

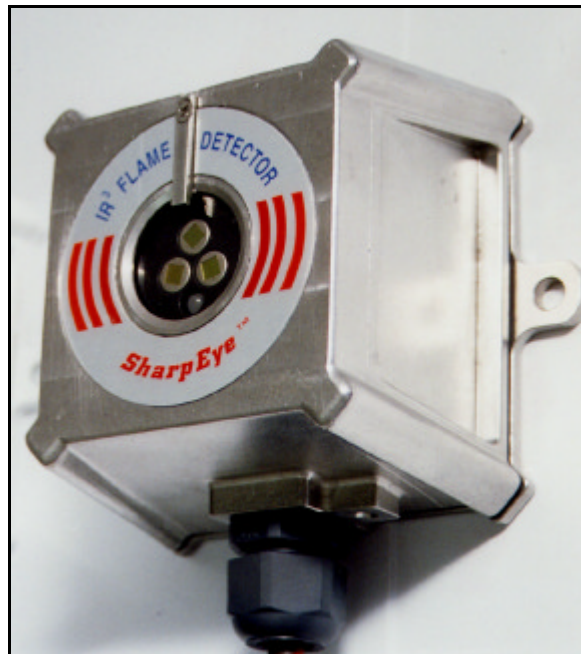


# Mini Triple IR (IR3) Flame Detector

Model 20/20MI

## User and Maintenance Manual

TM 787100, Rev. C August 2004



**ATEX (Cenelec) Approved**  
Ex II 1 GD, EEx ia IIC T5 (+65°C), T4 (+85°C)



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**Warning:**

This manual should be carefully read by all individuals who have or will have responsibility for using, maintaining or servicing the product.

The Detector is not field-repairable due to the meticulous alignment and calibration of the sensors and the respective circuits. Do not attempt to modify or repair the internal circuits or change their settings, as this will impair the system's performance and void the Spectrex, Inc. Product warranty.



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# 1. Scope

## 1.1 Product Overview

The Spectrex Model 20/20MI is a new version of the triple IR spectrum flame detector designed to provide maximum fire protection. It uses innovative technology of advanced digital signal processing to analyze the dynamic characteristics of fire. Three sensitive IR channels process the signals. Detection performance is controlled by a microprocessor and easily adapted to all environments, applications and requirements. The result is a unique and superior flame detector, which provides excellent detection sensitivity with extreme immunity to false alarm.

This version of IR3 is approved intrinsically safe and manufactured in S.M.T. Technology. The programmable functions are available through a RS-485 port used with a standard PC and software supplied by Spectrex or by a handheld computer.

The detector is ATEX certified to EEx ia IIC T5 (see Appendix B).

To use the HOST software and to change the required functions, refer to manual TM784050 for instructions.

## 1.2 Document Overview

This manual describes the detector and its features and provides instructions on the installation, operation and maintenance.

This manual is divided into separate Sections as follows:

- Section 1. Scope** - a general introduction and overview of the product and the Manual, with a brief description of its content.
- Section 2. Technical Description** - the detector's theory of operation.
- Section 3. Performance** - the detector features and capabilities.
- Section 4. Operation** - the detector's operation modes, user interface and indications.
- Section 5. Technical Specifications** - the Detector's electrical, mechanical and environmental specifications.
- Section 6. Installation Instructions**, including wiring and mode setting.
- Section 7. Operating Instructions** and power-up procedures.
- Section 8. Maintenance Instructions** and support procedures.
- Appendix A. Typical Wiring Configurations** - wiring diagrams for installation.
- Appendix B. Intrinsically Safe Wiring Configurations For 20/20MI-XX-X-C**
- Appendix C. Long Range IR3 Fire Simulator**
- Appendix D. FM Report for 20/20 MI-3**
- Appendix E. Ordering information**

## 2. Technical Description

- **Detection Range:** up to 132 ft (40m) for a 1 ft<sup>2</sup> (0.1m<sup>2</sup>) fire.
- **Ultra High Immunity to False Alarms** (see section. 3.3).
- **Advanced Digital Processing of the Dynamic Characteristics of Fire:** Flickering, Threshold correlation and Ratio.
- **Three Separate IR Channels:** Between 3-5 microns.
- **Field Programmable Sensitivity:** four ranges.
- **Two Response Levels:** Warning & Detection.
- **Solar Blind**
- **Microprocessor Based:** Digital signal processing.
- **Built In Test (BIT):** Manual and Automatic (see section. 4.4).
- **Electrical Interface:**
  - Dry contact relays (non-Ex version).
  - Communication network RS-485.
  - 4-20mA output.
- **Certification:** ATEX (Cenelec)

### 2.1 Principles Of Operation

#### 2.1.1 Hydrocarbon fire detection

The triple IR flame detector detects all conceivable types of hydrocarbon fires, i.e. any fire, which emits CO<sub>2</sub>.

#### 2.1.2 Identifying the CO<sub>2</sub> peak

The hydrocarbon fire is characterized by a typical radiation emission. The CO<sub>2</sub> peak emits intense radiation in the spectral band between 4.2 μ - 4.5 μ and weaker radiation intensity outside this spectral band.

#### 2.1.3 The limitations of IR-IR flame detectors

CO<sub>2</sub> in the atmosphere attenuates the radiation in this spectral band. (Absorption and emission of radiation always occur in the same band.) As a result, the greater the distance between the detector and the fire, the weaker the intensity of the radiation reaching the detector (the CO<sub>2</sub> attenuation increases). This phenomenon explains the limitations of the existing IR-IR flame detectors in the market:

- Detection distance is restricted to 33ft (10 m) only.
- Their immunity to false alarm sources is limited.

#### 2.1.4 The advantages of IR3 technology

To overcome these limitations, Spectrex Inc. devised an innovative concept of utilizing an additional detection channel. Three channels collect more data from the environment, permitting more accurate analysis and better performance.

After careful investigation, three channels were selected which, when operating jointly, provide optimal fire detection characteristics:

**Channel 1:** 4.2  $\mu$  - 4.6  $\mu$

Fire - the CO<sub>2</sub> peak

**Channel 2:** 4.0  $\mu$  - 4.2  $\mu$

Eliminates false alarms from high temperature sources.

**Channel 3:** 4.8  $\mu$  - 5.2  $\mu$

Eliminates false alarms from flickering of background radiation.

Most IR sources, which create misleading IR alarm stimuli, including the sun, incandescent and halogen lamps, electric arc discharges, electrical heaters, etc., do not possess this unique spectral signature of fire.

The IR sensors of the detector respond only to flickering of radiation signals. The signals are compared to a predetermined threshold. Processing of the results from the three IR channels is performed by the board microprocessor. The result is a much greater detection distance and a highly increased ability to distinguish between fire and false alarms.

This sophisticated technology surpasses all other existing flame detection techniques on the market today.

This unique flame analysis capability (patent pending) has been incorporated into the Triple-IR fire detector manufactured by Spectrex, Inc. The result is a unique flame detector, which does not produce false alarms and provides at the same time detection over greatly increased distances.

### 2.1.5 Modbus RS-485

For more advanced communication 20/20MI has a RS 485 modbus Compatible output that provides Data communication from a network (up to 247 detectors) to a host computer on universal controller for central monitoring.

This feature enables easy maintenance local and remote diagnostic tools.

### 2.1.6 Use in Hazardous Atmosphere

The 20/20MI certified version is intrinsically safe, classified to

ATEX EX II 1GD T 1 23 °C per SIRA 04 ATEX 2010 (for St.St housing)  
and SIRA 04 ATEX 2011X (for aluminum housing)

EEx ia IIC T4 (Ta= -40° C to + 85° C)

EEx ia IIC T5 (Ta= -40° C to + 65° C)

The detectors are suitable for use in hazardous zones 0, 1 and 2 where group IIC gasses and vapor are present.

In order to comply with the intrinsic safety requirement, barriers must be incorporated (in the safe area) and there will be restrictions on cable types and lengths. The detailed parameter will be dependent on the type of barrier used.

See Appendix B for I.S. wiring detail

### 2.1.7 Types and Models

The 20/20MI has two models:

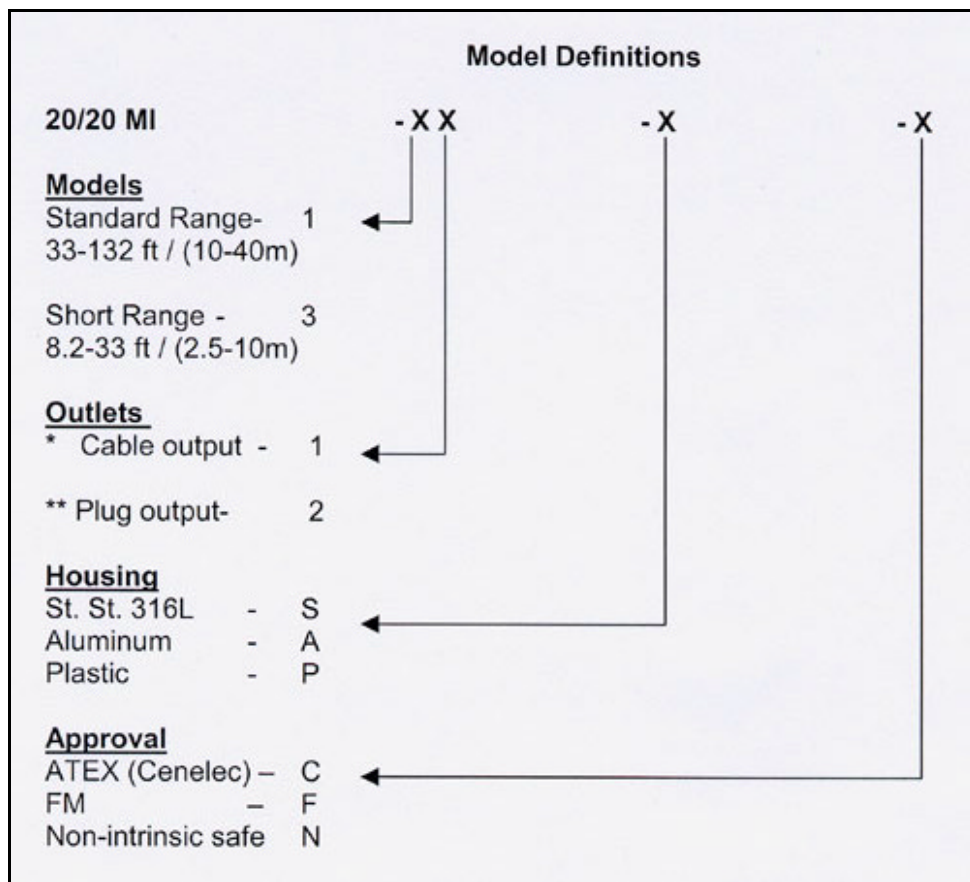
Standard - up to 40m

Short range - up to 10m.

Optional:

The 20/20MI has three (3) housing options: St. St. 316L, aluminum, and plastic.

The output is via either a connector or a cable tail (up to 2m long).



C - ATEX certified Per EX II 1GD, EEx ia IIC T4 or T5 (this model is available with 4-20mA and RS-485 outputs only)

F- FM – functional test only - model 20/20 MI-3.

