

Spectrex™ SharpEye™ 40/40C and 40/40D Flame Detectors



Legal notice

The device described in this document is the property of Emerson.

No part of the hardware, software, or documentation may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form or by any means, without prior written permission from Emerson.

While great efforts have been made to ensure the accuracy and clarity of this document, Emerson assumes no liability resulting from any omissions in this document or from misuse of the information obtained herein. The information in this document has been carefully checked and is believed to be entirely reliable with all of the necessary information included. Emerson reserves the right to make changes to any products described herein to improve reliability, function, or design and reserves the right to revise this document and make changes from time to time in content hereof with no obligation to notify any persons of revisions or changes. Emerson does not assume any liability arising out of the application or any use of any product or circuit described herein; neither does it convey license under its patent rights or the rights of others.

⚠ WARNING

All individuals who have or will have responsibility for using, maintaining, or servicing this product must read this manual carefully.

⚠ WARNING

Physical access

Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and needs to be protected against.

Physical security is an important part of any security program and fundamental to protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

⚠ CAUTION

Equipment damage

This device is not field repairable due to the meticulous alignment and calibration of the sensors and the respective circuits. Modifying or repairing the internal circuits may impair the system's performance and void the Emerson product warranty.

Do not attempt to modify or repair the internal circuits or change their settings.

Warranty

1. **Limited Warranty** . Subject to the limitations contained in Section 2 (Limitation of Remedy and Liability) herein, Seller warrants that (a) the licensed firmware embodied in the Goods will execute the programming instructions provided by Seller; (b) that the Goods manufactured by Seller will be free from defects in materials or workmanship under normal use and care; and (c) Services will be performed by trained personnel using proper equipment and instrumentation for the particular Service provided. The foregoing warranties will apply until the expiration of the applicable warranty period. Sensors and detectors are warranted against defective parts and workmanship for 36 months for Spectrex 40/40C models and 60 months for Spectrex 40/40D models from the date of purchase. Products purchased by Seller from a third party for resale to Buyer (Resale Products) shall carry only the warranty extended by the original manufacturer. Buyer agrees that Seller has no liability for Resale Products beyond making a reasonable commercial effort to arrange for procurement and shipping of the Resale Products. If Buyer discovers any warranty defects and notifies Seller thereof in writing during the applicable warranty period, Seller shall, at its option, (i) correct any errors that are found by Seller in the firmware or Services; (ii) repair or replace FOB point of manufacture that portion of the Goods found by Seller to be defective; or (iii) refund the purchase price of the defective portion of the Goods/Services. All replacements or repairs necessitated by inadequate maintenance; normal wear and usage; unsuitable power sources or environmental conditions; accident; misuse; improper installation; modification; repair; use of unauthorized replacement parts; storage or handling; or any other cause not the fault of Seller, are not covered by this limited warranty and shall be replaced or repaired at Buyer's sole expense, and Seller shall not be obligated to pay any costs or charges incurred by Buyer or any other party except as may be agreed upon in advance by Seller. All costs of dismantling, reinstallation, freight, and the time and expenses of Seller's personnel and representatives for site travel and diagnosis under this limited warranty clause shall be borne by Buyer unless accepted in writing by Seller. Goods repaired and parts replaced by Seller during the warranty period shall be in warranty for the remainder of the original warranty period or 90 days, whichever is longer. This limited warranty is the only warranty made by Seller and can be amended only in a writing signed by an authorized representative of Seller. The limited warranty herein ceases to be effective if Buyer fails to operate and use the Goods sold hereunder in a safe and

reasonable manner and in accordance with any written instructions from the manufacturers. THE WARRANTIES AND REMEDIES SET FORTH ABOVE ARE EXCLUSIVE. THERE ARE NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESSED OR IMPLIED, AS TO MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE OR ANY OTHER MATTER WITH RESPECT TO ANY OF THE GOODS OR SERVICES.

2. Limitation of Remedy and Liability SELLER SHALL NOT BE LIABLE FOR DAMAGES CAUSED BY DELAY IN PERFORMANCE. THE REMEDIES OF BUYER SET FORTH IN THE AGREEMENT ARE EXCLUSIVE. IN NO EVENT, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION (WHETHER BASED IN CONTRACT INFRINGEMENT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT, OR OTHERWISE), SHALL SELLER'S LIABILITY TO BUYER AND/OR BUYER'S CUSTOMERS EXCEED THE PRICE TO BUYER OF THE SPECIFIC GOODS MANUFACTURED OR SERVICES PROVIDED BY SELLER GIVING RISE TO THE CLAIM OR CAUSE OF ACTION. BUYER AGREES THAT IN NO EVENT SHALL SELLER'S LIABILITY TO BUYER AND/OR BUYER'S CUSTOMERS EXTEND TO INCLUDE INCIDENTAL, CONSEQUENTIAL, OR PUNITIVE DAMAGES. THE TERM "CONSEQUENTIAL DAMAGES" SHALL INCLUDE, BUT NOT BE LIMITED TO, LOSS OF ANTICIPATED PROFITS, REVENUE OR USE AND COSTS INCURRED INCLUDING WITHOUT LIMITATION FOR CAPITAL, FUEL AND POWER, AND CLAIMS OF BUYER'S CUSTOMERS.

