ft (1.6m)	>= 15 ft (4.6m)	3 in X 3 in (76mm X 76mm) n- Heptane	20 ft (6m)	80 ft (24m)		
Electric Heater, 1500W (Un-Modulated)	>= 8 ft (2.5m)	>= 10 ft (3.1m)					
Flourescent lamps, Two 34W (Modulated)	>= 5 ft (1.6m)	>= 10 ft (3.1m)	3 in X 3 in (76mm X 76mm) n- Heptane	20 ft (6m)	80 ft (24m)		
Flourescent lamps, Two 34W (Un-Modulated)							
Halogen lamp, Quartz (un-shielded), 500W (Modulated)	>= 5 ft (1.6m)	>= 12 ft (3.7m)	3 in X 3 in (76mm X 76mm) n- Heptane	20 ft (6m)	80 ft (24m)		
Halogen lamp, Quartz (un-shielded, 500W (Un-Modulated)		>= 8 ft (2.5m)					
Halogen lamp, Quartz (shielded), 500W (Modulated)	>= 5 ft (1.6m)	>= 12 ft (3.7m)	3 in X 3 in (76mm X 76mm) n- Heptane	20 ft (6m)	80 ft (24m)		
Halogen lamp, Quartz (shielded), 500W (Un-Modulated)		>= 8 ft (2.5m)					
Incandescent Lamp, 300W (Modulated)	>= 5 ft (1.6m)	>= 10 ft (3.1m)	3 in X 3 in (76mm X 76mm) n- Heptane	20 ft (6m)	80 ft (24m)		
Incandescent Lamp, 300W (Un-Modulated)		>= 5 ft (1.6m)					
Sodium Vapor Lamp, 70W (Modulated)	>= 5 ft (1.6m)	>= 7 ft (2.2m)	3 in X 3 in (76mm X 76mm) n- Heptane	20 ft (6m)	80 ft (24m)		
Sodium Vapor Lamp, 70W (Un-Modulated)		>= 5 ft (1.6m)					

Install the Honeywell® FlameManager Application

Download and install the PC application.

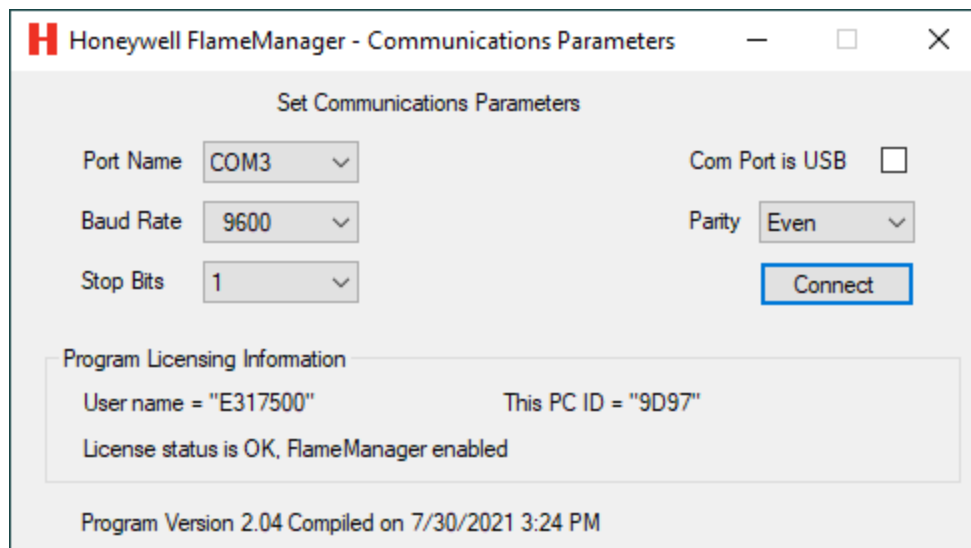
Minimum System Requirements:

- Microsoft Windows 10 or later. 32 or 64-bit version.
 - Microsoft .NET framework version 4.6 or later.
 - A USB port.
 - A 1280 X 768 pixels or larger screen.
 - 1 GB of free disk space
1. Go to Firmware download site and download the FlameManager.zip file.
 2. Unzip FlameManager.
 3. Run Setup.exe
 4. Copy the file **HoneywellFlame.lic** to the Documents folder.
 5. Verify that the FlameManager icon appears on the desktop. It looks like this:



FlameManager is an application program for personal computers running Microsoft Windows version 10 and later. It facilitates configuring and interrogating the FS24X Plus™ Flame detector. FlameManager can communicate with the FS24X Plus™ over either USB or RS-485 networks. Most of the capabilities of the program are operating from the Main Window from which is shown in Main Window.

However, obtaining the rich information in the Main Window requires setting up the communications parameters. This is accomplished with the Communications Parameters form which is shown in Communications Parameters window.



At minimum, two fields must be set to enable communications.

The first field is the port name. MS-Windows assigns the name COM1, COM2 ... COM99 to serial devices. These are typically devices plugged into a USB port, including possibly the FS24X Plus™ itself. On many computers, selecting the COM port number will be trivial because the flame detector will be the only port present. In PCs with many devices connected, it may be necessary to observe which COM port appears and disappears from the list when the FS24X Plus™ is connected.

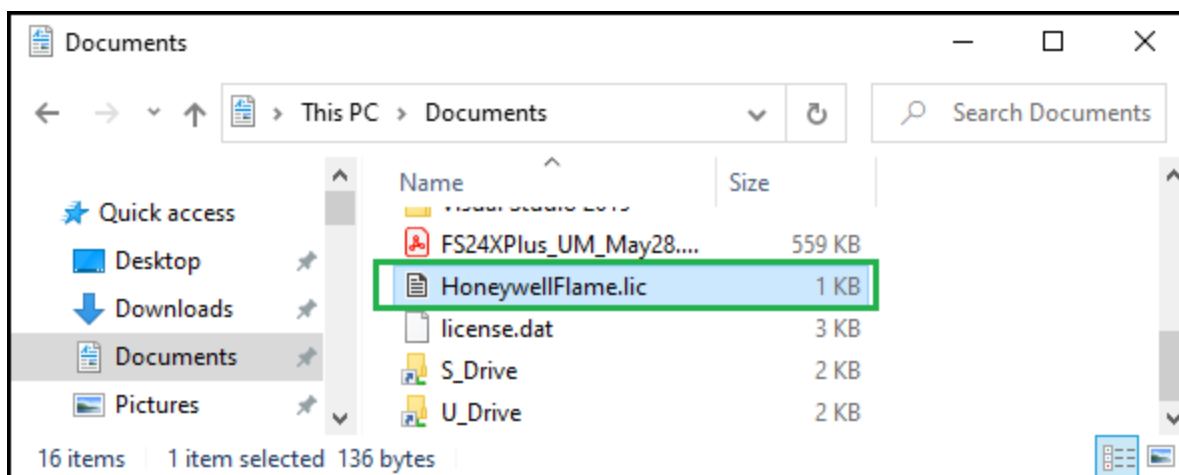
The second field is the communications media type – either USB or RS-485. To set this, check or uncheck “Com Port is USB” as appropriate. Either medium uses Honeywell’s proprietary FP2 protocol.

USB is more convenient than RS-485 because there is no need to configure baud rate, parity, or stop bits. It is faster than the default RS-485 speed of 9600 baud and no special hardware is needed. USB alone is sufficient to power the detector and permit configuration. However, when 24 VDC power is absent, the relays will be de-energized, and the detector will continuously report a fault.