\* Cable for connection to junction box

\*\* Mating connector supplied with detector

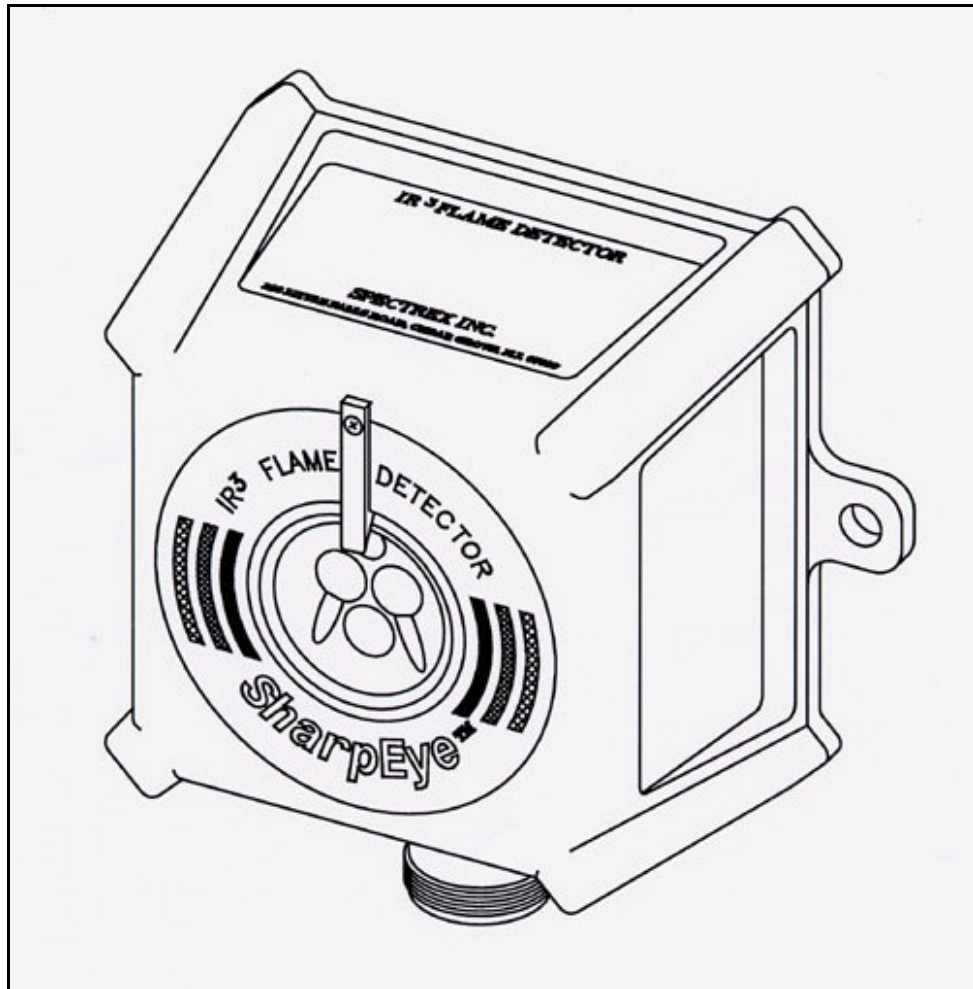


Figure 1: IR3 Flame Detector

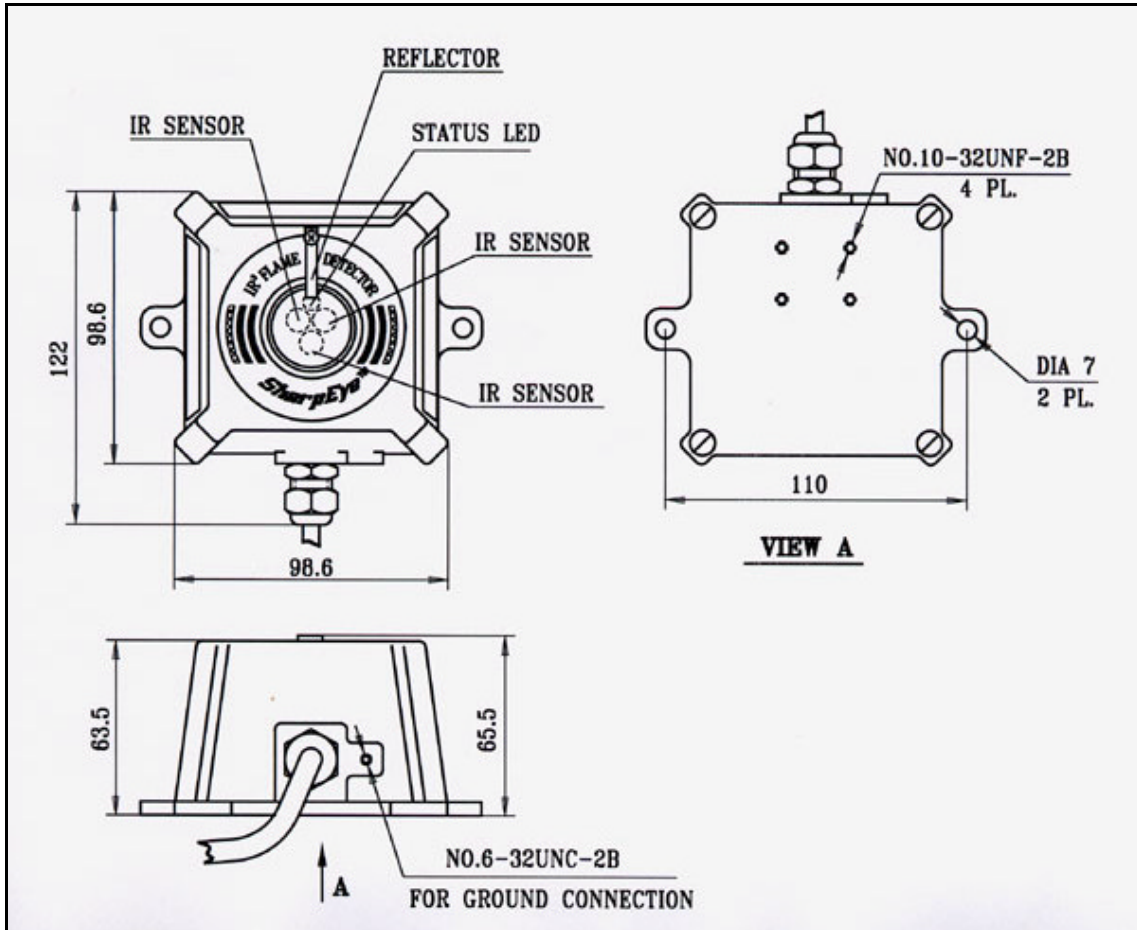


Figure 2: Flame Detector Assembly - Outline Drawing (Cable output option)

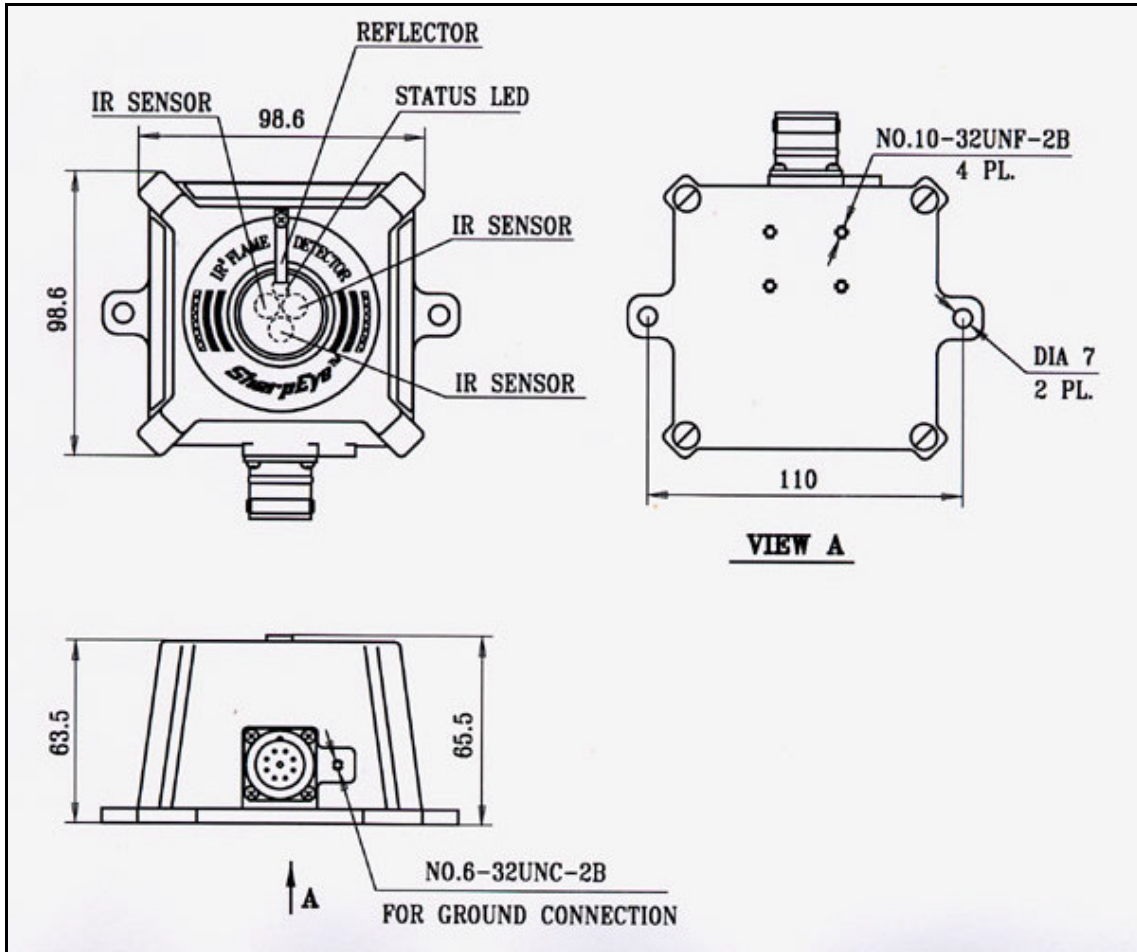


Figure 3: Flame Detector Assembly - Outline Drawing (Connector output option)



## 3. Performance

### 3.1 Detection Sensitivity

Detection sensitivity is the maximum distance at which the detector will reliably detect a specific size of fire & typical type of fuel (standard fire).

#### Standard Fire:

A 1ft<sup>2</sup> (0.1m<sup>2</sup>) Gasoline pan fire with max. wind speed of 6.5 ft/sec (2 m/sec).

#### Sensitivity Ranges:

The detector has four user selectable sensitivity ranges. For each range there are two response levels.

1. WARNING (Pre-alarm)
2. ALARM

The detection distance, for the WARNING level, is approximately 10% higher than the ALARM distance. Alarm response times for a “standard fire” at a specified range are shown hereunder.

**Table 1: Alarm Response Time Versus Range – 20/20MI-1**

	10	20	30	40
<b>Sensitivity Range – ft (m)</b>	33 (10)	65 (20)	100 (30)	132 (40)
<b>Response Time (sec)</b>	5	8	10	10

**Table 2: Alarm Response Time Versus Range – 20/20MI-3**

	2.5	5	7.5	10
<b>Sensitivity Range – ft (m)</b>	8.2 (2.5)	16.5 (5)	24.7 (7.5)	33 (10)
<b>Response Time (sec)</b>	1	1	2	3

For some typical ambient conditions the Zeta parameter as defined in NFPA 72 for the detector is 0.005 (1/meter).

**Note:**

Zeta parameters may vary significantly with changes in temp, air pressure, humidity, visibility conditions, etc.

**Other fuels**

The detector will react to other types of fires as follows:

Pan Fire Size: 1ft<sup>2</sup> (0.1m<sup>2</sup>)

Maximum Wind Speed: 6.5 ft/sec (2 m/sec)

Maximum Response Time: 10 sec

**Table 3: Response Sensitivity Ranges**

Type Of Fuel	% Of Max. Distance at each Sensitivity Range
Gasoline	100%
N-Heptane	100%
Alcohol 95%	75%
JP4	75%
Kerosene	75%
Diesel Fuel	70%
Methane*	30%
Propane*	30%

\* 0.5m plume fire

**Table 4: Sensitivity to other fire sizes**

Fuel	Fire Size	Detection Sensitivity	Distance	Maximum Detection Time 20/20MI-1
Jet Fuel	2 x 2 ft	40	132 ft (40m)	10 seconds
Jet Fuel	2 x 2 ft	20	65 ft (20m)	8 seconds

### 3.2 Cone Of Vision

Horizontal: 100°

Vertical: 100°

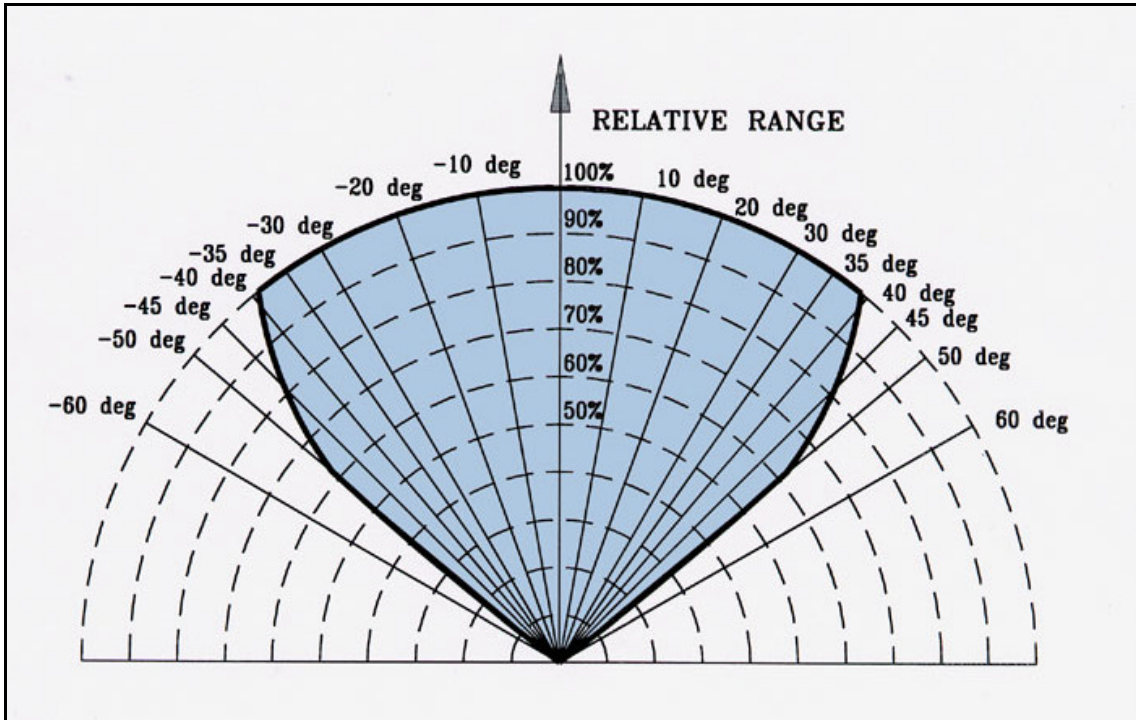


Figure 4: Horizontal and Vertical Fields of View

### 3.3 False Alarms Prevention

The detector will not provide an alarm or a warning signal as a reaction to the radiation sources specified below.