Technical support

To get technical support for this product, contact your local Rosemount representative or the Rosemount Technical Support department at +1 866 347 3427 or safety.csc@emerson.com

Abbreviations and acronyms

Abbreviation or acronym	Definition
ATEX	Atmospheric explosives
AWG	American wire gauge
BIT	Built-in test
EMC	Electromagnetic compatibility
EOL	End of line
FOV	Field of view
HART®	Highway addressable remote transducer - communication protocol
IAD	Immune at any distance
IECEX	International Electrotechnical Commission Explosion
IPA	Isopropyl alcohol
IR	Infrared
JP5	Type of jet fuel
Latching	Refers to relays remaining in the ON state even after the ON condition has been removed.
LED	Light emitting diode
LPG	Liquified petroleum gas
mA	Milliamps (0.001 amps)
Modbus®	Master-slave messaging structure
N.C.	Normally closed
N.O.	Normally open
N/A	Not applicable
NFPA	National Fire Protection Association
NPT	National pipe thread
PN	Part number
SIL	Safety integrity level

Abbreviation or acronym	Definition
UNC	Unified coarse thread
Vac	Volts alternating current
Vdc	Volts direct current

Contents

Chapter 1	Introduction.....	7
	1.1 Product overview.....	7
	1.2 Models.....	7
Chapter 2	Installation.....	11
	2.1 Installation guidelines.....	11
	2.2 Preparation for use.....	12
	2.3 Attach detector to tilt mount.....	12
	2.4 Open the back cover.....	13
	2.5 Wire terminals and ground cable.....	13
	2.6 Install the protective cover.....	17
	2.7 Aim the detector.....	18
	2.8 Changing default detector settings	18
Chapter 3	Operation.....	19
	3.1 Power up the detector.....	19
	3.2 Testing procedures.....	19
Chapter 4	Initial setup.....	21
	4.1 Continuous feature test.....	21
	4.2 Response to fault indication.....	21
	4.3 Built-in-test (BIT).....	21
Chapter 5	Maintenance.....	23
	5.1 Keeping maintenance records.....	23
	5.2 Clean the detector.....	23
Chapter 6	Troubleshooting.....	25
	6.1 LED is off, fault relay is open, 0-20mA shows 0mA, analog voltage output is 0V.....	25
	6.2 LED flashes yellow at 4Hz, fault relay is open, 0-20mA shows 1mA.....	25
	6.3 LED flashes yellow at 4Hz, relay is open, 0-20mA shows 2mA.....	25
	6.4 LED constantly red, alarm relay energized, 0-20mA indicates alarm.....	26
	6.5 No HART® communication, 0-20mA shows 0mA.....	26
Chapter 7	Specifications.....	27
	7.1 Technical specifications.....	27
	7.2 Electrical specifications.....	31
	7.3 Mechanical specifications.....	32
Appendix A	Reference data.....	35
	A.1 Ordering information, specifications, and dimensional drawings.....	35
	A.2 Product certifications and installation drawings.....	35

Appendix B	FM fuel test responses	37
-------------------	-------------------------------------	-----------

1 Introduction

1.1 Product overview

The SharpEye™ 40/40 series is based on proven Spectrex technologies, including IR3 and UV/IR. The SharpEye 40/40 series features QuadSense™ technology, providing the fastest response to fire, longest distance detection or revolutionary UV/IR technology, coupled with superior immunity to false alarms, functioning in harsh conditions with unparalleled reliability and durability. The series is suited to meet the challenges of wide range of industrial and commercial applications with long distance and fast response detection, providing superior protection of high value property and personnel to keep a SharpEye on your safety. Detection performance can be easily adapted to all environments, applications, and requirements, by changing the detector's configuration parameters. Adjusting these parameters, as well as performing other maintenance and monitoring tasks, is possible by means of RS-485-based Modbus® communication or HART® communication.

1.2 Models

The SharpEye 40/40 Flame Detectors are electro-optical devices designed to identify fire events, enabling alarm activation. The detectors are intended for indoor or outdoor use and can be used stand alone or connected to an alarm/automatic extinguishing system.

The SharpEye 40/40 series comprises the following detectors:

SharpEye 40/40C-I

The SharpEye 40/40, a multispectrum Quad-sense™ flame detector, detects hydrocarbon fuel and gas fires with enhanced performance, advanced long distance detection of hydrocarbon fires, fast detection in under five seconds, and strengthened reliability. The SharpEye 40/40C-I is based on proven Triple IR (IR3) technology, ensuring high sensitivity with superior immunity to false alarms.

SharpEye 40/40C-M

The SharpEye 40/40C-M multispectrum Quad-sense IR flame detector is specifically designed for the detection of hydrocarbon and hydrogen flames with enhanced performance, advanced long distance detection of hydrogen and hydrocarbon fires, fast detection in under five seconds, and strengthened reliability. The SharpEye 40/40C-M is based on proven triple IR (IR3) technology, ensuring high sensitivity with superior immunity to false alarms.

SharpEye 40/40C-LB

The SharpEye 40/40C-LB is a dual spectrum UV/IR flame detector, designed to provide fast detection in under five seconds of a range of fires, such as hydrocarbon-based fuel and gas, hydroxyl, hydrogen, metal, and inorganic.

SharpEye 40/40C-L4B

The SharpEye 40/40C-L4B is a dual spectrum UV/IR flame detector designed to provide fast detection in under five seconds of hydrocarbon-based fuel and gas fires.

SharpEye 40/40D-I

The SharpEye 40/40D-I, an ultra-fast multispectrum Quad-sense IR3 flame detector, provides superior, longest distance detection of hydrocarbon fires at up to 295 ft. (90 m), exceptional ultra-fast detection in under 50 msec, and unparalleled reliability. The SharpEye 40/40D-I is based on proven Triple IR (IR3) technology, ensuring highest sensitivity with best immunity to false alarms.