However, RS-485 is advantageous in that it can be accessed while the detector is in the enclosure, it tolerates a longer length of up to 1200 meters [4000 feet] and is faster if configured for the highest baud rate. It requires an RS-485 transceiver which most computers lack. Honeywell® does not sell RS-485 transceiver but has used Advantech BB-USOPTL4 extensively. This and similar devices can be purchased multiple distributors. RS-485 communications require that the communications parameters (baud rate, parity, and stop bits) match on both ends. The default communications parameters are 9600 baud, even parity, and one stop bit. Long or fast networks require correct 120Ω termination resistors on both ends. The live streaming feature requires either USB or RS-485 configured for the maximum speed of 115,200 baud.

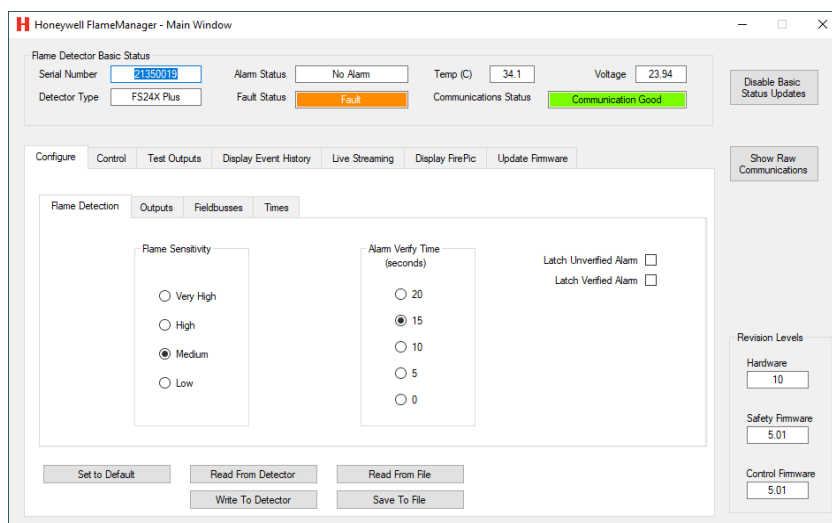
The FP2 does not support multidrop networks – installations wishing to communicate with multiple FS24X Plus™ Flame detector must have a unique pair of wires and RS-485 transceiver for each detector.

The communications parameter form shown in the Communications Parameters window also displays licensing information. The program requires the presence of a file “*HoneywellFlame.lic*” in the “Documents” folder as shown below.



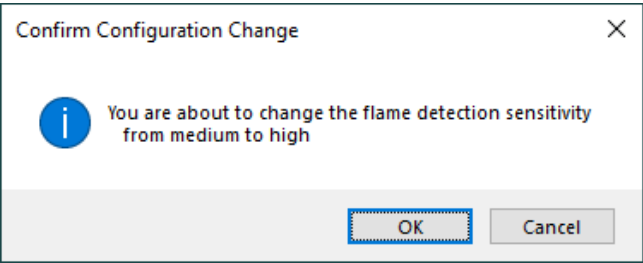
This file can be obtained from Honeywell®. When this file is found successfully, the communications parameter form displays “*License Status is OK*” as shown in the Communications Parameters window.

When all of the settings are correct in the communications parameter form, pressing [Connect] will cause the main window to appear as shown in the Main Window.

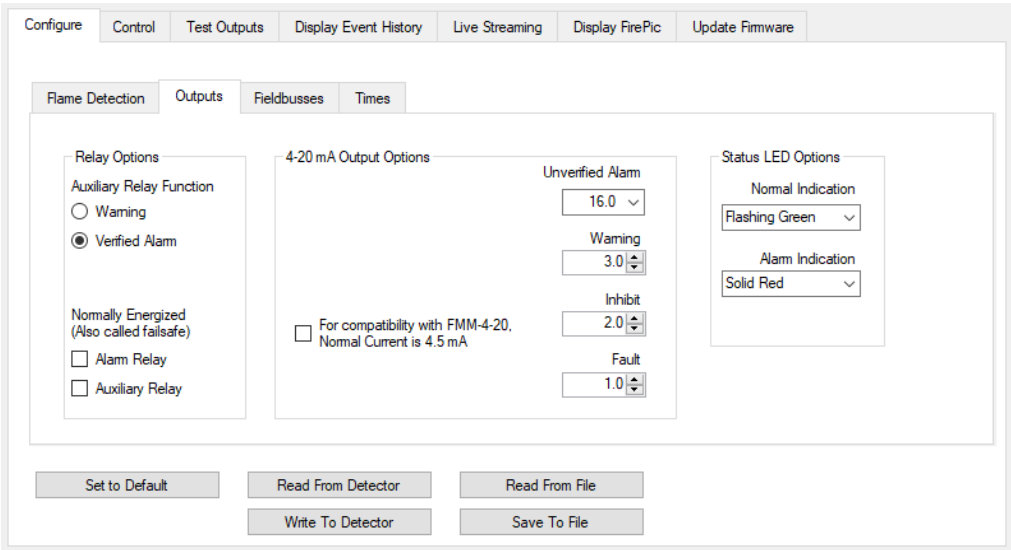


Most of the controls are self-explanatory. All the tabs and forms are listed below with explanation where needed.

The primary safety function of the FS24X Plus™ is affected by many of the controls, for example setting the flame sensitivity. Since this detector is suitable for use in systems with a safety integrity level of 2, it is essential that any change be clearly communicated. For this reason, a dialog such as shown in the image below will frequently appear requesting a confirmation of a change. Press [OK] to accept the change or [Cancel] to reject it.



The *Configure/Outputs* tab has the controls shown below. Several rules restrict the setting of mA levels.



The *Configure/Fieldbuses* tab permits setting up the RS-485 port as shown below. The port can communicate using standard Modbus or proprietary FP2, but not both concurrently. The Modbus register set is listed in a later Appendix. If FP2 communications on RS-485 is lost either because Modbus is enabled or because the asynchronous communications parameters are unknown, then control can be re-established using the USB port.

The screenshot shows the 'Configure' window with the 'Fieldbuses' tab selected. The interface includes a top navigation bar with tabs: 'Configure', 'Control', 'Test Outputs', 'Display Event History', 'Live Streaming', 'Display FirePic', and 'Update Firmware'. Below this, there are sub-tabs: 'Flame Detection', 'Outputs', 'Fieldbuses', and 'Times'. The 'Fieldbuses' sub-tab is active, displaying the following configuration options:

- RS-485 Asynchronous Comm Parameters:**
 - Baud Rate: 9600 (dropdown)
 - Parity: Even (dropdown)
 - Stop Bits: One (dropdown)
- Modbus Parameters:**
 - Address: 45 (spin box)
- Enable Protocols:**
 - HART: ☐
 - Modbus replaces FP2 on RS-485: ☐
- HART Device ID:** 0x01 01 01 (text box)

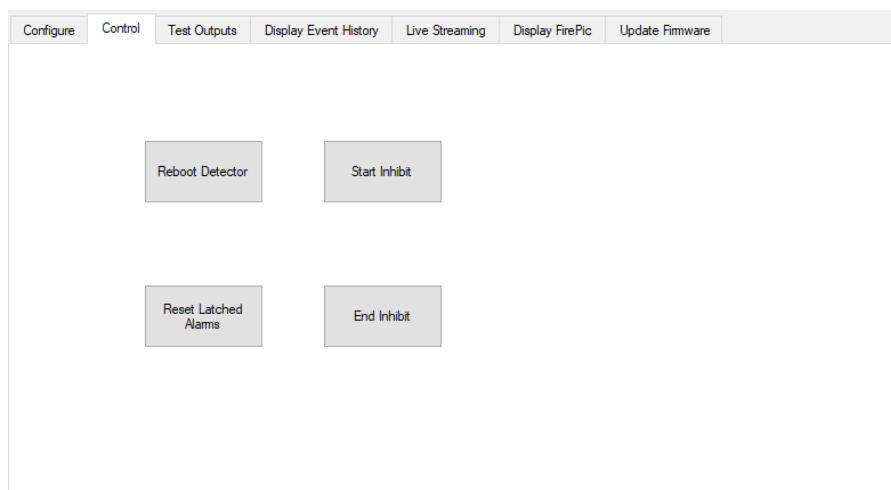
The *Configure/Times* tab is shown below. By default, all the timeouts are 10 minutes. This can be set up to 65000 seconds (18 hours) or even indefinitely by writing 0. These configurations should be used cautiously because they have the possibility of disabling the safety function permanently.