#### Notes:

IAD = Immune at Any Distance.

All sources are chopped from 0 to 20Hz.

**Table 5: Immunity To False Alarm Sources**

Radiation Source	Immunity Distance ft(m)
Sunlight	IAD
Indirect or reflected sunlight	IAD
Incandescent frosted glass light, 100 W	IAD
Incandescent clear glass light, rough service, 100 W	IAD
Fluorescent light with white enamel reflector, standard office or shop, 40 W (or two 20 W)	IAD
Electric arc [12mm (15/32 in) gap at 4000 V alternating current, 60 Hz]	IAD
Arc welding [4 mm (5/32 in) rod; 240 A]	See Table 6, 7
Ambient light extremes (darkness to bright light with snow, water, rain, desert glare and fog)	IAD
Bright colored clothing, including red and safety orange.	IAD
Electronic flash (180 watt-seconds minimum output)	IAD
Movie light, 625 W quartz DWY lamp (Sylvania S.G.-55 or equivalent)	6.5 (2)
Flashlight (MX 991/U)	IAD
Radiation heater, 1500 W	IAD
Radiation heater, 1000 W with fan	IAD
Quartz lamp (1000 W)	10 (3)
Mercury vapor lamp	IAD
Grinding metal	IAD
Lit cigar	1 (0.3)
Lit cigarette	1 (0.3)
Match, wood, stick including flare up	10 (3)

**Table 6: Welding Immunity Distance – 20/20MI-1**

Sensitivity	Detection Range	Immunity Distance
10	33 ft (10m)	>10 ft (3m)
20	65 ft (20m)	>15 ft (5m)
30	100 ft (30m)	>20 ft (7m)
40	132 ft (40m)	>33 ft (10m)

**Table 7: Welding Immunity Distance – 20/20MI-3**

Sensitivity	Detection Range	Immunity Distance
2.5	8.2 ft (2.5m)	>2.5 ft (0.75m)
5	16.5 ft (5m)	>5 ft (1.5m)
7.5	24.7 ft (7.5m)	>7.5 ft (2.25m)
10	33 ft (10m)	>10 ft (3m)

## 4. Operation

### 4.1 Visual Indications

One 3-color LED-indication is located in the detector front window:

Detector Status	LED color	LED mode
Fault, BIT Fault	Yellow	4 Hz flashing
Normal	Green	1 Hz flashing
Warning	Red	2 Hz flashing
Alarm	Red	Steady

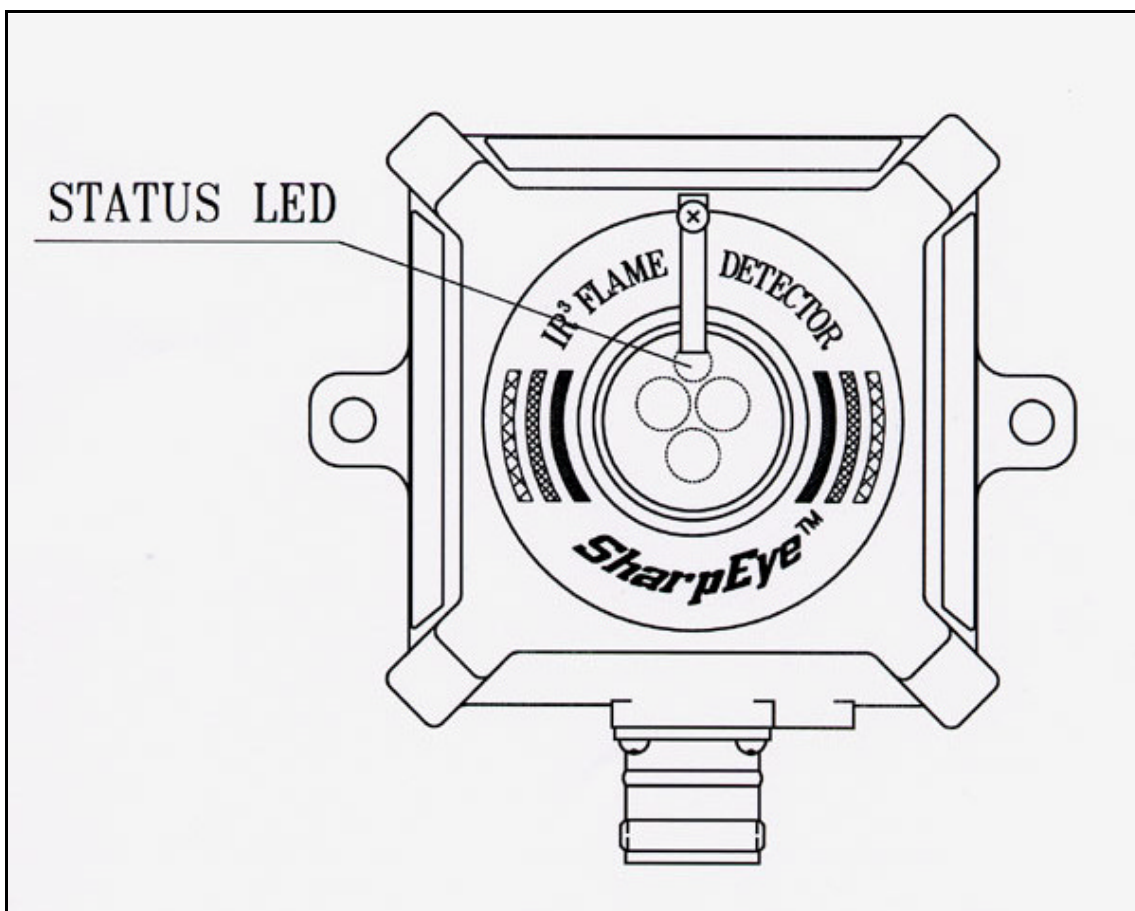


Figure 5: Indication LEDs

## 4.2 Output Signals

The detector controls the following outputs:

- Alarm relay (this output is not available in the ATEX certified model 20/20MI-XX-X-C)
- Fault relay (this output is not available in the ATEX certified model 20/20MI-XX-X-C)
- 4-20mA current output
- RS-485 communication

The detector can be in one of the following states.

<b>Normal:</b>	The detector is functioning normally.
<b>BIT:</b>	The detector performs a Built In Test.
<b>Warning:</b>	Fire detected – warning alarm (pre-alarm) state
<b>Alarm:</b>	Fire detected – fire alarm state
<b>Latched Alarm (Optional)</b>	The alarm outputs are latched due to the detection of a fire that has already been extinguished.
<b>BIT Fault:</b>	A fault is detected during BIT sequence. The detector will continue to detect fire if the alarm conditions occur.
<b>Fault:</b>	A fault is detected when the power supply is too low or during a software fault.

In each state, the detector will activate different outputs as specified in table 8.

**Table 8: Output Signals versus Detector State**

Detector State	Color LED	Flashing LED	Alarm Relay	Fault Relay	4-20mA Output
<b>Normal</b>	Green	1 Hz	Off	On	5 mA
<b>Warning Alarm <sup>(1)</sup></b>	Red	2 Hz	Off	On	10 mA
	Red	Steady	On	On	15 mA
<b>Latch <sup>(2)</sup></b>	Red	Steady	On	On	15 mA
<b>BIT Fault <sup>(3)</sup></b>	Yellow	4 Hz	Off	Off	2 mA
<b>Warning at BIT Fault</b>	Red	2 Hz	Off	Off	10 mA
<b>Alarm at BIT Fault</b>	Red	Steady	On	Off	15 mA
<b>Fault</b>	Yellow	4 Hz	Off	Off	0 mA

Notes:

- 1 The alarm outputs will be activated as long as the alarm conditions are present
- 2 The Alarm state can be latched (optional) according to programmable function
- 3 The detector will be in its BIT FAULT state until it has passed a successful BIT and will stop approximately 3 seconds after the fire is no longer detected.

### 4.2.1 Optional latching

The detector has an optional latched alarm output capability, which operates according to the programmable function. If selected, upon the detection of a fire, the detection signal is latched until manually reset (disconnecting the power supply or performing a manual BIT). Latching affects the ALARM RELAY, 4-20mA output, the ALARM LED.

### 4.2.2 Built-In-Test

When the programmable function “Alarm BIT” at YES successful, Manual BIT will activate the alarm relay for 3 sec. and the 4-20mA output will provide 15mA for 3 sec.

## 4.3 Detector Mode Setup

### 4.3.1 Detector setting

**See Section 4.3.3 for default factory settings**

The 20/20 MI incorporates several functions that can be set by the customer using:

Spectrex Host software, which will be supplied for each detector shipment, refer to manual TM 784050 for programming instructions. The Host software enables you to change functions as described in 4.3.2.

### 4.3.2. Detector’s various functions

#### a. Sensitivity Ranges

The detector offers four (4) sensitivity settings. The settings refer to the gasoline fire of 1ft<sup>2</sup> from

low sensitivity of     33 ft (10 m) to 132 ft (40m) for 20/20MI-1  
                                  8.2 ft (2.5m) to 33 ft (10m) for 20/20MI-3

For other types of fuel sensitivity, refer to Table 3.

**Table 9: Sensitivity range**

Sensitivity	20/20MI-1 Detection Range		Sensitivity	20/20MI-3 Detection Range ft(m)	
	Ft	m		ft	m
10	30	10	2.5	8.2	2.5
20	66	20	5	16.5	5
30	100	30	7.5	24.7	7.5
40	132	40	10	33	10



**b. Alarm Delay**

The detector is equipped with an Alarm Delay option, which provides programmable time delays of 0 to 30 seconds with eight (8) fixed settings: 0, anti-flare, 3, 5, 10, 15, 20, and 30 seconds.

When an Alarm (Detection) level condition is encountered, the detector delays the execution of the Alarm output's relay by the specified period of time. The detector will then evaluate the condition for 3 seconds. If the Alarm level is still present, the Alarm outputs will be activated. If this condition no longer exists, the detector will return to its standby state. The Alarm delay option will affect the alarm relay and the 4-20mA output. The LED will indicate warning level during the delay time only if the fire condition exists.

**Anti Flare**

Anti Flare mode is selected to prevent false alarm in locations where fast flares may be present. The Time delay for fire alarm in this mode is from 2.5 to 15 seconds (mostly less than 10 seconds).

**Table 10: Time Delay**

Delay (seconds)
0
*A – anti-flare
3
5
10
15
20
30

\* Default

**Note:** The FM approval does not allow use of 20, and 30 second setting delay

**c. Function Setup**

The user can select the desired mode of operation by means of host.

**Table 11: Function Setup**

	<b>Name</b>	<b>Yes</b>	<b>No</b>
1	Alarm Latch	Alarm latching enable	Alarm latching disable <b>(default)</b>
2	Automatic BIT	Automatic & manual BIT <b>(default)</b>	Manual BIT only
3	Alarm BIT	Successful Manual BIT activates the Alarm Relay for approximately 3 seconds; the 4-20mA will provide 15mA for 3 sec	Successful manual BIT does not activate the Alarm Relay <b>(default)</b>

**d. Addresses Setup**

Refer to TM 784050 for instructions for defining the addresses of the detectors. The detector provides up to 247 addresses (from 1 to 247) that can be used with RS-485 communication link.

**4.3.3. Detector Default Set Up**

The detector has five (5) functions that can be programmed according to customer requirement at factory or at customer facility using software Host. The standard set up (default) that the detector is programmed to if there are no specific requirements are as follows:

**Table 12: Default function set up**

Detector default set up:	20/20MI-1	20/20MI-3
Sensitivity	20	5
Delay	A	0
Alarm Latch	NO	NO
Automatic BIT	YES	YES
Alarm BIT	NO	NO

**4.4 Built In Test****4.4.1. General**

The detectors' Built In Test (BIT) checks the following:

- Electronics circuitry
- Sensors
- Window cleanliness

The detector can be set to perform the BIT automatically and manually or manually only.

#### 4.4.2. Principles

If the result of a BIT is the same as the current status of the detector (NORMAL or BIT FAULT), the detector's status is unchanged. If the result of a BIT differs from the current status of the detector, the detectors' status is changed (from NORMAL to BIT FAULT or from BIT FAULT to NORMAL).

Note: In BIT FAULT status, the detector can continue to detect a fire.

#### 4.4.3. Automatic & Manual BIT

##### Manual Bit

Functions as described in section 4.4.4. In the case of an unsuccessful BIT all outputs will function as described in section 4.4.4. but the BIT will be automatically executed every 1 minute. This mode of operation will continue until successful BIT has been encountered. As a result, the detector will resume its normal operation.

##### Automatic BIT

The detector automatically performs a BIT every 15 minutes. A successful BIT does not activate any indicator.

- The FAULT relay remains CLOSED (NORMAL).
- The LED continues to flash (1 Hz) at green.
- The 4-20mA output continues to indicate 5 mA.

An unsuccessful BIT sequence activates the following:

- The FAULT relay is opened.
- 4-20mA output indicates BIT FAULT (2 mA).
- The LED flashes (4 Hz) at yellow.
- BIT procedure will be performed every 1 minute.