SharpEye 40/40D-M

The SharpEye 40/40D-M is a multispectrum Quad-sense IR flame detector provides superior, longest distance detection of hydrogen (at up to 165 ft. [50 m]) and hydrocarbon fires (at up to 295 ft. [90 m]), exceptional ultra-fast detection in under 50 msec, and unparalleled reliability. The SharpEye 40/40D-M is designed to deal with the challenges of invisible fires based on proven triple IR (IR3) technology, ensuring highest sensitivity with best immunity to false alarms.

SharpEye 40/40D-LB

The SharpEye 40/40D-LB is an ultra-fast UV/IR flame detector, which is able to detect in under 20 msec and features a unique dual sensor with selectable UV and IR channels that can be used separately or combined. The detector is designed to detect a range of fires, such as hydrocarbon-based fuel and gas, hydroxyl, hydrogen, metal, and inorganic.

SharpEye 40/40D-L4B

The SharpEye 40/40D-L4B is an ultra-fast UV/IR flame detector is able to detect in under 20 msec, and features a unique dual sensor with selectable UV and IR channels that can be used separately or combined. The detector is designed to detect hydrocarbon-based fuel and gas fires.

Table 1-1: SharpEye 40/40 Series General Technical Specifications

Spectral response	Infrared and ultraviolet bands
Response time	Varies according to model, typically under 5 seconds
Field of view	Varies according to model, up to 100 degrees
Output	4-20 mA, relays, communication
Enclosure	Stainless steel 316 or aluminum polyurethane painted
Operating voltage	18-32 V=(DC)
Maximum power rating	9.6 W
Relay contacts	2A/30 Vdc
Over voltage category	2
Relative humidity	Non-condensing relative humidity up to 100%

⚠ CAUTION

If the product is used outside of specified limits, this voids the product certification, and our company is not responsible for any incurred warranty expense.

Do not open this product, except for the terminal compartment as listed in this document, under any circumstances.

The detector is not field-repairable. Any attempt to modify or repair the internal circuits or change their settings, as this will impair the system's performance and void the product warranty.

Opening the attachment screws to dismantle the front part of the detector from remaining parts is restricted and voids the product warranty.

2 Installation

2.1 Installation guidelines

Installation should comply with NFPA 72E or any other local and international regulations and standards, as applicable to flame detectors and installation of Ex approved products. To ensure optimal performance and efficient installation, consider the following guidelines.

Sensitivity

To determine the level of sensitivity, consider the following:

- Size of fire at the required distance to be detected
- Type of flammable materials
- Proximity to false alarm sources

Wiring

The wire gauge must be designed according to the distance from the detector to the controller and the number of detectors on the same power line (see [Wire terminals and ground cable](#)).

To fully comply with EMC directive and protect against interference caused by RFI and EMI, the cable to the detector must be shielded and the detector must be grounded. The shield should be grounded at the detector end.

Spacing and location

The number of detectors and their locations in the protected area are determined by:

- Size of the protected area
- Sensitivity of the detectors
- Obstructed lines of sight
- Cone of view of the detectors

Environment

Dust, snow, or rain can reduce the detector's sensitivity and require more maintenance activities.

The presence of high intensity emission sources may affect sensitivity.

Aiming the detector

The detector should be aimed toward the center of the detection zone and have a completely unobstructed view of the protected area.

It is recommended to position the detector tilted down at a 45° angle to maximize coverage and prevent accumulation of dust and dirt.

Installation should not begin until all conceivable considerations regarding detection location have been taken into account.

2.2 Preparation for use

The installation sequence may vary according to the physical structure of the site.

Note

Installation steps are also detailed in the Quick Start Guide supplied with the detector.

The following tools are required for installation. These are standard tools and are not supplied with the detector.

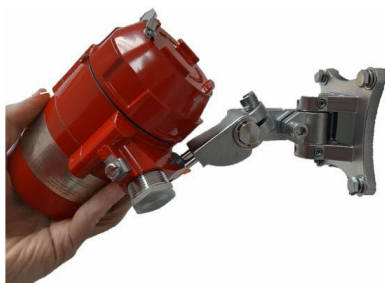
Table 2-1: Required Tools

Tool	Function
Hex key 1.5 mm	Fasten back cover security screw
Hex key 6 mm	Adjust the tilt mount
Hex key 10 mm	Affix the detector to the tilt mount
Hex key 3/16-in.	Attach protective cover to detector
Flat screwdriver 6 mm	Connect ground terminal
Flat screwdriver 2.5 mm	Connect wires to the terminal blocks
Hex key 5/16-in.	Stop plug 3/4 national pipe thread (NPT)
Open wrench 28 mm	Stop plug M25 only

2.3 Attach detector to tilt mount

Procedure

1. Unpack the detector.
2. Insert location pins on the tilt mount into the openings on detector housing.



3. Thread the holding screw and tighten it.

Note

The detector field of view can be changed by releasing the horizontal and vertical locking screws.

4. Point the detector toward the protected area and ensure the view of the area is unobstructed.

5. Secure the detector in that position by tightening the locking screws on the tilt mount.
The detector is now correctly located, aligned, and ready to be connected to the system.

2.4 Open the back cover

Procedure

1. Loosen the back cover security screw.



- A. Back cover security screw
B. Protective plug

2. Unscrew the back cover.

Note

The back cover is attached by a security cable.

