USER MANUAL

FS24X™ HART MODULE

FS24X QuadBand Triple IR™ HART MODULE

Honeywell

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Read and understand this manual before installing or operating equipment

FSX™ Fire and FlameDetectors

Hart Module (FSX-A014R)

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Scope

The Fire Sentry FS24X Flame Detector with HART® complies with HART® Protocol Revision 7.0. This document specifies device features and HART® protocol implementation details. The functionality of this Field Device is described sufficiently to allow its proper application in a process and its complete support in HART-capable Host Applications.

1.2 Purpose

This specification is designed to complement other documentation (e.g., the FS24X *Installation Guide and Operating Manual*) by providing a complete, unambiguous description of this Field Device from a HART communication perspective.

1.3 Who should use this document?

The specification is designed to be a technical reference for HART®-capable host application developers, system integrators and knowledgeable end-users. It also provides functional specifications used during Field Device development, maintenance, and testing. This document assumes the reader is familiar with HART® Protocol requirements and terminology.

1.4 Abbreviations and definitions

IR	Infrared
PV	Primary Variable
EEPROM	Electrically-Erasable Read-Only Memory
ROM	Read-Only Memory

1.5 References

- *HART Smart Communications Protocol Specification*. HCF_SPEC-12. Available from the HCF.
- *FS24X Installation Guide and Operating Manual*, Document 6178-001. Available from Honeywell Analytics .

2. DEVICE IDENTIFICATION

Manufacturer Name:	Honeywell Analytics	**Model Name(s):**	FS24X
Manufacture ID Code:	210 (D2 Hex)	**Device Type Code:**	130 (82 Hex)
HART Protocol Revision	7.0	**Device Revision:**	1
Number of Device Variables	None		
Physical Layers Supported	FSK		
Physical Device Category	Sensor and Transmitter		

The FS24X HART® module is identified by a serial number that begins with "24X-". This serial number will be visible on the module circuit card, along with a bar code containing the same information.

The FS24X is designed to detect fire in a hazardous area. This device should be mounted so as to avoid areas that contain non-fire radiant energy sources (such as radiant heaters, high intensity lamps, etc.) in close proximity to the detector's field of view. FS24X detectors should be mounted so that they look downward with minimum twenty degree (20°) angle. Avoid mounting the detectors in areas where temperatures are outside the specified operating temperature range (-40°C to +85°C). Refer to the FS24X manual (SECTION 2: INSTALLATION) for mounting instructions.

3. PRODUCT OVERVIEW

The FS24X is a Multi-Spectrum Flame Detector. A HART® communication module is required for HART® communication.

4. PRODUCT INTERFACES

4.1 Process Interface

4.1.1 Sensor Input Channels

Fire Sentry multi-spectrum and multi-spectral infrared Flame Detectors are sophisticated, state of the art, electro-optical digital radiant energy transducers that sense Wideband Infraredradiant energy emitted by fire's combustion processes that include molecular emissions and hot particulate blackbody emissions. Additionally, the FS24X Detectors sense the specific WideBand 4.3 IR "Triple IR" region from approximately 3 to 5 microns.

FS24X Detectors also utilize additional spectral regions, the Visible Band and Near Band Infrared wavelengths, to aid in discrimination against non-fire false alarm sources.

4.2 Host interface

4.2.1 Analog Output 1: Loop Current

Loop current is the only output from this transmitter, representing the presence of flame in the range of the instrument, as well as fault status. This output corresponds to the Primary Variable. Refer to the section 4.3.3 for connection details.

4.3 Local Interfaces, Jumpers and Switches

4.3.1 Local Controls and Displays

This device has no external local controls.

