NET SAFETY MONITORING INC.

PHOENIX

Triple Infrared Flame Detector

User Manual

Models:

IR3S-A, IR3S-R, IR3S-D, IR3S-AD

ISO 9001:2000

QMI REGISTERED

MAN-0044 Rev 15 IR3S-XX
December 02, 2008

IMPORTANT INFORMATION

This manual is for informational purposes only. Although every effort has been made to ensure the correctness of the information, technical inaccuracies may occur and periodic changes may be made without notice. Net Safety Monitoring Inc., assumes no responsibility for any errors contained within this manual.

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Net Safety Monitoring Inc., products are carefully designed and manufactured from high quality components and can be expected to provide many years of trouble free service. Each product is thoroughly tested, inspected and calibrated prior to shipment. Failures can occur which are beyond the control of the manufacturer. Failures can be minimized by adhering to the operating and maintenance instructions herein. Where the absolute greatest of reliability is required, redundancy should be designed into the system.

Warranty

Net Safety Monitoring Inc., offers a pro-rated 7 year warranty on the IR3S, from date of purchase.

No other warranties or liability, expressed or implied, will be honoured by Net Safety Monitoring Inc.

Contact Net Safety Monitoring Inc., or an authorized representative for details.

We welcome your input at Net Safety Monitoring. If you have any comments please contact us at the phone/address below or visit our web site and complete our on-line customer survey: www.net-safety.com.

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INTRODUCTION

The Phoenix, Net Safety's latest flame detection product, is a triple spectrum IR fire detector designed to respond to infrared radiation emitted by a wide range of hydrocarbon based fires.

The three IR sensors allow the Phoenix to extend detector range, reduce the number of detectors required, produce substantially fewer false alarms and draw less power than many other products on the market.

The Phoenix is suitable for indoor and outdoor applications and has been tested and proven reliable in extreme environmental conditions including heavy rain.

LOCATE DETECTOR

When positioning fire detectors, consider such factors as distance from the fire, type of fuel and temperature, as well as any environmental factors which may influence the detector's response to radiation.

Typical applications

- automotive-manufacturing and paint spray booths
- aircraft hangars (commercial and military)
- offshore platforms, refineries, pipelines and production ships
- printing industry facilities
- oil, gas and petrochemical refineries/production/storage/off loading/shipping
- various production, processing and storage facilities
- munitions handling
- warehouses (flammable liquids/toxic gases) and tank farms (floating/non-floating)
- power generation pumps, generators and unmanned stations

Potential Fire Sources

The following are examples of some potential fire sources:

- alcohol
- gasoline
- paint
- aviation fuel
- acetylene
- natural gas
- solvents
- heptane/naptha
- diesel and hydraulic fuel
- liquefied natural gas (LNG)
- liquefied petroleum gas (LPG)
- propane/methane/butane

Potential Inhibitors

A potential inhibitor is anything located between the detector and a potential fire source which could prevent the Phoenix from detecting a fire or reduce its sensitivity to fire. Possible inhibitors include but are not limited to the following:

- Solid objects such as machinery, glass or plexiglass between the detector and potential fire source
- Excess water, fog, rain, dirt or dust on the detector window or heavy smoke between the detector and potential fire source

Immune

The Phoenix exhibits excellent immunity to many conditions/activities including but not limited to the following:

- hot body radiation
- sunlight (direct/reflected)
- arc welding radiation
- lightning
- artificial lighting
- water surface flicker
- water/rain on the lens

Sensitivity

The practical application distance is directly related to the intensity of the IR radiation source.

Table 1: Summary of Distances(FM Performance Tested)

Response Testing			
Fuel	**Size**	**Distance (ft/m)**	**Average Response Time (Seconds)**
n-Heptane	1' x 1'	100/30.5	1.74
Methane	36" Plume	110/33.5	4.4
Methanol	1' x 1'	105/32	9.8
Ethanol	1' x 1'	90/27.4	1.6

NOTE: The response time is based on zero time delay and maximum sensitivity.

Field of View (As per FM and NFPA definition)

The area in front of a flame detector, where a standardized flame can be detected and which is specified by distance and angle off the central axis, is the Field of View. The referenced flame is moved to 50% of the maximum on-axis detection distance and then moved off-axis horizontally and vertically to the limit of detection. These off-axis angle limits specify Field of View.