3. Remove the protective plug.

2.5 Wire terminals and ground cable

⚠ CAUTION

Improper wiring may damage the detector.

Procedure

1. Connect the terminals according to [Table 2-2](#).

The terminal details can also be found on the inside back cover, as shown in [Figure 2-1](#).

Figure 2-1: Terminal Box



Table 2-2: Terminal Box

Terminal	Function
T1	24 Vdc (+)
T2	24 Vdc (-)
T3	External built-in test (BIT) switch
T4	Fault relay - normally open
T5	Fault relay
T6	Fault relay - normally closed
T7	Alarm relay - normally open
T8	Alarm relay
T9	Alarm relay - normally closed
T10	0-20 mA (+)
T11	0-20 mA (-)
T12	Alarm output (40/40D models)
T13	RS485 (+)
T14	RS485 (-)
T15	Accessory relay - normally open
T16	Accessory relay
T17	Accessory relay - normally closed

- Use [Figure 2-2](#), [Figure 2-3](#), [Figure 2-4](#), and [Figure 2-5](#) for typical wiring configurations.

Figure 2-2: Typical Wiring for Four-Wire Controllers

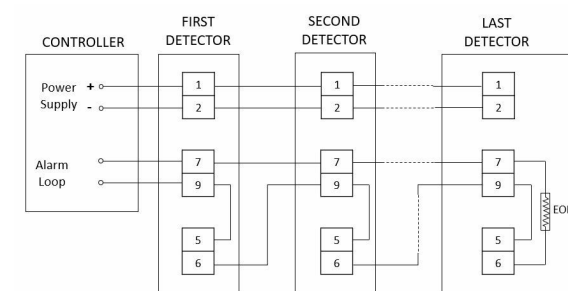


Figure 2-3: Non-Isolated Sink (Three Wires)

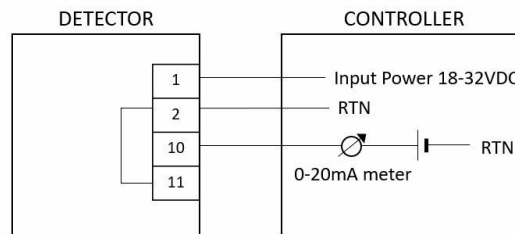


Figure 2-4: Sink Four-Wire

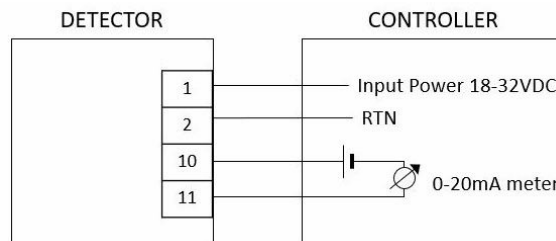
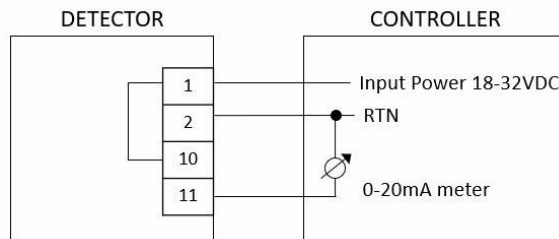


Figure 2-5: Source Three-Wire



Note

For additional configuration options, please refer to the Modbus® Manager Manual.

3. Check the wires for secure mechanical connection and press them neatly against the terminal to prevent them from interfering while closing the back cover.
4. Close the terminal compartment by screwing the back cover on to the housing.
5. Tighten the back cover security screw.

Figure 2-6: Closing Security Screw



- A. Back cover security screw
- B. Ground cable connection point

6. Connect the ground cable to the area indicated in [Figure 2-6](#).

⚠ WARNING

The terminal temperature may be higher than 185 °F (85 °C).

⚠ CAUTION

To comply with EMC directive 2014/30/EU and protect against interference caused by radio frequency interference (RFI) and electromagnetic interference (EMI), shield the cable to the detector and ground the detector. Ground the shield at the detector end.

2.6 Install the protective cover

⚠ CAUTION

The protective cover should always be installed with the detector.

Procedure

1. Place the protective cover on top of the detector.



2. Secure the protective cover by tightening the screw.

Note

When installing the stainless steel protective cover, the same installation instructions apply.

2.7 Aim the detector

See [Aiming the detector](#) for guidelines on aiming the detector.

2.8 Changing default detector settings

Main settings that can be modified using the Modbus® Manager or HART communication include:

- Sensitivity
- Response time
- Heated optics functionality
- Alarm delay
- Accessory relay options
- Alarm latch
- Field of view integrity indication

Refer to the Modbus Manager Manual or HART protocol Reference Manual for instructions on changing these settings.

3 Operation

3.1 Power up the detector

This section describes how to turn on the detector.

Procedure

After connecting the detector to power, wait up to 60 seconds for the detector to completed the initial start-up procedure.

Note

Turning on the detector initiates the following sequence of events:

- a. The yellow LED flashes at 4Hz.
- b. BIT is executed.
- c. BIT completes.
- d. Detector enters normal mode, indicated by:
 - Flashing green LED at 1Hz
 - Fault relay contacts closing
 - mA output is 4mA (for models featuring analog [voltage] output, this will be 2V)

3.2 Testing procedures

This section describes the explosion proof testing procedure using the Spectrex™ explosion proof FS flame simulator series. The detector can also be tested using the Manual BIT.