The clock can be set to either UTC or local time. FlameManager works well with either choice and can subtract the appropriate offset on all of the functions that read the clock. However, the HART® event history report does not adjust for time zones. For installations utilizing this feature, setting the detector's clock to local time may be more convenient.

The screenshot shows the 'Configure' window with the 'Times' tab selected. The interface includes the same top navigation bar as the previous screenshot. Below this, there are sub-tabs: 'Flame Detection', 'Outputs', 'Fieldbuses', and 'Times'. The 'Times' sub-tab is active, displaying the following configuration options:

- Timeout Values (Seconds):**
 - Inhibit: 600 (spin box)
 - Force LED: 600 (spin box)
 - Force Relay: 600 (spin box)
 - Force mA Loop: 600 (spin box)
- Notes:**
 - 1) A timeout value of zero is interpreted as unlimited.
 - 2) After timeout, normal operation resumes automatically.
- Real Time Clock in Detector:**
 - Literal Value: 2021 Nov 03 17:25:45 (text box)
 - Translated from UTC to Local: 2021 Nov 03 12:25:45 (text box)
 - Buttons: 'Write Local Time from PC to Detector' and 'Write UTC Time from PC to Detector'.

The *Control* tab facilitates adjusting inhibit and other functions as listed below.



The *Display Event History* tab is shown below. Updating this list can be slow as the detector can store thousands of events. Frequent instances of Fault 2002 shown below is normal when operating the detector without 24 VDC power.

Configure	Control	Test Outputs	Display Event History	Live Streaming	Display FirePic	Update Firmware
	Time	Type	Description	Arg1		
▶	11/3/2021 5:26:27 PM	2002	SW Fault 'Temp. Mon' Err = 'TEMP_SENS_ADC_IN'	00000026		
	11/3/2021 5:24:37 PM	2002	SW Fault 'Temp. Mon' Err = 'TEMP_SENS_ADC_IN'	00000026		
	11/3/2021 5:22:25 PM	2002	SW Fault 'Temp. Mon' Err = 'TEMP_SENS_ADC_IN'	00000026		
	11/3/2021 5:20:35 PM	2002	SW Fault 'Temp. Mon' Err = 'TEMP_SENS_ADC_IN'	00000026		
	11/3/2021 5:20:24 PM	7002	Changed to Fault state	00000004		
	11/3/2021 5:18:45 PM	2002	SW Fault 'Temp. Mon' Err = 'TEMP_SENS_ADC_IN'	00000026		
	11/3/2021 5:18:40 PM	5004	Start 4-20mA Error 2	00000004		
	11/3/2021 5:18:40 PM	7002	Changed to Inhibit state	00000002		
	11/3/2021 5:18:40 PM	500B	Start Diagnostic Fault 3	00000002		
	11/3/2021 5:18:40 PM	7005	Powered up with Firmware Revision 3.31	0000031F		
	11/3/2021 5:18:26 PM	500A	Start Diagnostic Fault 2	00000002		
	11/3/2021 5:18:26 PM	5001	Start line voltage under-voltage fault	00000001		