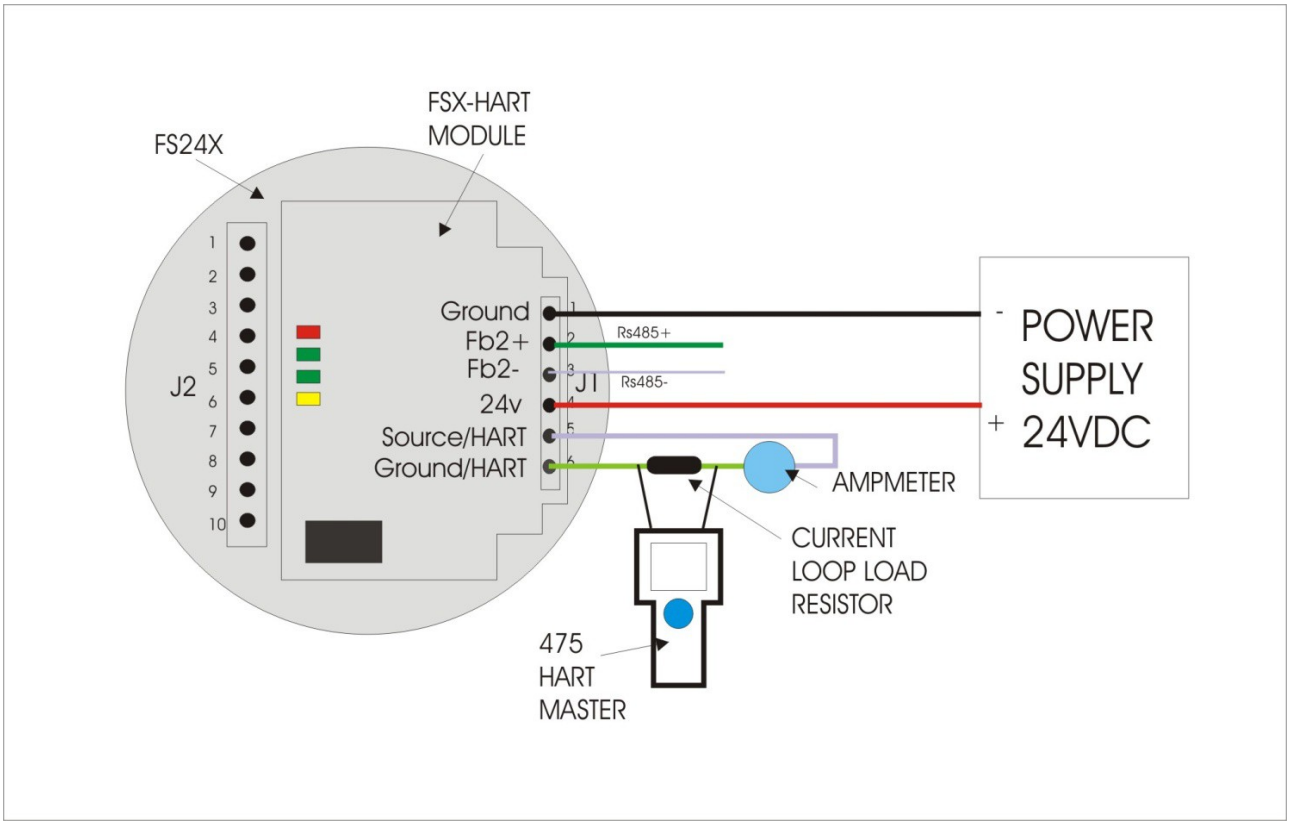
The indication of a detected malfunction is shown by reducing the loop current output to 1 mA. The FS24X Flame Detector uses three (3) separate, bright LED's to indicate the Detector's status. The Blue or Green LED blinks (flashes) once every ten (10) seconds to indicate a Normal, safe operational condition (i.e. no Faults and no Alarms). The Blue or Green LED is OFF when no external 24 VDC input power is applied to the Detector. TheRed LED turns ON when a fire is detected. The Yellow LED blinks (flashes) when the window lens is dirty. The dirty-lens condition also results in a loop current of 2 ma. For all other Fault conditions, the Yellow LED will turn ON.