Table 3-1: Flame Simulator Compatibility

Spectrex model flame simulator	Suitable with detectors
FS-1100	Spectrex 40/40C-I and 40/40D-1
FS-1200	Spectrex 40/40C-LB, 40/40C-L4B, 40/40D-LB, and 40/40D-L4B
FS-1400	Spectrex 40/40C-M and 40/40D-M

To perform a flame simulator test:

1. Power up the system and wait for up to 60 seconds for the detector to return to normal status.
The **Power** LED turns on.
2. Ensure all indicators show normal (see [Power up the detector](#)).

For full instructions on operating a flame simulator test, see the relevant reference manual.

Table 3-2: Flame Simulator Reference Manuals

Flame simulator	Reference manual
Spectrex FS-1100	TM380002
Spectrex FS-1200	TM380102
Spectrex FS-1400	TM380302

4 Initial setup

4.1 Continuous feature test

The detector is supplied with default settings, containing Continuous Feature Test. To change these settings, refer to Modbus[®] Manager Manual.

During normal operation, the detector tests itself continuously and indicates a fault if a failure is found.

The detector continuously tests:

- Input voltage level
- All internal regulator voltage level
- Voltage level status of sensor and sensor circuitry for noise or disconnection in the electronic circuitry
- 0-20 mA level output
- Relays and heater operation
- Processor watch dog
- Software
- Memory
- Oscillator frequency

4.2 Response to fault indication

If a failure is found, the detector indicates by:

- LED: yellow flashes (4Hz)
- Fault relay opens
- 0-20mA: 1mA default
- Analog voltage output: 0v output (SharpEye 40/40D models only)

The fault indications remain until the detector is turned off. The fault indications return if the fault is still found when power is restored.

4.3 Built-in-test (BIT)

The detector's BIT checks the following:

- Sensors
- Window cleanliness
- Electronic circuitry

The detector can be set to perform the BIT in the following modes:

- Automatically and manually
- Manually only

BIT operation

The BIT is intended to check optical integrity and electronic circuitry. The detector's status remains unchanged if the result of a BIT is the same as the current status (normal or BIT fault). The detector's status changes if the BIT differs from the current status.

Note

In BIT fault status, the detector can continue to detect a fire in most cases.

Automatic BIT

The detector automatically performs a BIT every 15 minutes. A successful BIT sequence does not activate any indicator. The BIT interval can be modified if required by the customer using the RS485 Modbus® Manager or HART® communicator. In case of a BIT fault, this sequence continues until a successful BIT occurs, when the detector resumes normal operation.

- As result of successful automatic/manual BIT, the fault relay remains *energized*.
- As result of unsuccessful automatic/manual BIT, the fault relay *deenergizes*.

Manual BIT

Manual BIT can be initiated using the Modbus Manager or HART communicator. Connecting terminal 3 to ground also initiates manual BIT. Alarm duration during manual BIT is configurable using the Modbus Manager or HART communicator.

5 Maintenance

5.1 Keeping maintenance records

Maintenance operations performed on a detector should be recorded in accordance with site guidance and requirements.

5.2 Clean the detector

Procedure

1. Disconnect power from the flame detector.
2. Wipe the detector housing with clean water and a damp cloth.

CAUTION

Do not use a brush or sharp tools.

3. Identify where dust, dirt, or moisture accumulates on the detector window.
 - a) Clean with a soft optical cloth.
 - b) Rinse with clean water.

6 Troubleshooting

6.1 LED is off, fault relay is open, 0-20mA shows 0mA, analog voltage output is 0V

Note

Analog voltage output applies to SharpEye™ 40/40D models only.

Cause

No power to the unit.

Recommended actions

1. Check that the operating voltage is correct, according to [Electrical specifications](#).
2. Check power polarity.
3. Check the terminal wiring.

6.2 LED flashes yellow at 4Hz, fault relay is open, 0-20mA shows 1mA

Cause

Low voltage

Faulty detector

Recommended actions

1. Check that the operating voltage is correct, according to [Electrical specifications](#)
2. Re-power the detector.

6.3 LED flashes yellow at 4Hz, relay is open, 0-20mA shows 2mA

Cause

BIT fault

Faulty detector

Recommended actions

1. Ensure the detector window and reflector mirror are clean.
2. Re-power the detector.

6.4 LED constantly red, alarm relay energized, 0-20mA indicates alarm

Cause

Existing alarm condition

Alarm latched

Recommended actions

1. Check cause of alarm.
2. Ensure the alarm latch is not enabled in the detector settings.
3. Re-power the detector.

6.5 No HART[®] communication, 0-20mA shows 0mA

Cause

No HART is available at 0mA level.

Recommended actions

For fault mode, the default indication is 1mA. This can be configured to 0mA.

This is not recommended when using a HART connection in order to preserve the HART communication.

7 Specifications

7.1 Technical specifications

Spectral response

Spectrex™ 40/40C-I	Four IR bands between 4μm and 5μm
Spectrex 40/40C-M	Four IR bands between 2μm and 5μm
Spectrex 40/40C-LB	UV: 0.185 - 0.260 μm IR: 2.5-3.0 μm
Spectrex 40/40C-L4B	UV: 0.185 - 0.260 μm IR: 4.3 – 4.8μm
Spectrex 40/40D-I	Four IR bands between 4μm and 5μm
Spectrex 40/40D-M	Four IR bands between 2μm and 5μm
Spectrex 40/40D-LB	UV: 0.185 - 0.260 μm IR: 2.5-3.0 μm
Spectrex 40/40D-L4B	UV: 0.185 - 0.260 μm IR: 4.3 – 4.8μm

Detection range per fuel (ft/m)

Note

The ranges shown are at highest sensitivity setting for 1ft² (0.1m²) pan fire.