Transfer Status

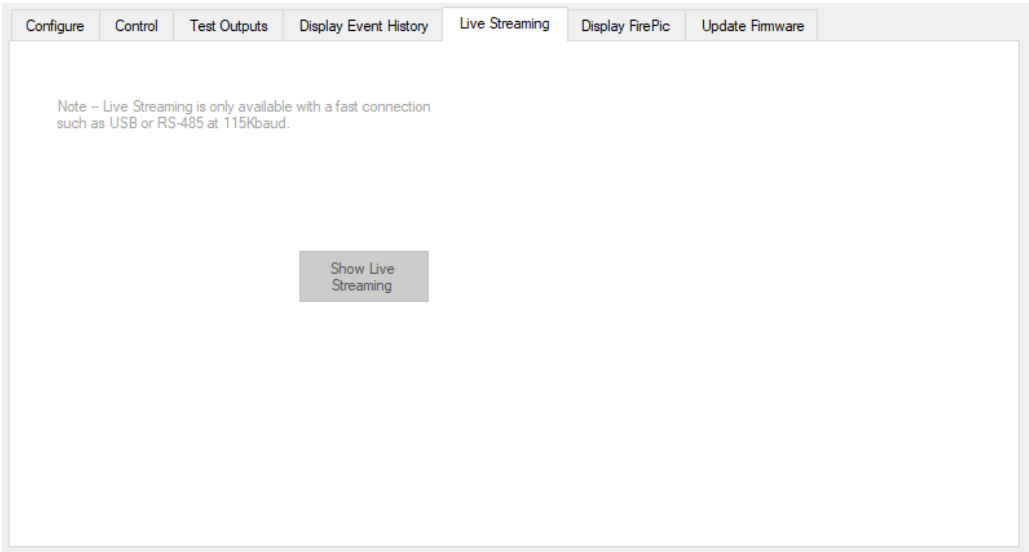
Block 16 contained 64 events

☐ Translate timestamp from UTC to local time

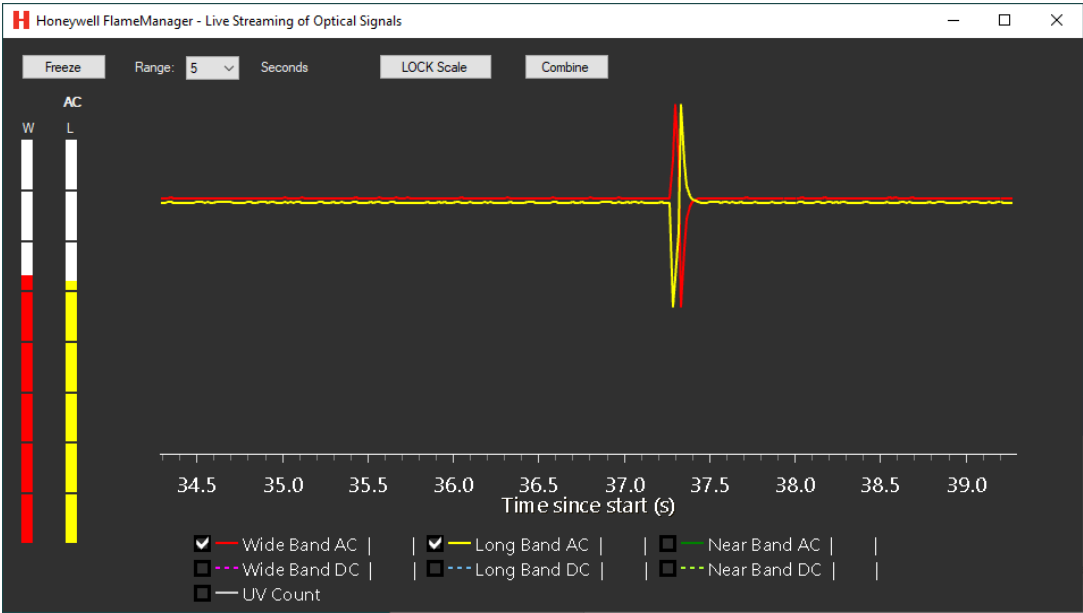
Refresh List

Export Event History to File

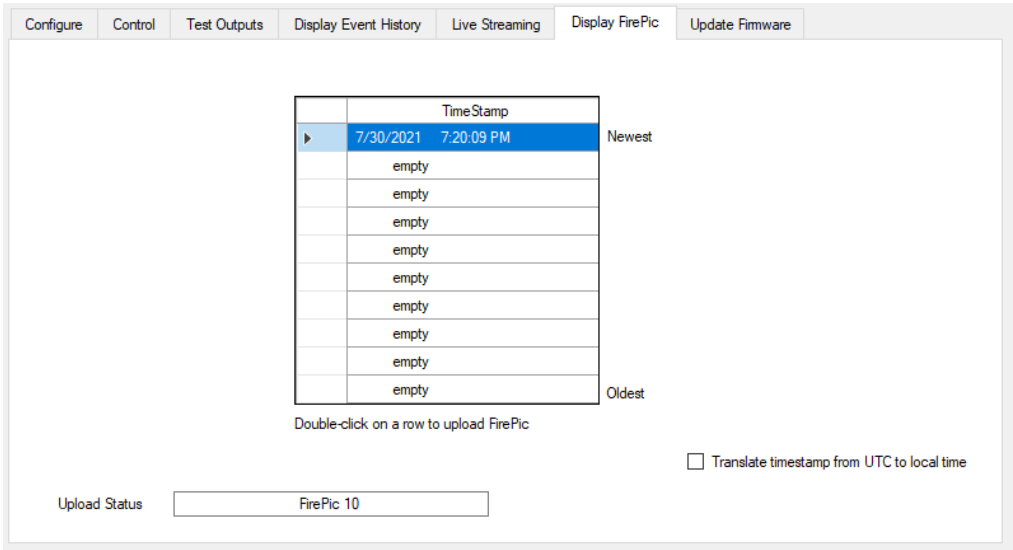
The *Live Streaming* tab is very simple as shown below. It may be useful to press the button [*Disable Basic Status Updates*] at the top right of the main form in order to conserve network bandwidth and produce more smoothly scrolling graph.



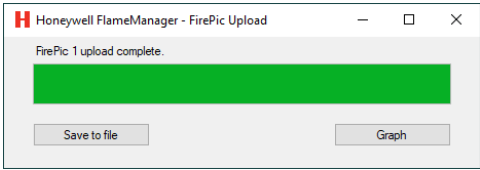
When the button [*Show Live Streaming*] shown in the previous image is pressed, a new form will open like the one shown below. This automatically scales vertically to accommodate the huge 32-bit dynamic range of the FS24X Plus™. The large pulse shown is the self-test pulse which occurs twice per minute. At times when the self-test pulse is not visible, the graph will zoom in and appear noisier. The vertical bars on the side of the graph show the relative signal amplitude in a log scale. It is often useful to disable the DC graphs to reduce clutter. One of the buttons facilitates separating the DC and AC signals into different regions of the form.



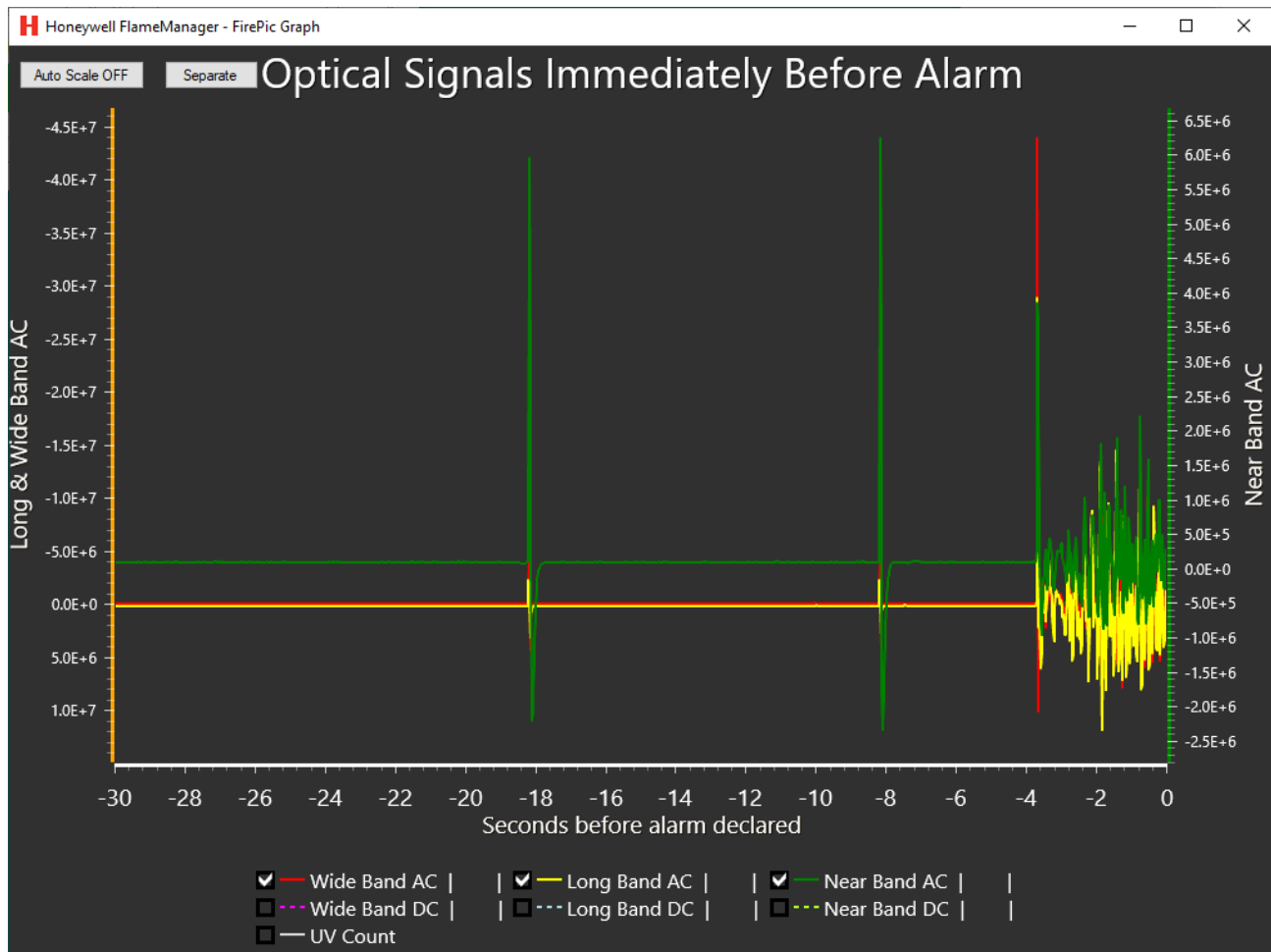
The *Display FirePic™* tab is shown below. The 30 seconds of pre-alarm infrared signals are stored for the 10 most recent alarm events. Double-clicking on a row causes the FirePic™ dataset to be uploaded to the PC. When this is done, a form much like shown below will appear.



The upload process takes a minute or more depending on the network used. The FirePic™ can be saved as a CSV file. This can be emailed to Honeywell® for analysis.



Pressing the [Graph] button will cause a new form much like the image shown below to open. In this example, the two large pulses at 18 and 8 seconds before the alarm are self-test signals.