#### 4.4.4. Manual BIT only

The BIT is initiated manually by momentarily connecting PIN No. 3 (or yellow wire) with PIN No. 2 (or black wire). A successful manual BIT activates the following:

- FAULT relay remains CLOSED.
- ALARM relay is activated for 3 sec (only when Function Alarm BIT at YES)
- 4-20 mA OUTPUT current will be 15mA (only when Function Alarm BIT at YES).
- The LED will illuminate at red for 3 sec.

Unsuccessful BIT activates the following:

- FAULT relay is opened.
- 4-20 mA output indicates BIT FAULT condition (2mA).
- The LED flashes (4 Hz) at yellow.

Note: During a MANUAL BIT, if Function Alarm BIT is in YES position, the ALARM relay will be activated and the 4-20mA outputs will initiate 15mA. Therefore, automatic extinguishing systems or any external devices that should be activated under actual alarm conditions should be disconnected during BIT.

## 5. Technical Specifications

### 5.1 Electrical Specifications

- A. **Operating Voltage:** 18-32 VDC
- B. **Power Consumption:**  
Max. 25mA in Stand-by  
Max. 50mA in Alarm
- C. **Electric input protection:** The input circuit is protected against voltage-reversed polarity, voltage transients, surges and spikes according to MIL-STD-1275A.
- D. **Electrical outputs**

- **Dry Contact Relays:**

**Table 13: Contact Ratings**

Relay Name	Type	Normal position	Maximum Ratings
Alarm	SPST	N.O.	2A at 30VDC or 0.5A at 250 VAC
Fault *	SPST	N.C.	2A at 30VDC or 0.5A at 250 VAC

- The FAULT relay will normally be energized and the contact will be closed during normal operation of the detector. The contact will be open at Fault condition or low voltage.
- The relay outputs are not available in the intrinsically safe model 20/20MI-XX-X-C.
- **4-20mA Current Output**  
The 4-20mA is isolated sink option.  
The maximum permitted load resistor is 600Ohm.

STATE	Output
FAULT	0 + 0.5mA
BIT FAULT	2mA±10%
NORMAL	5mA±10%
WARNING	10mA±5%
ALARM	15mA±5%

- **Communication Network:**  
The detector is equipped with an RS-485 communication link that can be used in installations with computerized controllers. The communications protocol is Modbus compatible.
  - This protocol is a standard and widely used.
  - It enables continuous communication between a single standard Modbus controller (Master device) and a serial Network of up to 247 detectors.
  - It enables connection between different types of Spectrex detectors or other Modbus devices to the same Network.

## 5.2 Mechanical Specifications

### A. Enclosure options

- Aluminum enclosure, chromate coating and epoxy enamel finish.
- St. St. 316L Electro chemical and passivation coating
- Plastic enclosure, glass fiber reinforced polyester

### B. Hazardous Area approvals

ATEX (Cenelec)\* EX II 1GD T123 °C  
 EEx ia IIC T4 (Ta = -40°C to +85°C)  
 EEx ia IIC T5 (Ta = -40°C to +60°C)

*\*The 20/20MI in Plastic housing is ATEX pending*

### C. Functional Test

FM functional test Per 3620  
 for 20/20 MI-3 (20/20 MI-1 pending)

### D. Water and dust tight

NEMA 250 type 6p.  
 IP 66 and IP 67 per EN 60529

### E. Electronic Modules

Conformal coated.

### F. Electrical connection (two options)

1. Connector Interface (mating connector supplied with detector)
2. Cable Interface

### G. Dimensions

Base: 4.3 in (110mm) x 3.9 in (100 mm)  
 Height: 2.6 in (65.5mm)

### H. Weight

Aluminum Alloy Housing	1.1 lb. (0.5 kg)
St. St. 316L Housing	2.4 lb. (1.2 kg)
Plastic Housing	0.6 lb. (0.3 kg)
Tilt Mount	0.8 lb. (0.37 kg)

### 5.3 Environmental Specifications

- **High Temperature**

Design to meet MIL-STD-810C, method 501.1 procedure II

Operating temperature: +160 °F (+70 °C)

Storage temperature: +185 °F (+85 °C)

- **Low Temperature**

Design to meet MIL-STD-810C, method 502.1, procedure I

Operating temperature: -40 °F (-40 °C)

Storage temperature: -65 °F (-55 °C)

- **Humidity**

Design to meet MIL-STD-810C, method 507.1, procedure IV

Relative humidity of up to 95% for the operational temperature range.

- **Salt Fog**

Design to meet MIL-STD-810C, method 509.1, procedure I

Exposure to a 5% Salt Solution Fog for 48 hours.

- **Dust**

Design to meet MIL-STD-810C, method 510.1, procedure I

Exposure to a dust concentration of 0.3 frames/cubic ft. at a velocity of 1750 fpm, for 12 hours.

- **Vibration**

Design to meet MIL-STD-810C, method 514.2, procedure VIII

Vibration at an acceleration of 1.1g within the frequency range of 5-30 Hz, and an acceleration of 3g within the frequency range of 30-500 Hz.

- **Mechanical Shock**

Design to meet MIL-STD-810C, method 516.2, procedure I

Mechanical Shock of 30g half-sin wave, for 11 msec.

- **Electromagnetic Compatibility (EMC):**

This product is in conformance with EMC directive 89/336/EC.

Radiated Emission	EN61000-6-3
Conducted Emission	EN61000-6-3
Radiated Immunity	EN61000-4-3
Conducted Immunity	EN61000-4-6
ESD	EN61000-4-2
Burst	EN61000-4-4
Surge	EN61000-4-5

## 6. Installation Instructions

### 6.1 Scope

The SharpEye Model 20/20MI is a self-contained Optical Flame Detector designed to operate as a stand-alone unit directly connected to alarm systems or automatic fire extinguishing systems. The detector can be a part of a more complex system where many detectors and other devices are integrated through a common control unit. This Section does not attempt to cover all of the standard practices and codes of installation. Rather, it emphasizes specific points of consideration and provides some general rules for qualified personnel. Wherever applicable, special safety precautions are stressed.

### 6.2 General Considerations

#### Very Important

The detector should be aimed toward the center of the detection zone and have a completely unobstructed view of the protected area. Whenever possible, the detector face should be tilted down at a slight angle to prevent the accumulation of dust and dirt. Do not start an installation unless all conceivable considerations regarding detector location have been taken into account.

To ensure optimal performance and an efficient installation, the following guidelines should be considered:

#### A. Sensitivity

To determine the level of sensitivity, the following issues should be considered:

- Size of fire at determined distance to be detected.
- Type of flammable materials.

#### B. Spacing and Location

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

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

#### C. Environment

- Dust, snow or rain can reduce the detectors sensitivity and require more maintenance activities.
- The presence of high intensity flickering of IR sources may affect sensitivity.

### **6.3 Preparations for Installation**

Installation should comply with NFPA 72E, as applicable to flame detectors. The detectors can be installed with the use of general-purpose common tools and equipment.

- 1 Verify the appropriate Purchase Order. Record the Part No. and the Serial No. of the detectors and the installation date in the appropriate Log-book.
- 2 Open the container package prior to detector installation and visually inspect the detector.
- 3 Verify that all components required for the detector installation are readily available before commencing the installation. In case that the installation is not completed in a single session, secure and seal detectors and conduits.
- 4 For wiring, use color-coded conductors or suitable wire markings or labels. 12 to 20 AWG (0.5 mm<sup>2</sup> to 3.5 mm<sup>2</sup>) wires may be used for site wiring. The selection of wire gauge should be based on the number of detectors used on the same line and the distance from the control unit, in compliance with specifications.



#### **6.4 Certification Instructions**

This section refers only for intrinsically safe installation on model 20/20MI-XX-X-C. The following instructions apply to equipment covered by certificate numbers Sira 04 ATEX 2010 and Sira 04 ATEX 2011X:

- 1 The equipment may be used in a hazardous area with flammable gasses and vapors with apparatus groups IIC, IIB and IIA and with temperature classes T1, T2, T3, T4 and T5.
- 2 The equipment is certified for use in ambient temperatures in the range of -40°C to +85°C and should not be used outside the range.
- 3 Installation shall be carried out in accordance with the applicable code of practice by suitably trained personnel.
- 4 The equipment is not intended to be repaired by the user. Repair of this equipment shall be carried out by the manufacturer in accordance with the applicable code of practice.
- 5 If the equipment is likely to come into contact with aggressive substance, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.  
Aggressive substances – e.g. acidic liquids or gases that may attack metals or solvents that may affect polymeric materials.  
Suitable Precautions – e.g. regular checks as part of routine inspections or Establishing from the material's data sheet that it is resistant to specific chemicals.
- 6 As an option the enclosure may be constructed from wrought alloy with specified magnesium content of less than 6%. In the event of rare incidents, ignition source due to impact and friction sparks could occur. This shall be considered when the equipment is being installed in locations that specifically require Group II, category 1G equipment this is highlighted as a special condition for safe use in the certificate Sira04 ATEX 2011X.
- 7 The manufacturer should note that, on being put into service, the equipment must be accompanied by a translation of the instructions in the language of the country in which the equipment is to be used and by the instructions in the original language.
- 8 The instructions shall contain the certification marking as detailed on the relevant Certification drawing, number 787831 and 787861.

## 6.5 Conduit Installation

The detector can be mounted directly on the wall through 7-mm hole (item 7, Fig. 6) or preferably with the optional Tilt Mount, Model 787640 (item 1, Fig. 6). The Tilt mount enables the detector to be rotated up to 60 degrees in all directions.

### 6.5.1 Tilt Kit P/N 787639

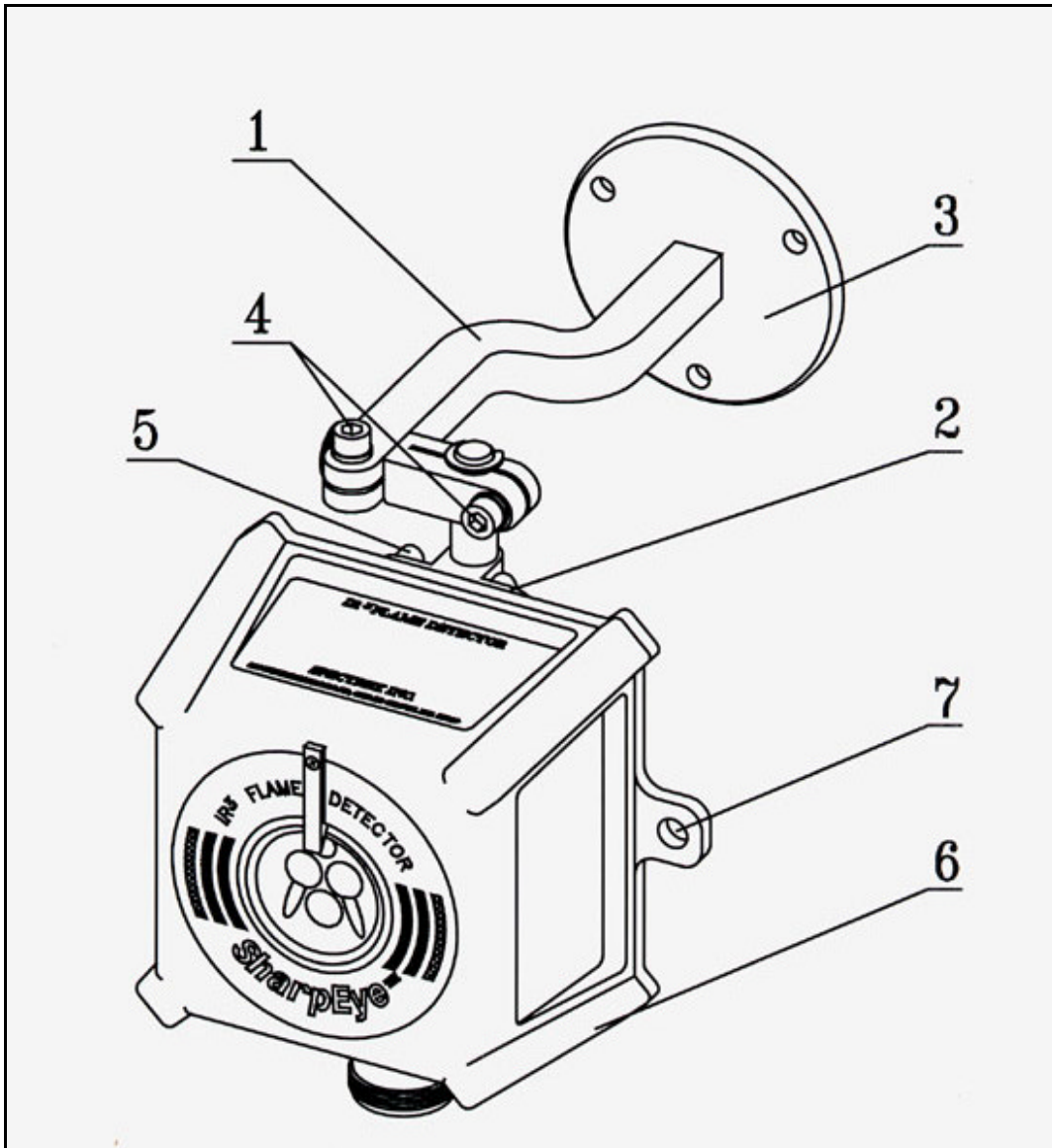
**Table 14: Tilt Kit**

Item	Qty	Type/Model	Location
Tilt Mount	1	787640	
Screw	4	10-32 UNF x 7/16"	Detector - Holding plate
Spring Washer	4	No. 10	Detector - Holding plate