Table 7-1: Spectrex™ 40/40C Models

Fuel	Spectrex 40/40C-I	Spectrex 40/40C-M	Spectrex 40/40C-LB	Spectrex 40/40C-L4B
Gasoline	215/65		50/15	93/28
N-Heptane	215/65		50/15	93/28
Diesel fuel	150/45		37/11	70/21
Kerosene	150/45		37/11	70/21
Alcohol 95%	135/40		30/9	57/17
IPA	135/40		37/11	70/21
Methanol	135/40		30/9	57/17
Methane	150/45		30/9	60/18
LPG	150/45		30/9	60/18
Polypropylene	115/35		30/9	60/18
Paper	82/25		16/5	33/10
Hydrogen	N/A	118/36	37/11	N/A

Table 7-1: Spectrex™ 40/40C Models (continued)

Fuel	Spectrex 40/40C-I	Spectrex 40/40C-M	Spectrex 40/40C-LB	Spectrex 40/40C-L4B
Magnesium alloy ⁽¹⁾	N/A		16/5	33/10
Gun powder	141/43		33/10	92/28
Fireworks	23/7		5/1.6	10/3
Cooking oil	150/45		37/11	70/21
Mineral oil: 20w50	150/45		37/11	70/21
Wood	82/25		16/5	33/10
Ethylene glycol	118/36		12/3.7	23/7
Butyl acrylate	177/54		37/11	70/21
Vinyl acetate	177/54		37/11	70/21
Flammable adhesive	150/45		37/11	70/21
Solvents	177/54		37/11	70/21
Oil paint	150/45		37/11	70/21
Jet fuel JP5	150/45		37/11	70/21
Jet fuel A1	150/45		37/11	70/21
Battery ⁽²⁾	200/61		39/12	75/23

(1) Contact Spectrex representative for guidance on detecting Magnesium alloy.

(2) One battery cell.

Table 7-2: Spectrex 40/40D Models

Fuel	Spectrex 40/40D-I	Spectrex 40/40D-M	Spectrex 40/40D-LB	Spectrex 40/40D-L4B
Gasoline	300/90		93/28	
N-Heptane	300/90		93/28	
Diesel fuel	210/63		70/21	
Kerosene	210/63		70/21	
Alcohol 95%	185/55		57/17	
IPA	185/55		70/21	
Methanol	185/55		57/17	
Methane	207/63		60/18	
LPG	207/63		60/18	
Polypropylene	160/49		60/18	
Paper	112/34		33/10	

Table 7-2: Spectrex 40/40D Models (continued)

Fuel	Spectrex 40/40D-I	Spectrex 40/40D-M	Spectrex 40/40D-LB	Spectrex 40/40D-L4B
Hydrogen	N/A	164/50	70/21	N/A
Magnesium alloy ⁽¹⁾	N/A		33/10	
Gun powder	197/60		66/20	92/28
Fireworks	33/10		10/3	
Cooking oil	207/63		70/21	
Mineral oil: 20w50	207/63		70/21	
Wood	112/34		33/10	
Ethylene glycol	164/50		23/7	
Butyl acrylate	246/75		70/21	
Vinyl acetate	246/75		70/21	
Flammable adhesive	207/63		70/21	
Solvents	246/75		70/21	
Oil paint	207/63		70/21	
Jet fuel JP5	210/63		70/21	
Jet fuel A1	207/63		70/21	
Battery ⁽²⁾	279/85		75/23	

(1) Contact Spectrex representative for guidance on detecting Magnesium alloy.

(2) One battery cell.

Standard response time

Table 7-3: Spectrex 40/40C Models

Spectrex 40/40C-I	Spectrex 40/40C-M	Spectrex 40/40C-LB	Spectrex 40/40C-L4B
Typically <5 sec			

Table 7-4: Spectrex 40/40D Models

Spectrex 40/40D-I	Spectrex 40/40D-M	Spectrex 40/40D-LB	Spectrex 40/40D-L4B
Typically <2 sec at 131ft/40m 10 sec at 300ft/90m		Typically 5 sec at 93ft/28m	

Ultra fast response time

Table 7-5: Spectrex 40/40C Models

Spectrex 40/40C-I	Spectrex 40/40C-M	Spectrex 40/40C-LB	Spectrex 40/40C-L4B
N/A			

Table 7-6: Spectrex 40/40D Models

Spectrex 40/40D-I	Spectrex 40/40D-M	Spectrex 40/40D-LB	Spectrex 40/40D-L4B
Typically <1 sec at 100ft/30m		20msec for flash fire at 10ft (3m)	

High speed response time

Table 7-7: Spectrex 40/40C Models

Spectrex 40/40C-I	Spectrex 40/40C-M	Spectrex 40/40C-LB	Spectrex 40/40C-L4B
N/A			

Table 7-8: Spectrex 40/40D Models

Spectrex 40/40D-I	Spectrex 40/40D-M	Spectrex 40/40D-LB	Spectrex 40/40D-L4B
50msec for 1ft diameter sphere LPG-air mixture explosion at 66ft/20m		50msec for 1ft diameter sphere LPG-air mixture explosion at 33ft (10m)	

Sensitivity ranges

Note

All distances relate to detection of a 1ft² (0.1m²) n-heptane fire

Table 7-9: Spectrex 40/40C Models

Spectrex 40/40C-I	Spectrex 40/40C-M	Spectrex 40/40C-LB	Spectrex 40/40C-L4B
Five ranges: 10ft (3m), 50ft (15m), 100ft (30m), 150 (45m), 215 (65m)		Two ranges: 10ft (3m), 50ft (15m)	Three ranges: 10ft (3m), 50ft (15m), 92ft (28m)