The last tab is *Update Firmware* and it is shown below. This facilitates improving the performance of existing flame detectors in the field. Firmware update is only permitted over the USB interface.

Configure Control Test Outputs Display Event History Live Streaming Display FirePic Update Firmware

Safety MCU Binary Firmware File

Control MCU Binary Firmware File

Reset

Verify Files

Update Firmware

Bootloader Version

Safety MCU 20.02

Control MCU 20.02

EDD/DTM

The FS24X Plus™ can communicate using the HART® protocol, which provides digital communications superimposed on the standard analogue output. More information about the HART® protocol can be found at the HART® Communication Foundation's website.

HART® is a master-slave protocol, i.e. FS24X Plus™ does not continually transmit data but will respond on request.

The DD file is written using HART® version 7 and is compatible with HART® DD Tokenizer versions 6 and 8.

The DD file is supplied in .fm6, .fm8, .hhd and .hdd versions. It is compatible with a wide range of industry standard products.

To use the HART® communications, load HART® DD file into a suitable HART® host (see manufacturer's instructions). The secondary master can be a handheld terminal. The detector has been tested with the handheld Emerson field communicator.

Access Levels and Password Protection

The FS24X Plus™ user interface recognizes three login profiles. Default profile 'Guest' offers limited access rights. The second profile 'Engineer' is available to wider engineering personnel. The third profile 'Honeywell® Engineer' is restricted to Honeywell® Field Service personnel.

The default 'Guest' profile is read-only and displays information about the current gas leak reading and detector status, including active warnings and faults.

The 'Engineer' profile access is required to test the detector, and to make changes to the default configuration.

The 'Engineer' profile access is password protected (8-digit alphanumeric, case sensitive). To avoid potential compatibility issues between different HART® host devices, ensure that a full 8-digit password is used.

The password is factory set to 00000000 (eight zeroes). Instructions to change the password are given below.

Note: Some HART® handheld devices will retain the previous login until switched off, even if FS24X Plus™ is disconnected. Ensure that 'Engineer' profile access is protected from unauthorized use by logging off when appropriate.

Menu Structure

The home screen displays current information about FS24X Plus™.

Home Screen	
1 User logged in as	Guest
2 Change login profile	1 Guest 2 Engineer 3 Honeywell® Engineer
3 Device Overview	
4 Device Setup	

Selecting Device Setup leads to the further menu options, depending on the access level of the user. The menu structures are given below. 'XXXX' represents information, '????' represents a user text field.

Device Overview Menu - Guest Access Level		
3 Device Overview	1 Dev Variant Name	XXXX
	2 Alarm Status	XXXX
	3 Alarm Type	XXXX
	4 Detector Status	XXXX
	5 Time (24-hour)	XXXX
	6 Date	XXXX
	7 Date Format	XXXX
	8 Serial Number	XXXX
	9 HART	1 PV Current Loop
		2 Poll addr
		3 Tag
		4 Long tag
		5 Descriptor
		6 Message
		7 Loop Current Mode
		8 Configure HART®
		9 HART® Parameters

Device Setup Menu - Guest Access Level		
4 Device Setup	1 Operations	1 Detector Status
	2 Diagnostics	2 Clear Latch
	3 Event History	
	1 Operations	1 Internal Com.Flt
	2 Diagnostics	2 Voltage Fault
	3 Event History	3 Test Lamp Detection
	1 Operations	
	2 Diagnostics	Latest Log
	3 Event History	

Device Setup Menu - Engineer Access Level			
4 Device Setup	1 Operations	1 Detector Status	XXXX
	2 Diagnostics	2 Inhibit	
	3 Event History	3 Sensitivity	
	4 Settings	4 4-20 mA Loop	
	5 Account	5 State Latch	
	6 Field Engineer Data	6 LED	
		7 Relays	
	1 Operations	1 Detector Status	Start Inhibit End Inhibit
	2 Diagnostics	2 Inhibit	
	3 Event History	3 Sensitivity	
	4 Settings	4 4-20 mA Loop	
	5 Account	5 State Latch	
	6 Field Engineer Data	6 LED	
		7 Relays	
	1 Operations	1 Detector Status	Sensitivity Change Sensitivity
	2 Diagnostics	2 Inhibit	
	3 Event History	3 Sensitivity	
	4 Settings	4 4-20 mA Loop	
	5 Account	5 State Latch	
	6 Field Engineer Data	6 LED	
		7 Relays	

	1 Operations 2 Diagnostics 3 Event History 4 Settings 5 Account 6 Field Engineer Data	1 Detector Status 2 Inhibit 3 Sensitivity 4 4-20 mA Loop 5 State Latch 6 LED 7 Relays	1 Fault Level 2 Warning Level 3 Normal Level 4 Alarm Level 5 Verified Alarm Level 6 Inhibit Level 7 Background IR Current 8 Background UV Current 9 Configure 4-20mA Loop
	1 Operations 2 Diagnostics 3 Event History 4 Settings 5 Account 6 Field Engineer Data	1 Detector Status 2 Inhibit 3 Sensitivity 4 4-20 mA Loop 5 State Latch 6 LED 7 Relays	1 LED Mode for Normal 2 LED Mode for Alarm 3 LED Intensity 4 Configure LED
	1 Operations 2 Diagnostics 3 Event History 4 Settings 5 Account 6 Field Engineer Data	1 Detector Status 2 Inhibit 3 Sensitivity 4 4-20 mA Loop 5 State Latch 6 LED 7 Relays	1 Fault (R1) 2 Alarm (R2) 3 Verified Alarm (R3) 4 Verified Alarm (R3) I/P Sel 5 Change Relay Settings
	1 Operations 2 Diagnostics 3 Event History 4 Settings 5 Account 6 Field Engineer Data	1 Change Password 2 Set Time (24-hour) 3 Set Date 4 Set Date Format	???? ???? ???? ????

	1 Operations 2 Diagnostics 3 Event History 4 Settings 5 Account 6 Field Engineer Data	1 Field Temperature 2 Analog 24V Rail 3 Long Band PBSE DCA Value 4 Long Band PBSE DCB Value 5 Long Band PBSE AC Value 6 Wide Band PBSE DCA Value 7 Wide Band PBSE DCB Value 8 Wide Band PBSE AC Value 9 Near IR Band DC Value 10 Near IR Band AC Value 11 Visible Band DC Value 12 Visible Band AC Value 13 5V Rail 14 3V3 Rail 15 AINCOM 16 UV Sensor Reading 17 Channel Status	

Menu Navigation

Menu options can be selected by highlighting the option and pressing Enter, by pressing the number of the option, or by double clicking on the option. For more information on how to select menu options please see the instructions for the HART® host device being used.

Error Reporting

FS24X Plus™ implements HART® protocol Command 48, meaning that if any event is detected in the detector while a HART® host is connected, it will be reported immediately. Therefore, warning messages may pop up during other operations.

Connection

It is best to use a dedicated HART® interface point to connect a HART® master (primary or secondary).

If such an interface is not available, it is possible to connect to HART® signal across a load resistor in the current loop, point-to-point mode.

For example, provided there is the minimum resistance of 250Ω in the 4-20 mA loop, the HART® handheld device can be connected across the terminals in the junction box.



If using multi-drop mode, the mA output cannot be used to provide a functional safety rated output signal.

HART®

Note: The mA output shall have an external loop resistance between 250Ω and 600Ω with HART®.