### 6.5.2 Tilt installation (Figs. No. 6 and 7)

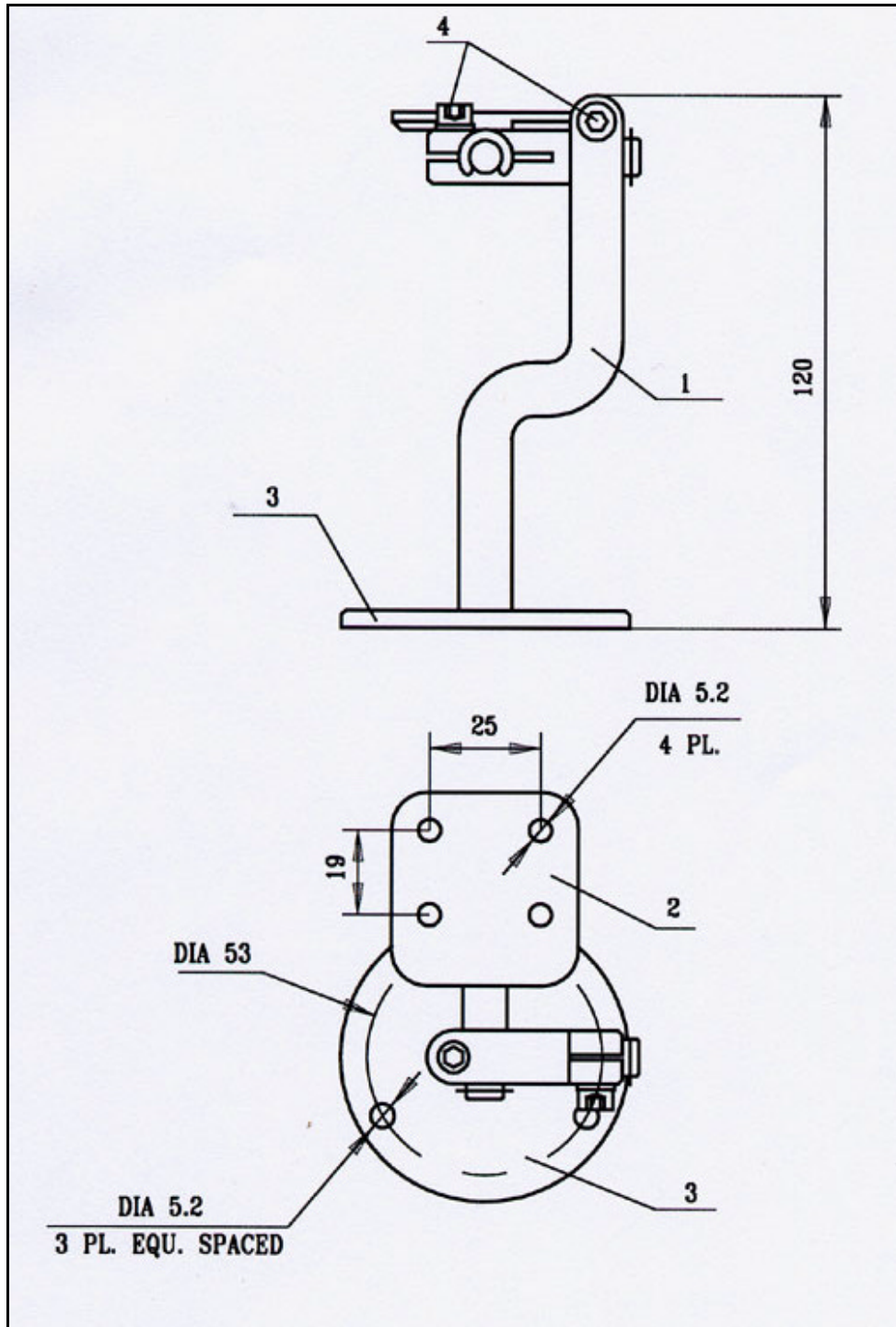
- 1 Place the tilt mount (item 1) in its designated location and secure it with three (3) fasteners through three (3) holes dia. 5.2mm (Fig. 7). Note: Skip this step if the Tilt Mount is already installed. Also detector removal for maintenance purpose does not require Tilt Mount removal.
- 2 Unpack the detector.
- 3 Place the detector, with its connector or cable pointing down, on the holding plate of the tilt mount (item 2). Secure the detector by four (4) 10-32 UNF x 7/16" screws with No. 10 spring washers to the Tilt Mount. Use 5/32 Hex Key for 10-32 screw (item 5).
- 4 Release the locking screw (item 4) in such a way that allows rotating the detector. Point the detector towards the protected area and make certain that the view of the area is unobstructed. Secure the detector in that position by tightening the locking screws (item 4) on the tilt mount. (Make sure the detector is in the right position.)

The detector is now correctly located, aligned and ready to be connected to the system.



Description			
1	Tilt Mount	5	Holding Screws
2	Detector Holding Plate	6	Washers
3	Mounting Plate	7	IR3 Detector Direct Mounting Holes
4	Locking Screw		

Figure 6: IR3 Detector and Tilt Mount Assembly



Description			
1	Tilt Mount	3	Mounting Plate
2	Detector Holding Plate	4	Locking Screw

Figure 7: Tilt Mount Assembly - Outline Drawing

## 6.6 Detector Mounting

When used in hazardous area, in order to comply with intrinsically safe requirement, barriers must be incorporated and there will also be restrictions on cable types and lengths. The detailed parameter will be dependent on the type of barrier used.

- A. Choose the wiring configuration according to Appendix A.
- B. Connect the wire to the required PIN on the connector or choose the required color on the cable, according to your wiring diagram.
- C. Connect the grounding wire to general screw outside the detector, (Figs.2 and 3). The detector must be well grounded to earth ground for proper operation.

## 6.7 Wiring Function

(See Fig. No. 8 and No.9.)

The following describes the function of each electrical wire of the detector:

### Power Supply

PIN No. 1 or red wire - used for Input Power

PIN No. 2 or black wire - used for Return

### Manual Bit Activation

PIN No. 11 or yellow wire - used for the Manual BIT activation.

The manual BIT is initiated by a momentary connection of the 11 (yellow wire) to the power supply Return line.

### Fault Relay

The Fault output is a N.C. SPST contact relay:

PIN No. 5 or brown wire

PIN No. 6 or light blue wire

The contact is normally energised closed when the detector is in its normal operational condition.

This output is not available in the intrinsically safe model 20/20MI-XX-X-C.

### Alarm Relay

The Alarm output is a N.O. SPST contact relay.

PIN No. 7 or orange wire

PIN No. 8 or violet wire

This output is not available in the intrinsically safe model 20/20MI-XX-X-C.

**4-20 mA Output**

This output is used for analog, 4-20 mA current output as specified in

Paragraph 5.1D

PIN No. 11 or pink wire is used as output (+).

PIN No.12 or blue wire is used as input (-)

See Appendix A for more details.

**RS-485**

This output is used for communication network as specified in Appendix A.

PIN No. 10 or white wire is the positive (+) lead.

PIN No. 9 or gray wire is the negative (-) lead.

**Ground**

Pin No. 12 or green wire is used for Ground connection.

**6.8 Operation Mode**

The detector is supplied with a default function set up as follows:

**Table 15: The detector default set up**

Function	20/20MI-1	20/20MI-3
Sensitivity	20	5
Delay	A	0
Alarm Latch	NO	NO
Automatic BIT	YES	YES
Alarm BIT	NO	NO

The function set up can be reprogrammed by the user through RS-485 using a PC with a Spectrex Host or through use of a handheld unit. Refer to TM 784050 for instructions.

***Programmable Function:***

Modes of operation are programmable with a PC or Handheld unit according to the selection table in Paragraph 4.3.2 and Refer to TM 784050.

***Address:***

The detector has the capability of acting as an addressable device.

The detector provides 247 (1-247) addresses, which can be used by the RS-485 communications link as described in paragraph 4.3.2 d - and Refer to TM 784050.

***Alarm Delay:***

An Alarm Delay may be required for certain applications. The detector has an Alarm Delay that permits time delays from 0, anti-flare, 3, 5, 10, 15, 20 and 30 seconds respectively. The delay can be defined by the RS-485.

Refer to TM784050.

## 7. Operating Instructions

### 7.1 Scope

The following instructions are designed to obtain optimal performance from the detector over its life cycle.

### 7.2 Power-Up

- 1 Apply power and wait approximately 60 seconds for the automatic self-test of the detector.

**Note:** Applying power initiates the following sequence: the LED flash (4 Hz) in yellow. BIT is executed, if successful then: LED flash (1 Hz) in green, FAULT relay contacts close

- 2 Wiring Inspection: If a short-circuit or line discontinuity exists, indications will appear on the control unit display panel. Review your wiring.
- 3 The detector goes into its FAULT state when supply voltage drops under 16.5V. The detector status goes back to NORMAL, when the supply voltage is above 17.5V.
- 4 Detector Inspection: Visually inspect the viewing window of the detector. It should be clean and clear.
  - LED should flash (1 Hz) in green
  - ALARM relays should be N.O
  - FAULT relay should be N.C
  - The 4-20mA Output should be 5mA.
- 5 If any of the outputs or indications are different from the description in step 4, see paragraph 8.6 for troubleshooting.

The Flame Detector is now ready for Functional Testing.

### 7.3 Reset (*only when optional 'latching' alarm has been selected*)

To RESET a detector when in its ALARM state, disconnect power, or initiate a manual BIT.

### 7.4 Functional testing

Following is a testing procedure for proper functioning of the detector. The detector can be tested using the Manual Built-in-Test or the Spectrex IR3 Fire Simulator - 20/20-310

### 7.4.1 Manual BIT Test

Momentarily connecting PIN number 11 or yellow wire with PIN 2 or black wire performs manual BIT.

#### **Important Note!**

If the function setup “Alarm BIT” is in YES, then the Alarm and 4-20mA Output will be activated during a manual BIT, therefore, automatic extinguishing systems or any external devices that may be activated during BIT must be disconnected.

- 1 Verify that the detector is operated properly.
- 2 Initiate manual BIT. After a few seconds the following occurs:
  - Alarm Relay will be activated and the 4-20mA output turns to 15mA for 3 seconds (only if “Alarm BIT” at YES).
  - The LED should light constant red for 3 seconds.
  - Fault Relay should stay N.O during the test.

### 7.4.2 Testing with Fire Simulator Model 20/20-310 (see Appendix B)

This test simulates an exposure of the detector to a real fire condition. The detector is exposed to radiation at the required detection level. As a result the detector must generate a Fire Alarm signal.

#### **Important Note!**

If the detector is exposed to a fire simulator, the Alarm Relay and 4-20mA will be activated during the simulation. Therefore, automatic extinguishing systems or any external devices, which may be activated during this process, must be disconnected.

- 1 Apply power to the system and wait up to 60 seconds for turning of the detector to normal state. The LED flash (1 Hz) at green. If the detector is on, skip this step.
- 2 Aim the Spectrex Fire Simulator Model 20/20-310 at the target point of the detector (see Fig. 15), in a way that the radiation emitted by it is facing directly towards the detector. (See appendix B)
- 3 Press the operation button once. After few seconds,
  - The LED should light constant at red for a few seconds.
  - The 4-20mA output should turn to 15mA for a few seconds and then return to 5mA.
  - The Alarm Relay should also turn on to this period.

This completes the installation procedure. The detector and system are now ready for operation.



### **7.5 Safety Precautions**

After Powering-up, the detector requires hardly any attention in order to function properly, but the following should be noted:

- 1 Follow the instructions in the manual and refer to the drawings and specifications issued by the manufacturer.
- 2 Do not expose the detector to radiation of any kind unless required for testing purposes.
- 3 Do not open the detector housing, while power is supplied.
- 4 Do not touch internal parts other than the three functional switches. Interference with internal circuits may impair detector performance and will invalidate manufacturer's Warranty.
- 5 Disconnect external devices, such as automatic extinguishing systems before carrying out any maintenance.

## **8. Maintenance Instructions**

### **8.1 Scope**

This Section deals with preventive maintenance, describes possible faults in detector operation and indicates corrective measures. Ignoring these instructions may cause problems with the detector and may invalidate the warranty. Whenever a unit requires service, please contact the manufacturer or its authorized distributor for assistance.

### **8.2 Maintenance Instrumentation and Personnel**

The detectors' maintenance requires ordinary tools and suitably qualified personnel, who should be familiar with local codes and practices.

### **8.3 Preventive Maintenance Procedures**

The detector must be kept as clean as possible. The viewing window and the reflector Flame Detector must be cleaned on a periodic basis. The frequency of cleaning operations depends upon the environmental conditions and specific applications. The fire detection system designer will give his recommendations.