Table 7-10: Spectrex 40/40D Models

Spectrex 40/40D-I	Spectrex 40/40D-M	Spectrex 40/40D-LB	Spectrex 40/40D-L4B
Six ranges: 10ft (3m), 50ft (15m), 100ft (30m), 150 (45m), 215 (65m), 300ft (90m)		Three ranges: 10ft (3m), 50ft (15m), 92ft (28m)	

Field of view

Table 7-11: Spectrex 40/40C Models

Spectrex 40/40C-I	Spectrex 40/40C-M	Spectrex 40/40C-LB	Spectrex 40/40C-L4B
H: 100° V: 95°	Hydrogen: H: 90° V: 90°	H: 100° V: 95°	

Table 7-11: Spectrex 40/40C Models (continued)

Spectrex 40/40C-I	Spectrex 40/40C-M	Spectrex 40/40C-LB	Spectrex 40/40C-L4B
H: 100° V: 95°	Other fuels: H: 80° V: 80°	H: 100° V: 95°	

Table 7-12: Spectrex 40/40D Models

Spectrex 40/40D-I	Spectrex 40/40D-M	Spectrex 40/40D-LB	Spectrex 40/40D-L4B
H: 100° V: 95°	Hydrogen: H: 90° V: 90°	H: 100° V: 95°	
H: 100° V: 95°	Other fuels: H: 80° V: 80°	H: 100° V: 95°	

Temperature range (operating and storage)

Table 7-13: Spectrex 40/40C Models

Spectrex 40/40C-I	Spectrex 40/40C-M	Spectrex 40/40C-LB	Spectrex 40/40C-L4B
-40 to +185 °F (-40 to +75 °C)			

Table 7-14: Spectrex 40/40D Models

Spectrex 40/40D-I	Spectrex 40/40D-M	Spectrex 40/40D-LB	Spectrex 40/40D-L4B
-76 to +185 °F (-60 to +85 °C)			

Humidity

Non-condensing Relative Humidity up to 100%

7.2 Electrical specifications

The electrical specifications apply to all models unless stated otherwise.

Operating voltage	24 VDC nominal (18-32 VDC)
Power consumption	Standby: Max. 3W (8W with heated window) Alarm: Max. 4.2W (9.6W with heated window)
Cable entries	2 x ¾-in. - 14NPT conduits or 2 x M25 x 1.5 mm ISO
Electrical input protection	According to EN 50130
Electromagnetic capability	EMI/RFI protected to EN61000-6-3 and EN 50130
Electrical interface	The detector includes 17 terminals, one wiring option.

Electrical input protection

The input circuit is protected against voltage-reversed polarity, voltage transients, surges, and spikes according to EN54-10.

Outputs

Relays	Alarm, fault, and auxiliary SPST volt-free contacts rated 2A at 30 VDC	
Analog	5V at detection, 0v at fault, 2v at normal	
0-20mA (stepped)	Spectrex™ 40/40C Models	Fault: 0 +1mA BIT fault: 2mA ± 0.3mA Normal: 4mA ± 0.3mA Warning: 16mA ± 0.3mA Alarm: 20mA ± 0.3mA
	Spectrex 40/40D Models	Fault: 0 +1mA BIT fault: 2mA ± 0.3mA Normal: 4mA ± 0.3mA Warning: 16mA ± 0.3mA Alarm: 20mA ± 0.3mA

Heated optics

The front window can be heated to improve performance in ice, condensation, and snow conditions. The heater increases the temperature of the optical surface by 41–77 °F (5–25 °C) above the ambient temperature⁽¹⁾. The heated optics can be configured in three ways:

Off	Optics are not heated
On	Optics are continuously heated
Auto (default)	Operated only when the change of temperature requires the heating

Note

In auto mode, the starting heat temperature can be defined between 32–95 °F (0–35 °C). The detector stops heating the window when the temperature is 27 °F (15 °C) above the start temperature.

7.3 Mechanical specifications

Enclosure options

Spectrex 40/40C Models	Heavy duty copper free aluminum (less than 1%), polyurethane painted
Spectrex 40/40D Models	Stainless steel 316 with electropolish finish

(1) Spectrex 40/40D models have a low power heater option

Heavy duty copper free aluminum (less than 1%), polyurethane painted

Tilt mount

Stainless steel 316 with electropolish finish

Detector dimensions

4 x 4.6 x 6.18 inches (100.6 x 117 x 155 mm)

Weight

Spectrex 40/40C Models

Detector: 2.8 lb (1.3 kg)

Tilt mount 2.5 lb (1.1 kg)

Spectrex 40/40D Models

Stainless steel detector: 6.3 lb (2.9 kg)

Aluminum detector: 2.8 lb (1.3 kg)

Tilt mount 2.5 lb (1.1 kg)

Environmental standards

DNV 2-4 (Spectrex 40/40D Models only)

Water and dust

IP66 and IP68 per EN60529

A Reference data

A.1 Ordering information, specifications, and dimensional drawings

To view current SharpEye™ 40/40 Series ordering information, specifications, and dimensional drawings, follow these steps:

Procedure

1. Go to Spectrex.com/SharpEye/40/40.
2. Click to select **Documentation**.
3. In the *Document Type* dropdown, select **Manuals and Guides** to apply the filter.
4. Select the appropriate document.