Device Identification

Manufacturer Name:	Honeywell®	Model Name(s):	FS24X Plus™
Manufacture ID Code:	210 (D2 Hex)	Device Type Code:	132 (84 Hex)
HART® Protocol Revision:	7.0	Device Revision:	1
Physical Layers Supported:	FSK		
Physical Device Category:	Transmitter, Detector		

The FS24X Plus™ will normally be mounted at height, typically secured to a wall with the with bracket supplied Installation Kit (optional). The supplied Standard Adjustable Mounting Bracket allows mounting on a plate, pole or other plant infrastructure. All bolts are captive to avoid accidental loss during installation. The name plate is located opposite the field terminals and indicates the model name and revision.

Universal Commands

Command #3 returns PV, units, and Loop Current. The first (PV) and the last (Loop Current) variables are same.

Command #14 contains serial number of the device (3 bytes), followed by measurement units (1 byte) and 3 floating point variables for max, min, and span loop current in mA.

Device-Specific Commands

The following device-specific commands are implemented:

Command	Description
128	Read Fire Alarm Status
130	Read Device Status
135	Read Inhibit Status
136	Simulate 4-20 mA
137	Read Internal Commination Fault Status
138	Read Voltage Fault Status
139	Read Test Lamp Detection Status
140	Read Temperature
141	Read Voltage
142	Read All Sensor Readings
144	Read Model
153	Read Device Alarm State
154	Set Detector Sensitivity
155	Read Detector Sensitivity
158	Set Relay Default State
159	Read Relay Default State
161	Reset Latch's
162	Set Password
164	Read Event History
165	Force Relay State
166	Force 4-20mA - Specific Loop Current
167	Force HALO State
168	Write mA Configuration
169	Configure Alarm, Warning State - Latch / Unlatch
172	Configure HALO Mode for Normal
173	Read HALO Mode for Normal
174	Set Date Format
175	Set RTC (Time and Date)
176	Read RTC (Time and Date)
177	Configure HALO Mode for Alarm
178	Read HALO Mode for Alarm
179	Read Alarm, Warning State - Latch / Unlatch
180	Start / End Inhibit
181	Read Inhibit Timeout
182	Configure Inhibit Timeout
183	Read mA Configuration
187	Read Force Timeout
188	Configure Force Timeout
190	Write Login

191	Read Date Format
192	Read Relay 3 (Aux) Input Selection
193	Set Relay 3 (Aux) Input Selection
195	Set Alarm Verification Time
196	Write LED Intensity
197	Read LED Intensity
198	Read Serial Number

Additional Device Status (Command #48)

Command #48 returns nine bytes of data, with status information available in bytes #6 and #8, as indicated in the following table:

Byte	Bit	Meaning	Condition
0	0 to 7	Not used	
1	0 to 7	Not used	
2	0 to 7	Not used	
3	0 to 7	Not used	
4	0 to 7	Not used	
5	0 to 7	Not used	
6	0		Lid off or dirty, temperature or voltage out of range, or internal failure
	1	Not used	Flame detected
	2	Not used	
	3	Not used	
	4	Not used	
	5	Not used	
	6	Not used	
	7	Not used	
7	0 to 7	Not used	
8	0	Not used	
	1	Not used	
	2	Not used	
	3	Not used	
	4	Power Supply Conditions Out of Range	Voltage Fault
	5	Not used	
	6	Not used	
	7	Not used	

Not used bits are always set to 0. In each case, bit #0 is the low-order bit.

Command #128: Read Fire Alarm Status

Reads the Fault Number.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Integer	0 - If device is not in Alarm 1 - If device is in Alarm

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #130: Read Device Status

Reads Current Operating State.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Integer	Operating state

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #135: Read Inhibit Status

Read Inhibit is On/Off.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	0 - If device is not in Inhibit 1 - If device is in Inhibit

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #136: Simulate 4-20 mA

Forces Loop to State Selected.

Request Data Bytes

Byte	Format	Description
0	Enum	Fault/Alarm,1,2/Warning/Inhibit/Normal

Response Data Bytes

Byte	Format	Description
0	Enum	Fault/Alarm,1,2/Warning/Inhibit/Normal

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #137: Read Internal Commination Fault Status

Reads Internal Commination Fault Status.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	0 - If device has no internal commination fault
		1 - If device has internal commination fault

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #138: Read Voltage Fault Status

Reads Voltage Fault Status.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	0 - If device has no voltage fault 1 - If device has voltage fault

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #139: Read Test Lamp Detection Status

Reads Test Lamp Detection Status.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	0 - If test lamp is not detected 1 - If test lamp is detected

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #140: Read Temperature

Reads Temperature.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Float	Temperature

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-7		Undefined
8	Error	Access Restricted
9-15		Undefined
16	Error	Access Restricted
17-127		Undefined

Command #141: Read Voltage

Reads Voltage.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Float	Voltage

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-7		Undefined
8	Error	Access Restricted
9-15		Undefined
16	Error	Access Restricted
17-127		Undefined

Command #142: Read All Sensor Readings

Reads All Sensor Readings.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-59	Integer	Optical Sensor Data [0] - [15] Optical Sensor Data Representation: 0-3 Long Band PBSE DCA VALUE 4-7 Long Band PBSE DCB VALUE 8-11 Long Band PBSE AC VALUE 12-15 Wide Band PBSE DCA VALUE 16-19 Wide Band PBSE DCB VALUE 20-23 Wide Band PBSE AC VALUE 24-27 NEAR IR Band DC VALUE 28-31 NEAR IR Band AC VALUE 32-35 Visible Band DC VALUE 36-39 Visible Band AC VALUE 40-43 5V Monitoring 44-47 3V3_Safe Monitoring 48-51 AINCOM Monitoring 52-55 UV Count 56-59 u32_channel_status

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-7		Undefined
8	Error	Access Restricted
9-15		Undefined
16	Error	Access Restricted
17-127		Undefined

Command #144: Read Model

Reads the short tag.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-5	Packed ASCII	Default {25,60,180,97,8,32}Packed ASCII "FS24X Plus™"

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-7		Undefined
8	Error	Access Restricted
9-15		Undefined
16	Error	Access Restricted
17-127		Undefined

Command #153: Read Device Alarm State

Reads the Device Alarm State.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	[0] - Device Alarm Status 0 - Alarm2 1 - Alarm1 4 - None

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #154: Set Detector Sensitivity

Set Detector Sensitivity

Request Data Bytes

Byte	Format	Description
0	Enum	Detector Sensitivity Level

Response Data Bytes

Byte	Format	Description
0	Enum	Detector Sensitivity Level

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #155: Read Detector Sensitivity

Reads Detector Sensitivity

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Detector Sensitivity Level

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #158: Set Relay Default State

Set Relay Default State.

Request Data Bytes

Byte	Format	Description
0	Enum	Relay Enum Index
1	Enum	State

Response Data Bytes

Byte	Format	Description
0	Enum	Relay Enum Index
1	Enum	State

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #159: Read Relay Default State

Set Relay Default State.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Relay1 default state
1	Enum	Relay2 default state
2	Enum	Relay3 latch state

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #161: Reset Latch

Resets Latch.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
None		

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #162: Set Password

Set Password.

Request Data Bytes

Byte	Format	Description
0	Enum	Login level
1-8	PASSWORD	Password

Response Data Bytes

Byte	Format	Description
0	Enum	Login level
1-8	PASSWORD	Password

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #164: Read Event History

Reads Event History Logs.

Request Data Bytes

Byte	Format	Description
0	Integer	Warning or Fault type
1	Integer	Event direction
2	Integer	Login level

Response Data Bytes

Byte	Format	Description
0	Integer	Warning or Fault Type
1	Integer	Event direction
2	Integer	Login level
3-7	Integer	Event Index
8-11	ASCII	Time
12-15	Integer	Event Arg 1
16-19	Integer	Event Arg 2

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #165: Force Relay State

Force Relay State.