- 1 Disconnect power to the detector before proceeding with any maintenance including lens cleaning.
- 2 To clean the detector viewing window and reflector use water and detergent, rinse with clean water.
- 3 Where dust, dirt or moisture accumulates on the window, first clean with a soft optical cloth and detergent, then rinse with clean water.

### **8.4 Periodic Maintenance Procedures**

In addition to preventive cleaning and maintenance, the detector should be functionally tested every six months. This test should also be carried out for any reason the detector has been opened.

#### **8.4.1 Power-Up Procedure**

Perform Power-Up procedure every time power is restored to the system. Follow the instructions in paragraph 7.2.

#### **8.4.2 Functional Test Procedure**

Perform a functional test of the detector as described in paragraph 7.4.

### **8.5 Maintenance Records**

It is recommended to record maintenance operations performed on a detector in a system Log-book. The record should include information, which identifies the unit, the installation date, contractor, and entries for every maintenance operation performed including the description of the operation, date and personnel ID. If a

unit is sent to the manufacturer or distributor for service, a copy of the Maintenance records should accompany it.

## **8.6 Troubleshooting**

### **8.6.1 Fault Indication**

- 1 Check power supply for correct voltage, polarity and wiring.
- 2 Check detector window and reflector for cleanness. If necessary clean the window as indicated in paragraph 8.3 and repeat the test.
- 3 Disconnect the power supply to the system and check the detector's internal wiring.
- 4 Reconnect power supply and wait approximately 60 seconds. Repeat the test. If the indication LED is still flashing (4 Hz) in yellow, the unit requires service.

### **8.6.2 False Alarm or Warning Indication**

- 1 Disconnect the power supply from the system and check internal wiring.
- 2 Reconnect power supply and wait approximately 60 seconds. If indication remains, the unit requires service.



## Appendix A: Typical Wiring Configurations

### Important Note

See Appendix B for Wiring for Intrinsically Safe installation

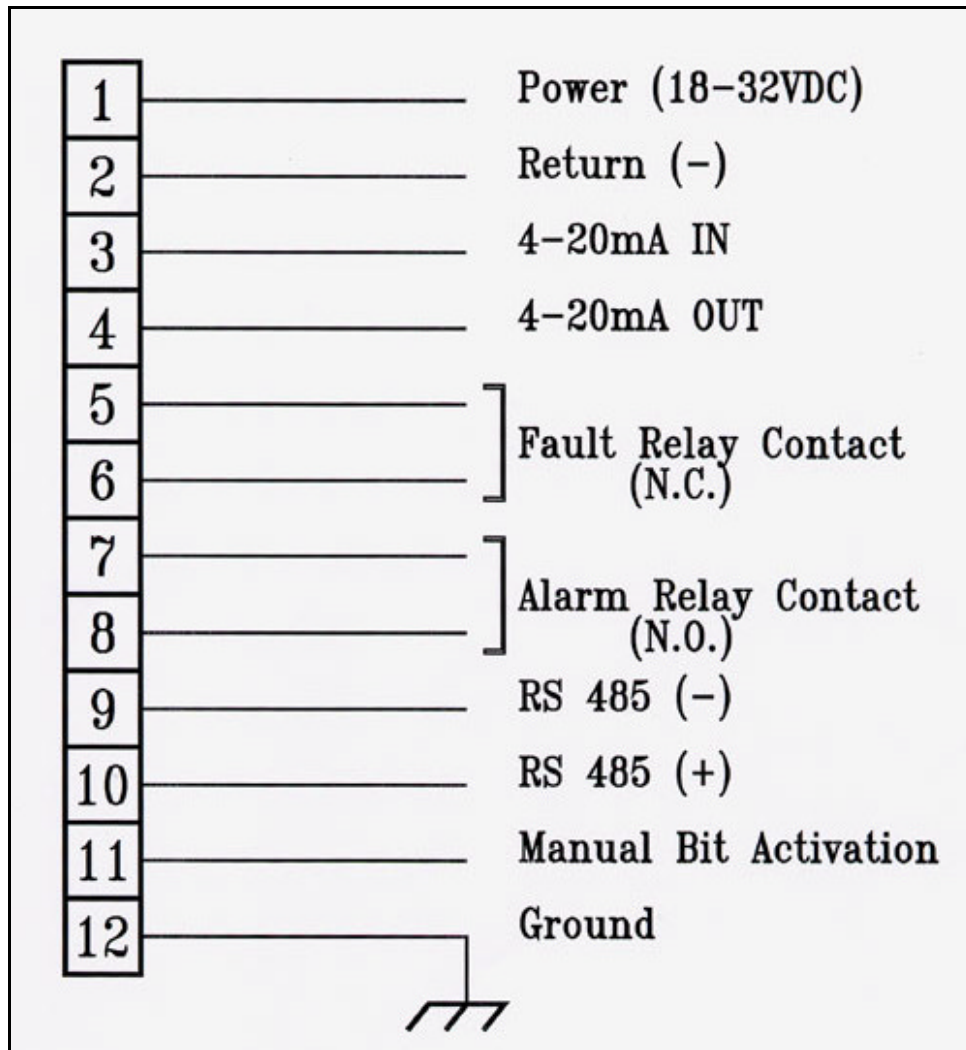


Figure 8: Connector Interface Option

### Note

In the intrinsically safe model 20/20MI-XX-X-C PINs 5,6,7,8 are not connected

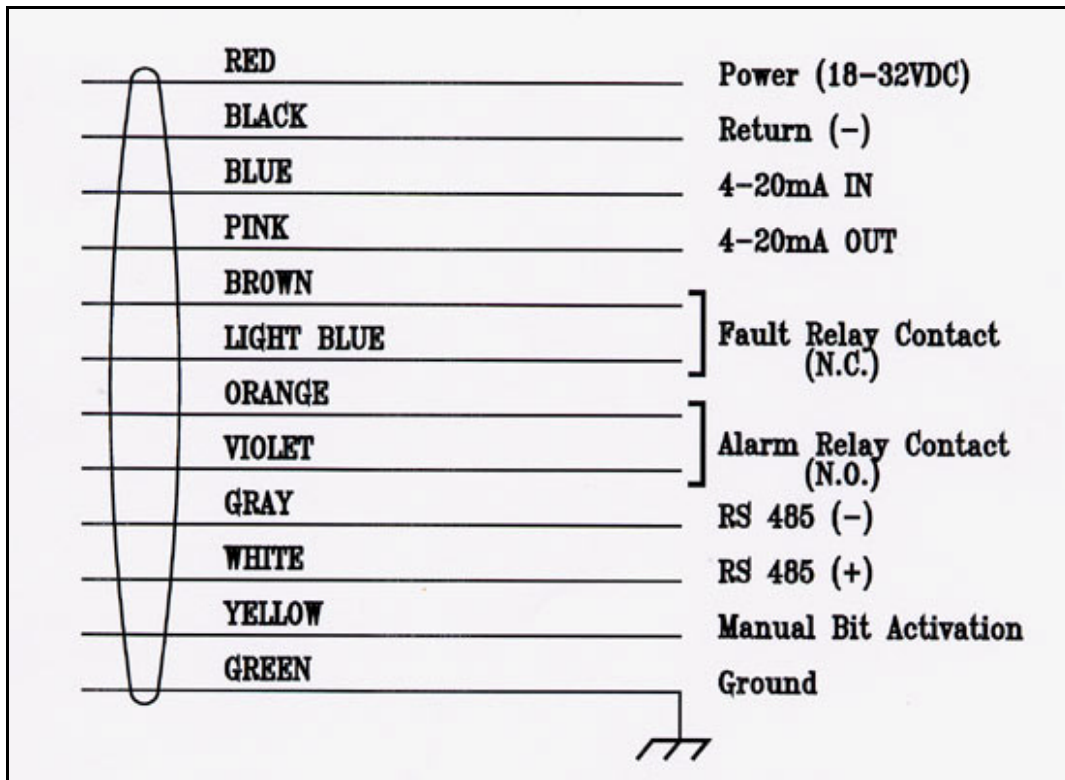


Figure 9: Cable Interface Option

**Note**

In the intrinsically safe model 20/20MI-XX-X-C wires brown, light blue, orange, violet are not connected

### RS-485 Communication Network

Using the RS-485 network capability of the IR3 detector and control software, it is possible to connect up to 32 detectors in an addressable system with 4 wires only (2 for power and 2 for communication). Using repeaters, the number of detectors can be much larger (32 detectors for each repeater) up to 247 on the same 4 wires. When using the RS-485 network, it is possible to read each detector status (FAULT, WARNING, ALARM) and to initiate a BIT to each detector individually.

For more details, consult the factory.

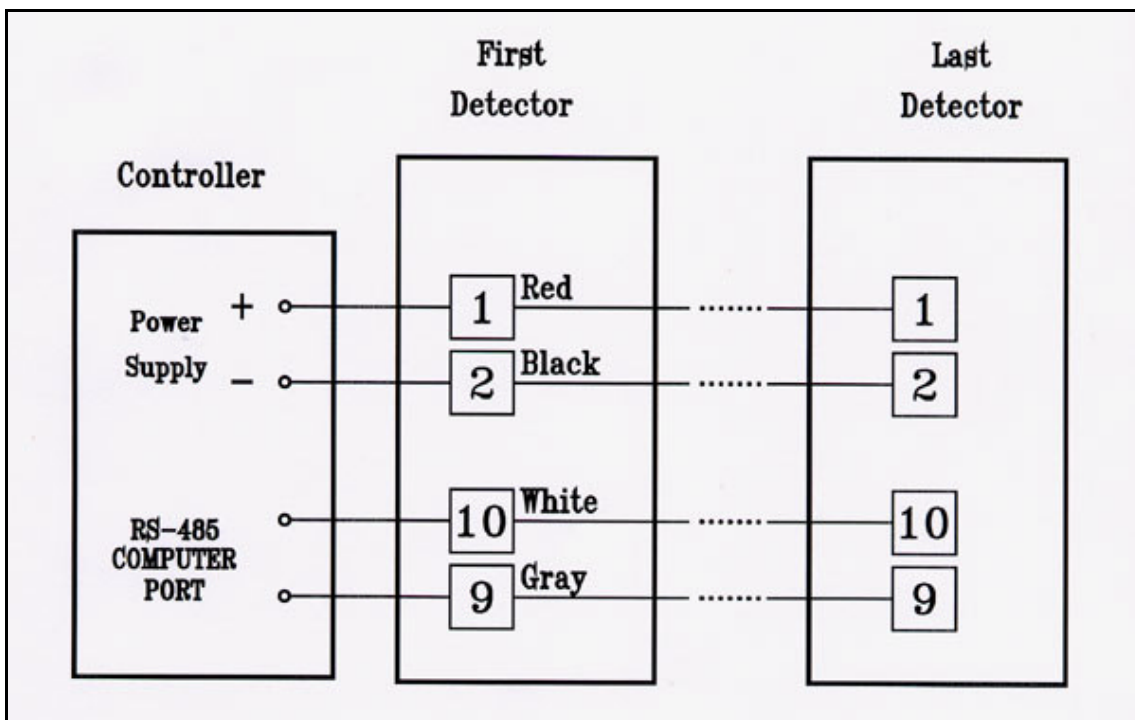


Figure 10: RS-485 Networking

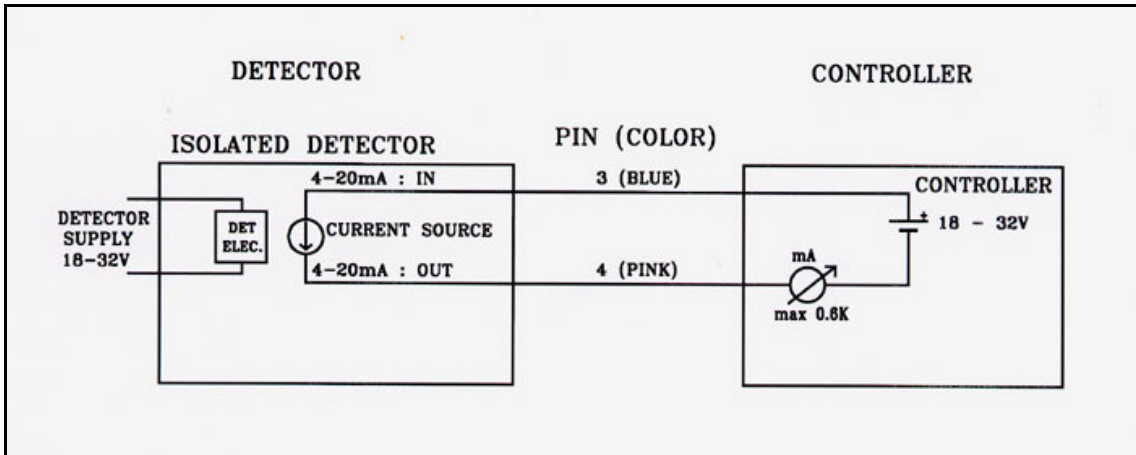


Figure 11: 4-20mA Wiring (Sink Option)

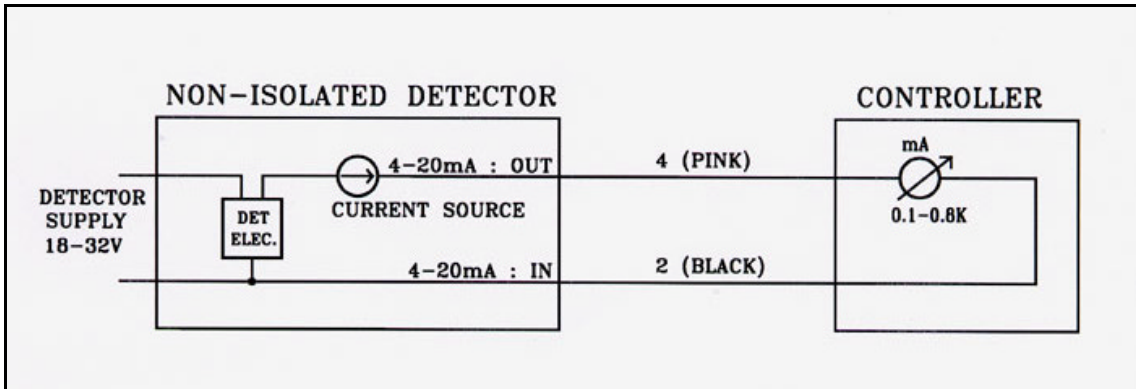


Figure 12: 4-20mA Wiring (Source Option)

Notes: The detectors are factory set to isolated 4-20mA-sink version. To work at non-isolated 4-20mA source version, connect PIN 3 or blue wire to PIN 1 or red wire. This can be done on the mating connector or in the junction box in the cable option. The 4-20mA will be measured between PIN 4 or pink wire and PIN 2 or black wire.