A.2 Product certifications and installation drawings

To view current SharpEye™ 40/40 Series product certifications and installation drawings, follow these steps:

Procedure

1. Go to Spectrex.com/SharpEye/40/40.
2. Click to select **Documentation**.
3. In the *Document Type* dropdown, select **Certificates and Approval** to apply the filter.
4. Select the appropriate document.

B FM fuel test responses

Results of the FM fuel tests are as follows:

Table B-1: Spectrex™ 40/40C Models

Fuel	Spectrex 40/40C-I	Spectrex 40/40C-M	Spectrex 40/40C-LB	Spectrex 40/40C-L4B
Gasoline ⁽¹⁾	65m		15m	
N-Heptane ⁽¹⁾	65m		15m	
Diesel fuel ⁽¹⁾	45m		11m	21m
JP5 ⁽¹⁾	45m		11m	21m
Kerosene ⁽¹⁾	45m		11m	21m
Alcohol 95% ⁽¹⁾	40m		9m	17m
IPA ⁽¹⁾	40m		11m	21m
Methanol ⁽¹⁾	40m		9m	17m
Methane ⁽²⁾	45m		9m	18m
LPG ⁽²⁾	45m		9m	18m
Polypropylene ⁽¹⁾	35m		9m	18m
Paper ⁽¹⁾	25m		5m	10m
Hydrogen ⁽²⁾	N/A	36m	11m	N/A
Magnesium alloy ⁽³⁾	N/A		5m	10m
Gun powder ⁽⁴⁾	43m		10m	28m
Fireworks ⁽⁵⁾	7m		1.6m	3m
Cooking oil ⁽¹⁾	45m		11m	21m
Mineral oil: 20w50 ⁽¹⁾	45m		11m	21m
Wood ⁽¹⁾	25m		5m	10m
Ethylene glycol ⁽¹⁾	36m		3.7m	7m
Butyl acrylate ⁽¹⁾	54m		11m	21m
Vinyl acetate ⁽¹⁾	54m		11m	21m
Flammable adhesive ⁽¹⁾	45m		11m	21m
Solvents ⁽¹⁾	54m		11m	21m
Oil paint ⁽¹⁾	45m		11m	21m
JET A1 ⁽¹⁾	45m		11m	21m

Table B-1: Spectrex™ 40/40C Models (continued)

Fuel	Spectrex 40/40C-I	Spectrex 40/40C-M	Spectrex 40/40C-LB	Spectrex 40/40C-L4B
Battery ⁽⁶⁾	61m		12m	23m

(1) 1ft²

(2) Plume fire: 0.75m high, 0.25m wide

(3) Only for UV detector.

(4) 1.5 inches²

(5) 10 pieces per test.

(6) One battery cell.

Table B-2: Spectrex 40/40D Models

Fuel	Spectrex 40/40D-I	Spectrex 40/40D-M	Spectrex 40/40D-LB	Spectrex 40/40D-L4B
Gasoline ⁽¹⁾	90m		28m	
N-Heptane ⁽¹⁾	90m		28m	
Diesel fuel ⁽¹⁾	63m		21m	
JP5 ⁽¹⁾	63m		21m	
Kerosene ⁽¹⁾	63m		21m	
Alcohol 95% ⁽¹⁾	55m		17m	
IPA ⁽¹⁾	55m		21m	
Methanol ⁽¹⁾	55m		17m	
Methane ⁽²⁾	63m		18m	
LPG ⁽²⁾	63m		18m	
Polypropylene ⁽¹⁾	49m		18m	
Paper ⁽¹⁾	34m		10m	
Hydrogen ⁽²⁾	N/A	50m	21m	N/A
Magnesium alloy ⁽³⁾	N/A		10m	
Gun powder ⁽⁴⁾	60m		20m	28m
Fireworks ⁽⁵⁾	10m		3m	
Cooking oil ⁽¹⁾	63m		21m	
Mineral oil: 20w50 ⁽¹⁾	63m		21m	
Wood ⁽¹⁾	34m		10m	
Ethylene glycol ⁽¹⁾	50m		7m	
Butyl acrylate ⁽¹⁾	75m		21m	
Vinyl acetate ⁽¹⁾	75m		21m	

Table B-2: Spectrex 40/40D Models (continued)

Fuel	Spectrex 40/40D-I	Spectrex 40/40D-M	Spectrex 40/40D-LB	Spectrex 40/40D-L4B
Flammable adhesive ⁽¹⁾	63m		21m	
Solvents ⁽¹⁾	75m		21m	
Oil paint ⁽¹⁾	63m		21m	
JET A1 ⁽¹⁾	63m		21m	
Battery ⁽⁶⁾	85m		23m	

(1) 1ft²

(2) Plume fire: 0.75m high, 0.25m wide

(3) Only for UV detector.

(4) 1.5 inches²

(5) 10 pieces per test.

(6) One battery cell.

SPECTREX

6021 Innovation Blvd.
Shakopee, MN 55379

+1 973 239 8398

spectrex.csc.rmtna@emerson.com

 [LinkedIn.com/company/Spectrex](https://www.linkedin.com/company/Spectrex)

 [Facebook.com/Spectrex-1699398927038125](https://www.facebook.com/Spectrex-1699398927038125)

 [Youtube.com/user/SpectrexIncUS](https://www.youtube.com/user/SpectrexIncUS)

©2020 Spectrex. All rights reserved.

Spectrex is a mark of one of the Emerson family of companies. All other marks are the property of their respective owners.