Request Data Bytes

Byte	Format	Description
0	Integer	Relay selection
1	Enum	Relay state

Response Data Bytes

Byte	Format	Description
0	Integer	Relay selection
1	Enum	Relay state

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #166: Force 4-20 mA - Specific Loop Current

Force 4-20mA - Specific Loop Current

Request Data Bytes

Byte	Format	Description
0-3	Float	mA Current

Response Data Bytes

Byte	Format	Description
0-3	Float	mA Current

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #167: Force HALO State

Force HALO State.

Request Data Bytes

Byte	Format	Description
0	Integer	LED State

Response Data Bytes

Byte	Format	Description
0	Integer	LED State

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #168: Write mA Configuration

Write mA Configuration.

Request Data Bytes

Byte	Format	Description
0	Enum	State
1-4	Float	Current (mA) Level

Response Data Bytes

Byte	Format	Description
0	Enum	State
1-4	Float	Current (mA) Level

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #169: Configure Alarm, Warning State - Latch/Unlatch

Write mA Configuration.

Request Data Bytes

Byte	Format	Description
0	Enum	State
1	Enum	Latch Enable or Disable

Response Data Bytes

Byte	Format	Description
0	Enum	0 - Warning 1 - Alarm1 2 - Alarm2
1	Enum	Latch Enable or Disable

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #173: Read HALO Mode for Normal

Read HALO Mode for Normal.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Integer	LED Mode

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #174: Set Date Format

Set Date Format.

Request Data Bytes

Byte	Format	Description
0	Enum	Format

Response Data Bytes

Byte	Format	Description
0	Enum	Format

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #175: Set RTC (Time and Date)

Write Time and Date.

Request Data Bytes

Byte	Format	Description
0	Integer	Time or Date selection for change
1-10	ASCII	Time
11-18	ASCII	Date

Response Data Bytes

Byte	Format	Description
0	Integer	Time or Date selection for change
1-10	ASCII	Time
11-18	ASCII	Date

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #176: Read RTC (Time and Date)

Read Time and Date.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-9	ASCII	Time
10-17	ASCII	Date

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #177: Configure HALO Mode for Alarm

Configures HALO Mode for Alarm.

Request Data Bytes

Byte	Format	Description
0	Integer	LED Mode

Response Data Bytes

Byte	Format	Description
0	Integer	LED Mode

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #178: Read HALO Mode for Alarm

Reads HALO Mode for Alarm.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Integer	LED Mode

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #179: Read Alarm, Warning State - Latch/Unlatch

Reads Alarm, Warning State - Latch/Unlatch.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Alarm1
1	Enum	Alarm2
2	Enum	Fault
3	Enum	Warning

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #180: Start/End Inhibit

Start/End Inhibit.

Request Data Bytes

Byte	Format	Description
0	Enum	Inhibit Start/End

Response Data Bytes

Byte	Format	Description
0	Enum	Inhibit Start/End

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #181: Read Inhibit Timeout

Read Inhibit Timeout.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-1	Integer	Inhibit Timeout

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #182: Configure Inhibit Timeout

Configures Inhibit Timeout Period.

Request Data Bytes

Byte	Format	Description
0-1	Integer	Inhibit Timeout

Response Data Bytes

Byte	Format	Description
0-1	Integer	Inhibit Timeout

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #183: Read mA Configuration

Reads mA Configuration.

Request Data Bytes

Byte	Format	Description
0-1	Integer	Inhibit Timeout

Response Data Bytes

Byte	Format	Description
0-3	Float	Fault Current
4-7	Float	Warning Current
8-11	Float	Alarm1 Current
12-15	Float	Alarm2 Current
16-19	Float	Inhibit Current
20-23	Float	Background IR Current
24-27	Float	Background IR Current
28-31	Float	Normal Current

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #187: Read Force Timeout

Reads Force Timeout Period.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-1	Integer	Force Timeout

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #188: Configure Force Timeout

Configure Force Timeout Period.

Request Data Bytes

Byte	Format	Description
0-1	Integer	Force Timeout

Response Data Bytes

Byte	Format	Description
0-1	Integer	Force Timeout

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #189: Read Relay State

Reads Relay State.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Relay1 State
1	Enum	Relay2 State
2	Enum	Relay3 State

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #190: Write Login

Checks Login Level Password.

Request Data Bytes

Byte	Format	Description
0	Enum	Login Level
1-8	PASSWORD	Password

Response Data Bytes

Byte	Format	Description
0	Enum	Login Level
1-8	PASSWORD	Password
9	Enum	Status

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Invalid Password
17-31		Undefined
32	Error	Busy
33-127		Invalid Login Level

Command #191: Read Date Format

Reads Date Format.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Date Format

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #192: Read Relay3 (Aux) Input Selection

Reads Relay3 (Aux) Input Selection.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Relay3 (Aux) Input Selection

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #193: Set Relay3 (Aux) Input Selection

Set Relay3 (Aux) Input Selection.

Request Data Bytes

Byte	Format	Description
0	Enum	Relay3 (Aux) Input Selection

Response Data Bytes

Byte	Format	Description
0	Enum	Relay3 (Aux) Input Selection

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #195: Set Alarm Verification Time

Set Alarm Verification Time.

Request Data Bytes

Byte	Format	Description
0	Enum	Alarm Verification Time

Response Data Bytes

Byte	Format	Description
0	Enum	Alarm Verification Time

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #196: Write LED Intensity

Writes LED Intensity.

Request Data Bytes

Byte	Format	Description
0	Integer	LED Intensity

Response Data Bytes

Byte	Format	Description
0	Integer	LED Intensity

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #197: Read LED Intensity

Reads LED Intensity.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Integer	LED Intensity

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Command #198: Read Serial Number

Reads Serial Number.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	ASCII	Serial Number

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Parameter Too Large
4	Error	Parameter Too Small
5	Error	Too few data bytes received
6	Error	Transmitter Specific Command Error
7	Error	Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

Common-Practice Commands

Supported Commands

The Following common-practice commands are implemented:

Command	Description
38	Reset " Configuration Changed" Flag
48	Read Additional Device Status

The Command #48 returns 2 bytes of data.

Supported Commands

This Field Device does not support Burst Mode, Catch Device Variable or any device-specific.

Tables

Engineering Unit Type Codes / PV Unit Codes

Code	Description	Note
39	Milliamperes	Electrostatic Unit of Current

Loop Current Operating Modes

Mode	Description	Loop Current in mA (Point to Point)	Loop Current in mA (Multi-drop)
0	Healthy	4 mA	4 mA
1	Optical Fault	1 mA	4 mA
2	Non-Optical Fault	1 mA	4 mA
3	Alarm	20 mA	4 mA

Operating Mode

Power On	0
Non-Recovery Fault	1
Inhibit	2
Alarm	3
Fault	4
Warning	5
Normal	6
Alarm	16
Verified Alarm	17

Login Level

0	Default
1	Level 1
2	Level 2

Performance

Power-Up

During power-up initialization, the device will not respond to HART® commands, and the analog output is set at 4.0 mA.

Command Response Times

Approximate command response times are listed in the following table:

Minimum	20ms
Typical	50ms
Maximum	100ms

Busy and Delayed-Response

The transmitter may respond with "busy" status if a further command is received while self-test is underway.

Delayed-response is not used.

Long Messages

The largest data field used is in the response to Command 21: 34 bytes including the two status bytes.

Non-Volatile Memory

EEPROM is used to hold the device's configuration parameters. New data is written to this memory immediately on execution of a write command.