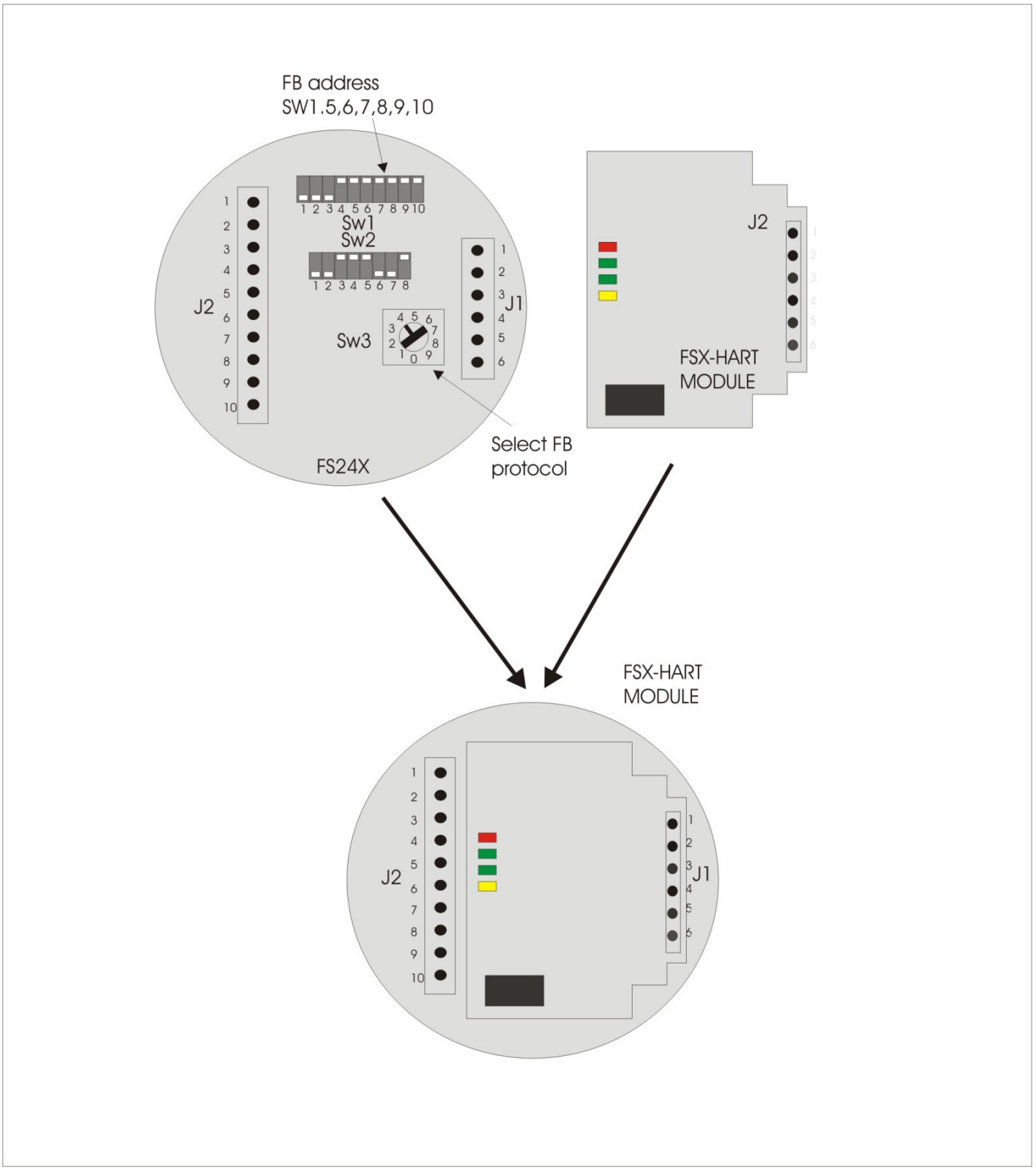
4.3.2 Internal Jumpers And Switches

There are no jumpers or switches on the HART® module. Refer to the FS24X Installation Manual for information relating to switch selections on the detector. ***Write Protection*** Not Supported.