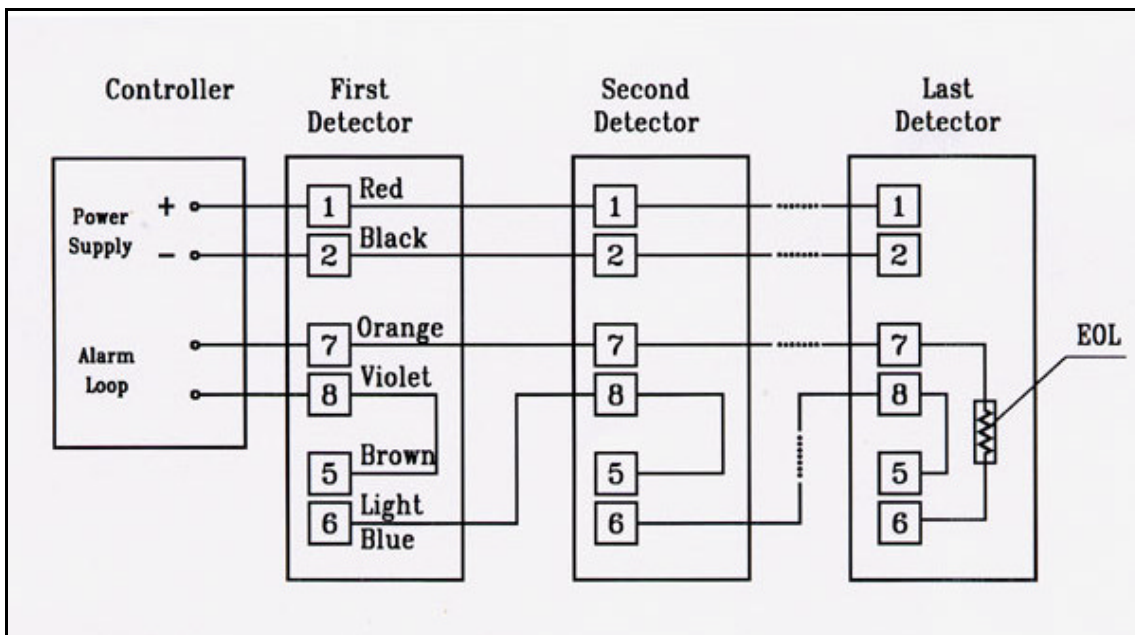


Figure 13: Typical Wiring For 4 Wire Controllers

Notes:

- 1 In the intrinsically safe model 20/20MI-XX-X-C this wiring configuration is not relevant
- 2 For EOL resistor value see Controller Manual
- 3 The color wire refers to the color of the cable output option. The PIN No. Refer to the connector option.



## Appendix B: Intrinsically Safe Connection For 20/20MI-XX-X-C

The 20/20MI-XX-X-C is intrinsically safe certified per ATEX Ex II 1GD, EEx ia IIC T4. This model does not include the relay outputs.

In order to comply with the intrinsic safety requirements, barriers/ galvanic isolators must be incorporated. This section will recommend types of barriers and connection. To comply with Intrinsic safety requirements, any barriers/isolators that will comply with parameters of the detector certification or lower and allow proper operation of the detector will be acceptable.

The attached list is for example only.

- a. For power line - MTL 5021, MTL5022, P&F KFD2-SL2-EX 1.B
- b. For 4-20mA output - MTL 7787, P&F KFD2-CR-Ex 1.30-300
- c. For RS-485 line - MTL 7766AC

The Flame Detector limitation parameters, per input/output, are as follows:

Pin	Ref	Ui	Ii	Pi	Ci	Li
1	Vin	30V	200mA	1W	0	0
2	GND					
3	4-20 mA IN	30V	200mA	0.5W	0	0
4	4-20 mA OUT					
5	RS485A+	±12V	80mA	1W	0	0
6	RS485B-					
7	Fault relay	30V	X	X	0	0
8	Fault relay rtn					
9	Alarm relay	30V	X	X	0	0
10	Alarm relay rtn					
11	Shield	0	0	0	0	0
12	EXT_BIT_SW	0	0	0	0	0

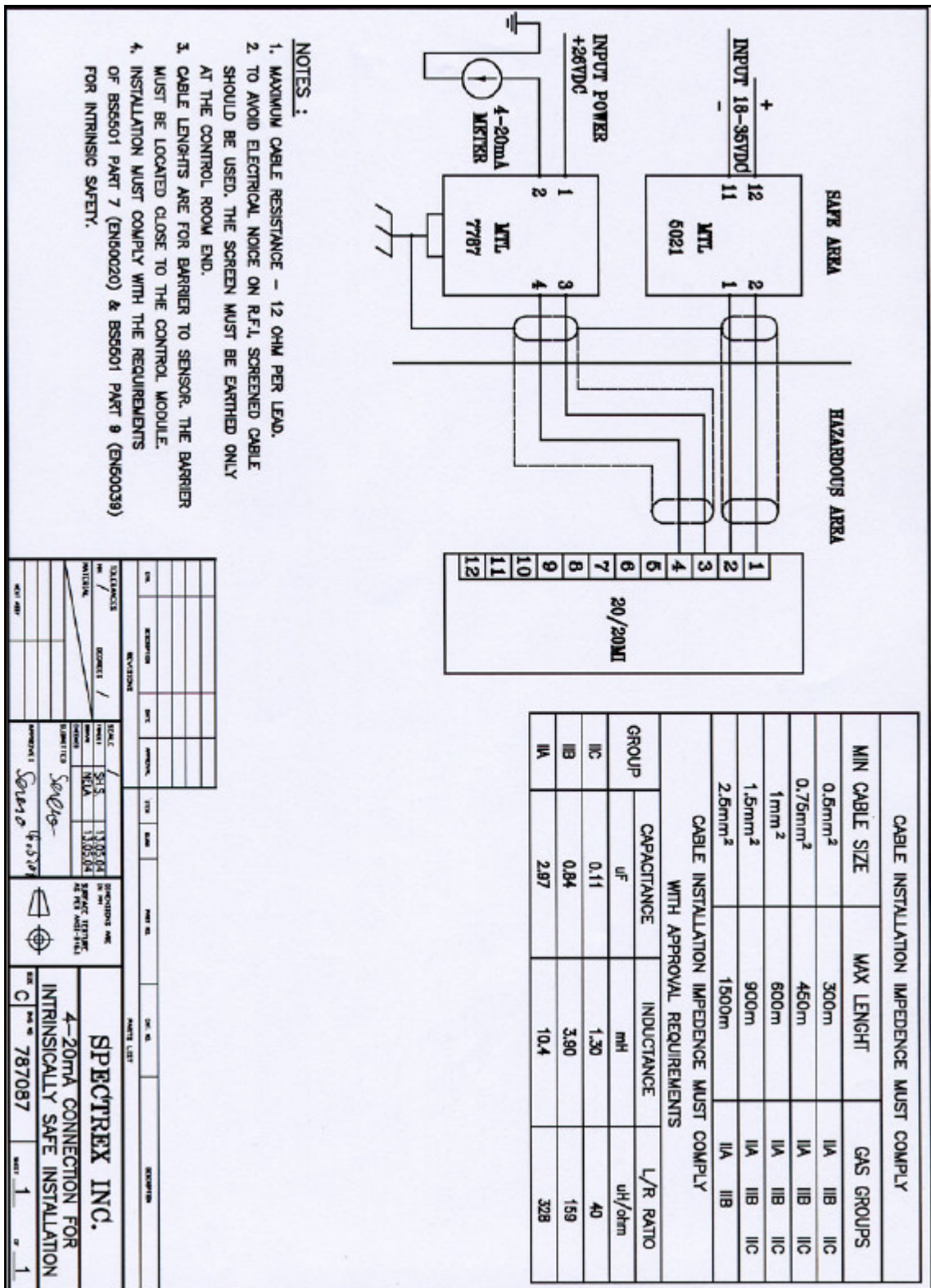


Figure 14: 4-20 mA (sink) connection for Intrinsically Safe installation

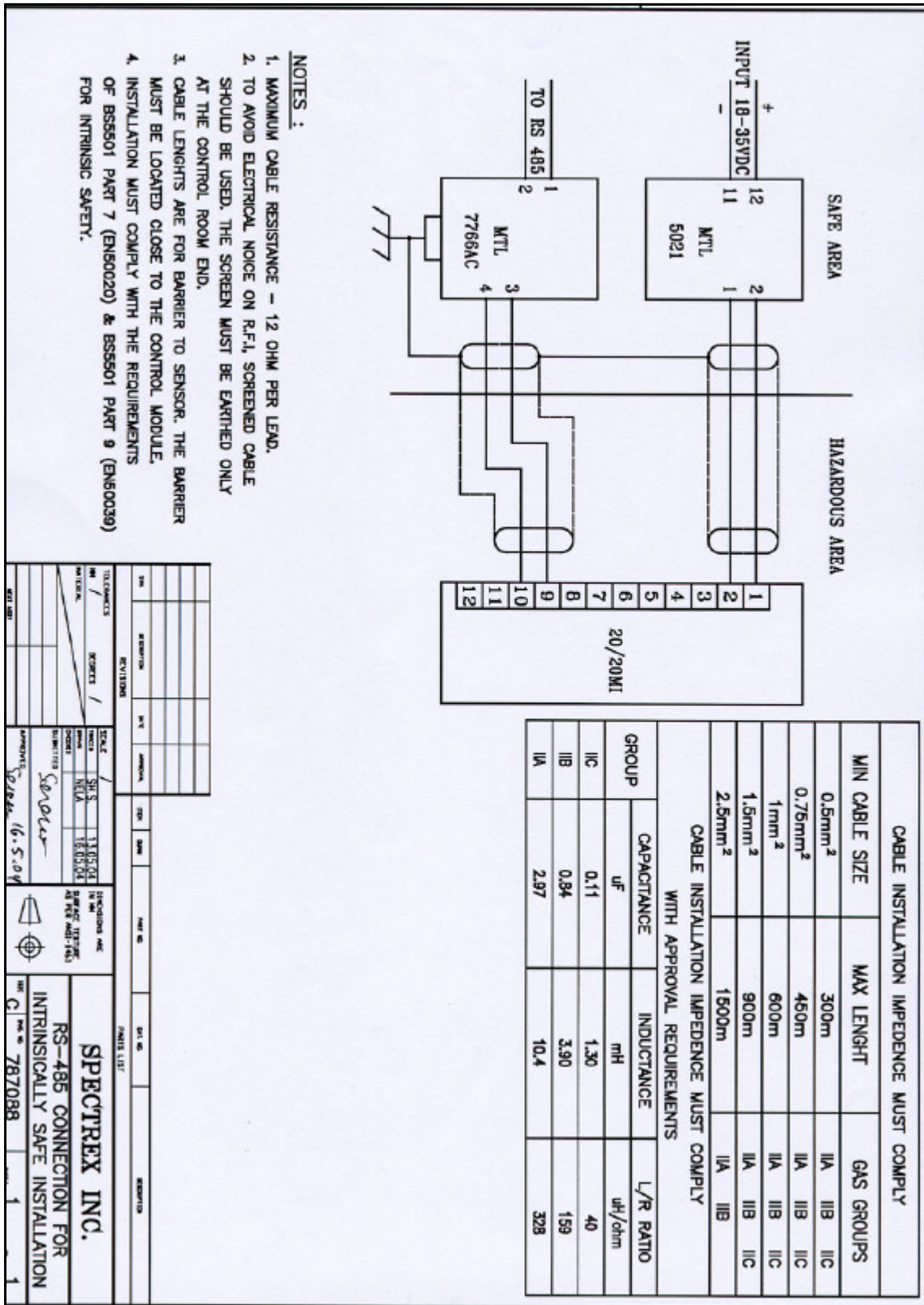


Figure 15: RS-485 connection for Intrinsically Safe installation



## Appendix C: Long Range IR3 Fire Simulator

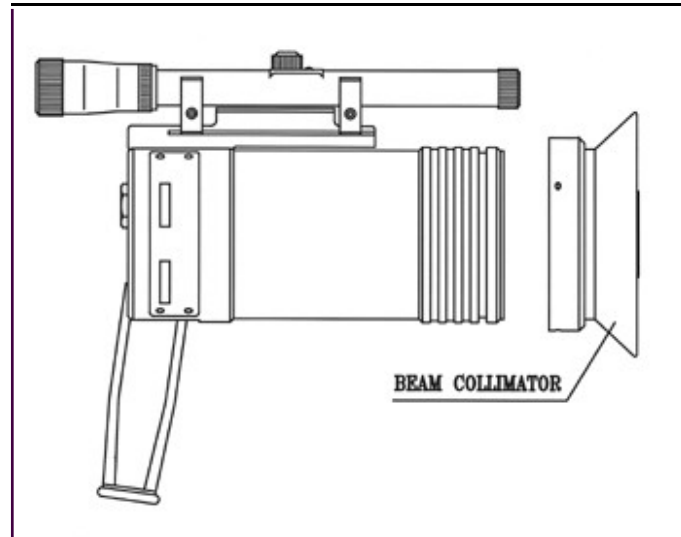


Figure 16: Fire Simulator

### Product Description

The SharpEye IR3 Long Range Fire simulator 20/20-310 is designed specifically for use with SharpEye IR3 flame detectors. The Fire Simulator emits IR radiation in a unique sequential pattern corresponding to and recognizable by the IR3 detector as fire. This allows the IR3 detectors to be tested under simulated fire conditions without the associated risks of an open flame.