Modes

Fixed current mode is implemented, using Loop current mode (Enable – Point to Point / Disable–Multi-drop). This mode is not cleared by power loss or reset.

Write-protection and User controllable Damping are not supported.

Appendix 6: Overview of the FS24X Plus™ Modbus Interface

The FS24X Plus™ Flame detector communicates status using a variety of channels including the HALO light ring flash pattern, a 4-20 mA current loop with HART®, three relays, RS-485 and USB. The current loop is designed for use in systems designed for safety integrity level (SIL) 2 as defined by EN 61508.

The relay outputs are designed for use in SIL 1 systems. The digital interfaces (RS-485 and USB) do not have any SIL rating but are still useful because of the data they provide.

The USB interface is not accessible when the enclosure is closed and is used for initial set-up or post event diagnostics or maintenance.

The RS-485 interface can communicate in two modes: either Honeywell® proprietary FP2 or standard Modbus. The configuration of the detector can be manipulated over USB or RS-485/FP2 but not standard Modbus. This section describes RS-485/Modbus.

Communications Capabilities.

The RS-485 port can be configured for speeds of 9600, 19200, 38400, 76800, or 115200 baud with a default of 9600 baud. Each byte can have even, odd, or no parity with a default of even parity. Additionally, each byte can have one or two stop bits with a default of one stop bit. These parameters are set on the Configure/Fieldbusses tab of Honeywell® *FlameManager*. After the settings are changed, the detector must be rebooted before they take effect. The Modbus interface is implemented entirely as holding registers as listed in Table 1. Writing is not permitted.

Table 1. Modbus Holding Registers

First MB Reg	Last MB Reg	Datatype	Description
40003	40004	float32	Alarm Level (0,1, or 2)
40005	40005	uint16	The most important active fault
40007	40007	uint8	Monitoring State (See Table 2)
40008	40008	int16	Heartbeat counter
40015	40015	int16	Temperature 1 (°C *10)
40016	40016	int16	Temperature 2 (°C *10)
40017	40017	int16	Temperature 3 (°C *10)
40037	40038	float32	Output Current (mA)
40039	40039	int16	External 24 VDC supply (mV)
40040	40040	int16	Internal 3.3 VDC supply 1 (mV)
40042	40042	int16	Internal 3.3 VDC supply 2 (mV)
40043	40043	int16	Internal 30 VDC supply (mV)
40044	40044	int16	Internal 320 VDC supply (Volts)

40045	40045	int16	Internal 5.0 VDC supply (mV)
40075	40081	char [14]	Detector serial number (string)
40084	40084	int16	Hardware revision number
40085	40085	int16	Software revision number
40103	40104	float32	Sensitivity configuration (0.3)
40105	40105	float32	Alarm Verification Time (seconds)
40123	40123	word16	Relay configuration (see Table 3)

Table 2. Modbus holding register 40007 will have the following values:

Value	Meaning
1	Normal monitoring
3	Inhibited
7	In warning MFlt
8	In Instrument Flt
Other	For future expansion

Table 3. Modbus holding register 40123 contains the logical OR of following bits:

Bit Number	Bit Value	Condition
0	0x0001	reserved for future use
1	0x0002	reserved for future use
2	0x0004	reserved for future use
3	0x0008	reserved for future use
4	0x0010	Relay 2 is normally energized
5	0x0020	Relay 3 is normally energized
6	0x0040	reserved for future use
7	0x0080	reserved for future use
8	0x0100	reserved for future use
9	0x0200	reserved for future use
10	0x0400	Always on
11	0x0800	Relay 3 is warning instead of alarm2
12	0x1000	reserved for future use
13	0x2000	reserved for future use
14	0x4000	reserved for future use
15	0x8000	reserved for future use

Appendix 7: Fault Conditions

When a Fault (Trouble) condition occurs, the HALO flashes in Yellow LED.

The Detector has the following outputs with a Fault condition:

- Fault Relay activation
- 4-20 mA (Sink, source or isolated) output

<=1 mA (Dirty Window Fault/Sensor Fault)

<=1 mA (All Other Faults)

- RS-485 FP2 Fault Notification³
- RS-485 Modbus Fault Notification³
- HART®

³ Only One Active Fault output from this group

Fault conditions can be caused by:

- Under Voltage Input Power (< 18 VDC).
- Over Voltage Input Power (> 32 VDC).
- Over Temperature (> 75° C or 167° F).
- Under Temperature (< -55° C or -67° F).
- One or more Microprocessor Failures.
- One or more Relay Coil Failures.
- Communication Fault.
- Electronic Self-Test Failure.
- Dirty Window Lens
- Sensor failures.

Hazardous Area

US / Canada – FM Certified:

Class I, Division 1 and Division 2, Groups ABCD, T5

Class II/III, Division 1 and Division 2, Groups EFG, T135°C

Class I, Zone 1 AEx db IIC T5 Gb

Class II, Zone 1 AEx tb IIIC, T135°C Db

Enclosure rating:

Type 4X, IP66/67

International / Europe / UK / Brazil:

⊕ II 2 G Ex db IIC, T5 Gb

⊕ II 2 D Ex tb IIIC, T 135°C Db

IP66/67

Ta = -55°C to +85°C

ATEX - FM14ATEX0058X

IECEX - FMG14.0027X

UK - FM21UKEX0035X

Brazil - DNV18.0088X

Others:

INMETRO (Brazil)

Marine certificates (Pending):

ABS, Lloyds, BV, DNV

Environmental

EMC, WEEE, and RoHS Compliant

Functional Safety

IEC61508 SIL 2 Certified by TÜV SÜD (Pending)

Performance

cFM (Pending)

FM 3260

EN54-10: Class 1 (medium, high, and very high sensitivities). Class 2 (low sensitivity).

- CPR (EN 54-10:2002)
- EU 2831-CPR-F4713
- UKCA 0832-UKCA-CPR-F1388

BRE Approval (EN 54-10:2002). Approval Number: 1175a/03

设计模板 - 中国 RoHS 2 限制材料表

产品：含铅焊料和含铅探测器的pcb产品

提交者：沙巴鲁丁·易卜拉欣

提交日期：2021年8月24日

设计授权地址：林肯郡

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr/Vl)	多溴二苯 (PBB)	多溴二苯醚 (PBDE)
PCB 组件	X	0	0	0	0	0
光红外探测器	X	0	0	0	0	0

此表中未列出的所有部件和组件都含有低于 **GB/T 26572** 限制要求的危险物质

此表是按照 **SJ/T 11364** 的规定编制的

0：表明该部分所有同质材料中所含的有害物质均低于 **GB/T 26572** 的限制要求

X：表明该部分使用的至少一种同质材料中所含的危险物质高于 **GB/T 26572** 的限制要求

WEEE Directive Disposal



EU Directive 2012/19/EU: Waste Electrical and Electronic Equipment (WEEE)

This symbol indicates that the product must not be disposed of as general industrial or domestic waste. This product should be disposed of through suitable WEEE disposal facilities. For more information about disposal of this product, contact your local authority, distributor or the manufacturer.



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Este símbolo indica que el producto no puede ser desechado como residuo doméstico o industrial genérico. Este producto debe ser desechado en instalaciones de reciclado RAEE adecuadas. Para más información acerca del desecho de este producto, contacte con su autoridad local, el distribuidor o el fabricante.



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Dit symbool geeft aan dat het product niet als algemeen industrieel of huishoudelijk afval mag worden weggegooid. Het product dient te worden afgevoerd via geschikte afvalverwijderingsinstallaties voor AEEA.

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about this product are available at

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Honeywell

1701M5001

Revision C

Publication Date:
February 10, 2022

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