4.3.3 Connection Summary

The diagrams below provide connection detail. The first shows how the FS24X Flame Detector plus the HART module connect to the outside world. The second diagram shows how the detector and the module mate together.





CAUTION

RISK OF PRODUCT DAMAGE

- Follow static protection procedures while handling the connectors and the wiring of the Module puck to the detector.
- Use a wrist strap connected to earth ground.

5. DEVICE VARIABLES

This Field Device does not expose any Device Variables.

6. DYNAMIC VARIABLES

Only one Dynamic Variable is implemented.

	Meaning	Units
PV	Loop Current	mA

7. STATUS INFORMATION

7.1 Device Status

Bit 7 ("Device Malfunction") is set whenever device reports any fault. Refer user manual for description of fault conditions.

Bit 5 ("Cold start") is set whenever device resets or first powers up.

Bit 4 ("More Status Available") is set whenever any failure is detected or change in operating mode. Command #48 gives further detail. (See section 7.3.)

Bit 3 ("Analog channel fixed") is set whenever the device into forced current or inhibit or multi-drop.

7.2 Extended Device Status

The Field Device cannot predict, in advance, when the maintenance will be required. "Device Variable Alert" is set when the PV is not indicating normal conditions, i.e. when an instrument detects the presence of a flame.

7.3 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	Detector Fault	Lid off or dirty, temperature or voltage out of range, or internal failure
	1	Detector Alarm	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.

8. 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.

9. COMMON-PRACTICE COMMANDS

9.1 Supported Commands

The following common-practice commands are implemented:

38 Reset "Configuration Changed" Flag

48 Read Additional Device Status

Command #48 returns 2 bytes of data.

9.2 Burst Mode

This Field Device does not support Burst Mode.

9.3 Catch Device Variable

This Field Device does not support Catch Device Variable.

10. DEVICE-SPECIFIC COMMANDS

The Field Device does not support any device-specific commands.

11. TABLES

11.1 Engineering Unit Type Codes

Code	Description	Note
39	milliamperes	Electrostatic Unit of Current

11.2 Loop Current Operating Modes

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

12. PERFORMANCE

12.1 Sampling Rates

Typical sampling rates are shown in the following table.

Primary detector sensor sample	60 per second
PV digital value calculation	1 per second
Analog output update	1 per second

12.2 Power-Up

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

12.3 Self-Test

The FS24X executes a self-test sequence every three seconds. 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 particular function, tests are repeated a number of 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 housing grill, a fault in not declared until a total of 180 consecutive test attempts have failed. This takes a total of nine minutes to complete.

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

Following power-up or reset, the analog output is set to 4.0mA and the device will not respond to HART® commands. During self-test, the analog output is held at its last value, and the device may respond normally to HART® commands. Continuous self-testing is part of the normal device operation.

12.4 Command Response Times

Approximate command response times are listed in the following table:

Minimum	20ms
Typical	50ms
Maximum	100ms

12.5 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.

12.6 Long Messages

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

12.7 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.

12.8 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.

12.9 Write Protection

Write-protection is not supported.

12.10 Damping

User controllable Damping is not supported.

ANNEX A. CAPABILITY CHECKLIST

Manufacturer, model and revision	Honeywell Analytics, FS24X , rev. 1
Device type	Detector and Transmitter
HART revision	7.0
Device Description available	No
Number and type of sensors	1 (one external)
Number and type of actuators	0
Number and type of host side signals	1: 4 - 20mA analog
Number of Device Variables	0
Number of Dynamic Variables	1
Mappable Dynamic Variables?	No
Number of common-practice commands	0
Number of device-specific commands	0
Bits of additional device status	8
Alternative operating modes?	No
Burst mode?	No
Write-protection?	No

ANNEX B. DEFAULT CONFIGURATION

Parameter	Default value
Lower Range Value	1
Upper Range Value	20
PV Units	mA
Sensor type	Analytical
Number of wires	3
Damping time constant	-
Fault-indication jumper	Not Supported
Write-protect jumper	Not Supported
Number of response preambles	5

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