There is a specially designed beam collimator model number 20/20-190 used for extended operating range.

### Unpacking

In addition to the delivery form, there should be the following contents:

- Fire Simulator with built in batteries
- Battery charger
- Optional Beam Collimator
- Storage Case

### Operating Instructions

#### WARNING:

Do not open the Fire Simulator to charge the batteries or for any other reason in a hazardous area.

**CAUTION:**

The following test will simulate a real fire condition and may activate the extinguishing system or other alarms. If this is not desired, disconnect/inhibit them before the test and reconnect after the simulation.

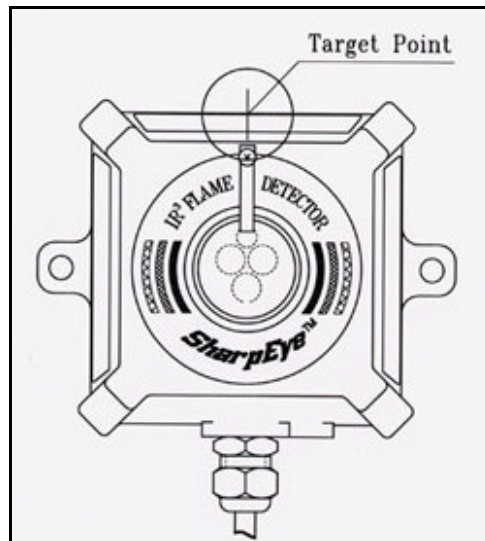


Figure 17: Mini IR3 Detector Target Point

**Follow these instructions to simulate a fire:**

1. Aim the Fire Simulator towards the detector's "Target Point".
2. For testing keep a distance of at least 50cm (20 inches) from the detector.
3. Press the operation button once. Fire simulation will last for 20 seconds. The detector will send an alarm signal (solid red LED).
4. For another fire simulation a 20 second time lapse is required between tests.
5. Make sure the optical window is clean and keep the Fire Simulator in a safe place when not in use.

**Battery Charging**

The Fire Simulator uses NiCad batteries as a rechargeable power source. When the batteries are fully charged it will operate for at least 60 uses without recharging. An internal buzzer is sounded when the voltage from the batteries is lower than the required operational level.

1. Place the Fire Simulator on a table in a safe area.
2. Turn the sealed plug (next to the operation button) counter-clockwise with a suitable wrench.
3. Connect the battery charger.
4. Charge for a maximum of 14 hours.
5. Disconnect the charger.
6. Tighten the sealed plug clockwise.

## Specifications

Mechanical		
Explosion Proof Enclosure:		
NFPA (designed to meet)		
Class I, Division 1 & 2 Groups B, C and D		
Class II, Division 1 & 2 Groups E, F, and G		
ATEX EX II 2G NEMKO 02ATEX255		
EExd IIB T5 50 C, per En 50-014 & EN50-018		
Electrical		
Power: 8 VDC Max.		
6 x Rechargeable 1.2 VDC NiCad Batteries		
Current: 2.5A Avg.		
Charge: 400mA for 14 Hours		
Environmental		
Temperature Range:	-4° F (-20° C) to 122° F (50° C)	
Vibration Protection:	1g (10-50hz)	
Water and Dust:	IP 67 per EN 60529	
Physical		
Dimension:	11.5 x 10.1 x 3.9 in (292 x 258 x 100 mm)	
Weight:	7.5 lb. (3.4 Kg)	
Range*		
Sensitivity	Range	Extended Range
	<b>20/20MI-1</b>	
33 ft (10m)	2.3 ft (0.7 m)	-
65 ft (20m)	4 ft (1.2 m)	8.2 ft (2.5 m)
100 ft (30m)	6.6 ft (2 m)	13.2 ft (4 m)
132 ft (40m)	10 ft (3 m)	20 ft (6 m)
	<b>20/20MI-3</b>	
8.2 ft (2.5m)	-----	
16.4 ft (5m)	1 ft (0.3 m)	-
24.7 ft (7.5m)	1.6 ft (0.5 m)	-
33 ft (10m)	2.3 ft (0.7 m)	-

\* At extreme temperatures - 15% Max. Reduction in range



## **Appendix D: FM Report for 20/20 MI-3**

### **Examination and Test**

Four samples of the model – 20/20 MI-3 flame detector, representative of production units, were examined and tested at FM Approvals in Norwood, Massachusetts.

One sample was examined, tested and compared to the manufacturer's drawings. All documentation applicable to this program is on file at FM Approvals.

### **Stability Test**

One Model 20/20 MI-3 flame detector was energized and tested to verify proper operation under normal, standby conditions. Continuous operation of this sample was monitored for 30 days in clean-air (working office type): there was no evidence of instability or false signal during that period.

### **Baseline Sensitivity Test**

All four samples of the 20/20MI-3 – flame detector were subjected to a small-scale sensitivity test consisting of a 1.75 in. (4.5 cm.) diameter fire of n-Heptane at a distance of 3 ft. (1m) from the detector. The average results for all four samples were as follows:

Model 20/20 MI-3 at 3 ft. (1m): 1.5 seconds.

**Flame Response Sensitivity Test**

All four samples of the Model 20/20MI-3 were exposed to the standard test consisting of a 12 in. x 12 in. (0.3m x 0.3m) pan fire with fuels noted below. The tests were conducted at FM Approvals in Norwood, MA, and the average results for all four samples are as follows:

Detector Model	Fuel	Distance to Fire		Sensitivity setting	Response (seconds - average)
		Ft.	m		
20/20 MI-3	n-heptance	33	10	10	3.0
20/20 MI-3	n-heptance	24.7	7.5	7.5	4.2
20/20 MI-3	n-heptance	16.5	5	5	4.1
20/20 MI-3	n-heptance	8.2	2.5	2.5	8.2
20/20 MI-3	Diesel	23.1	7	10	3.8
20/20 MI-3	Diesel	17.3	5.3	7.5	5.5
20/20 MI-3	Diesel	11.5	3.5	5	6.4
20/20 MI-3	Diesel	5.7	1.7	2.5	9.2
20/20 MI-3	Ethyl Alcohol	24.8	7.5	10	4.6
20/20 MI-3	Ethyl Alcohol	18.5	5.6	7.5	3.2
20/20 MI-3	Ethyl Alcohol	12.4	3.8	5	4.8
20/20 MI-3	Ethyl Alcohol	6.1	1.8	2.5	3.6
20/20 MI-3	Jet A	23.1	7	10	1.9
20/20 MI-3	Jet A	17.3	5.3	7.5	4.3
20/20 MI-3	Jet A	11.5	3.5	5	6.1
20/20 MI-3	8 in.(20cm) dia. Pan polypropylene pellets.	8	2.4	10	1.9

**Field of View Test**

One sample of the Model 20/20 MI-1, which has an identical enclosure to the 20/20 MI-3 and is considered representative of the series, was exposed to the 12 in. x 12 in. (0.3 m. x 0.3 m.) N-heptane pan fire during which time the viewing angle was varied +/-50° from the centerline along the horizontal and vertical axes. The following results were obtained:

Angle (Approximate)	Distance	Average Response Time
On centerline	33 ft. (10m.)	3 sec.
+ 50° horizontal	16.5 ft. ( 3 m.)	8.7 sec.
- 50° horizontal	16.5 ft. ( 3 m.)	8.1 sec.
+ 50° vertical	16.5 ft. ( 3 m.)	8.8 sec.
- 50° vertical	16.5 ft. ( 3 m.)	12 sec.

### False Stimuli Response Test

All four samples of the Model 20/20 MI-1 with sensitivity setting 10, considered representative of the series, were tested in the presence of modulated and non-modulated artificial sources of light and other heated bodies, then, in the presence of each of the false stimuli, were exposed to the standard test consisting of a 12 in. x 12 in. (0.3m. x 0.3m.) N-heptane pan fire. The false stimuli sources were as follows:

1. Resistive Electric Heater (1350w) at 3 ft. (1m.)
2. Fluorescent light (40 w) at 3 ft. (1m.)
3. Halogen light (500 w with lens) at 3 ft. (1m.)
4. Incandescent Light (100 w) at 3 ft. (1m.)
5. Arc welding with setting at 200 Amperes at 10 ft. (3 m.) using 7011 rod and steel plate.

The detectors produced no trouble or false alarm signal in the presence of these false stimuli at the distance specified, and they continued to respond satisfactorily to the test fire in the presence of these sources.



## Appendix E: Ordering Information

Please define the requested model according to 1.1.5 by filling in the appropriate squares below.

<b>20/20 MI</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Models</u>				
Standard Range - 1 33-132 ft/(10-40m)	←			
Short Range - 3 8.2-33 ft/(2.5-10m)		←		
<u>Outlet</u>				
Cable output 1				
Plug output 2	←			
<u>Housing</u>				
St. St. 316 - S				
Aluminum - A				
Plastic - P				
<u>Approval</u>				
ATEX (Cenelec) – C				
FM (performance) – F				←
Non-intrinsic safe N				

The detector default set up:	20/20MI-1	20/20MI-3
Sensitivity	20	5
Delay	A	0
Alarm Latch	NO	NO
Automatic BIT	YES	YES
Alarm BIT	NO	NO

If you need a special set up, please refer to Section 3.2 to complete the following table:

SENSITIVITY	<input type="checkbox"/>	ALARM LATCH	<input type="checkbox"/>
DELAY	<input type="checkbox"/>	AUTOMATIC BIT	<input type="checkbox"/>
		ALARM BIT	<input type="checkbox"/>

**Orders may be sent to:**

Spectrex Inc.  
 218 Little Falls Road  
 Cedar Grove, NJ 07009, USA  
 Fax: +1 (973) 239-7614  
 E-mail: [Spectrex@spectrex-inc.com](mailto:Spectrex@spectrex-inc.com)

Name				
Company				
Position				
Billing Address	Address			
	City	State	Zip	Country
Shipping Address	Address			
	City	State	Zip	Country
Phone	Country Code	Area Code	Number	
Fax	Country Code	Area Code	Number	
E-mail				

For additional information about ordering 20/20MI, please call Spectrex Inc. at: +1 (973) 239-8398.

For additional details or assistance, please contact

  
**SPECTREX INC.**  
218 Little Falls Road  
Cedar Grove, NJ 07009, USA  
Tel: +1 (973) 239-8398  
Fax: +1 (973) 239-7614  
Email: [spectrex@spectrex-inc.com](mailto:spectrex@spectrex-inc.com)  
Web-site: [www.spectrex-inc.com](http://www.spectrex-inc.com)

Your Local Authorized Distributor:

**Available Nationally From:**

**SYDNEY - Incite Fire**

Address Block Y, Unit 1 Regents Park Estate, 391  
Park Road, Regents Park, NSW 2227  
Phone 02 9644 7144  
Facsimile 02 9644 7255  
Email [sales@incitefire.com.au](mailto:sales@incitefire.com.au)

**MELBOURNE - Incite Fire**

Address Unit 120, 45 Gilby Road  
Mt Waverley VIC 3149  
Phone 03 9544 2211  
Facsimile 03 9544 2212  
Email [salesvic@incitefire.com.au](mailto:salesvic@incitefire.com.au)

**BRISBANE - eFire Technologies**

Address 25 Jeays Street  
Bowen Hills QLD 4006  
Phone 07 3252 5366  
Facsimile 07 3252 4099  
Email [sales@efiretechnologies.com.au](mailto:sales@efiretechnologies.com.au)



[www.incitefire.com.au](http://www.incitefire.com.au)