Table 2: Field of View Testing(FM Performance Tested)

Field of View Testing			
Fuel	**Size**	**Horizontal Degrees**	**Vertical Degrees**
n-Heptane	1' x 1'	100 (+50, -50)	100 (+50, -50)
Methane	36" Plume	90 (+45, -45)	90 (+45, -45)
Methanol	1' x 1'	90 (+45, -45)	90 (+45, -45)
Ethanol	1' x 1'	90 (+45, -45)	90 (+45, -45)

NOTE: Data based on Maximum Sensitivity Setting.

Sensitivity Setting Considerations

For practical planning purposes, the “Low” sensitivity setting results in a reduction of sensitivity of approximately 30%. Net Safety has determined through flame testing that the difference in sensitivity will vary between approximately 23% and 35%, using the “Low” sensitivity setting as compared to the “High” sensitivity setting, depending on the fuel type, environmental conditions and the individual detector. See ‘System Sensitivity’ and Table 8 when determining settings.

Table 3: Distance and Field of View

Distance and Field of View		
Distance (ft/m)	Horizontal Degrees	Vertical Degrees
200/61	70(+35,-35)	70(+35,-35)

Note: The data in table above is not FM Performance verified.

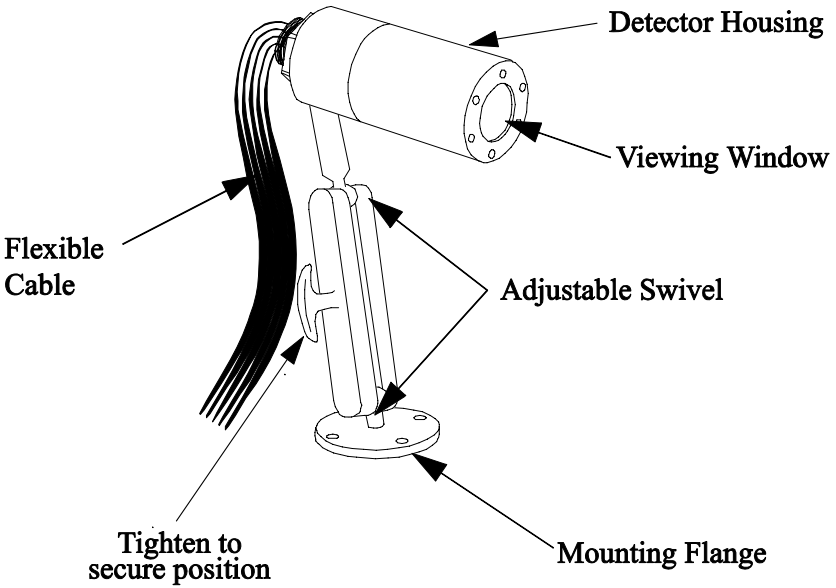
Installation Considerations

The following should be considered when mounting the Phoenix.

- Point detector toward where the flame is expected.
- Ensure an unobstructed view of the area to be monitored.
- Employ more than one detector to ensure the hazard is fully covered.
- Mount the detector a few feet (about 1 metre) below the ceiling so it can respond before being blocked by smoke accumulation at the ceiling.
- If dense smoke is likely to accumulate prior to flame (as in an electrical fire), supplement IR detector(s) with other protection such as Net Safety Monitoring Airborne Particle Monitor.
- The detector should be accessible for cleaning.

- Tilt detector downward a minimum of 10 to 20° to reduce dirt and dust accumulation which could obscure the detector's viewing window.
- Securely mount detector so as to minimize vibration.
- Detector sensitivity may be reduced by heavy fog, rain /or ice on the lens.
- Consider shortening the time delay settings when dense smoke is expected to accumulate before or during a fire (refer to "System Sensitivity").
- Reduce sensitivity setting if false alarms, related to surrounding activities, occur (refer to "System Sensitivity").
- If a detector is located close to an intense flickering IR source, the detector's sensitivity may be affected.
- When installed near or on water (such as an off shore platform), be sure to take into account the low horizon level when tilting detector downward.
- For protection against induced power disturbances, it is required to install detector wires in a braided flexible conduit, grounded and less than 5 feet to the junction box.

Figure 1: Detector and Swivel Mount

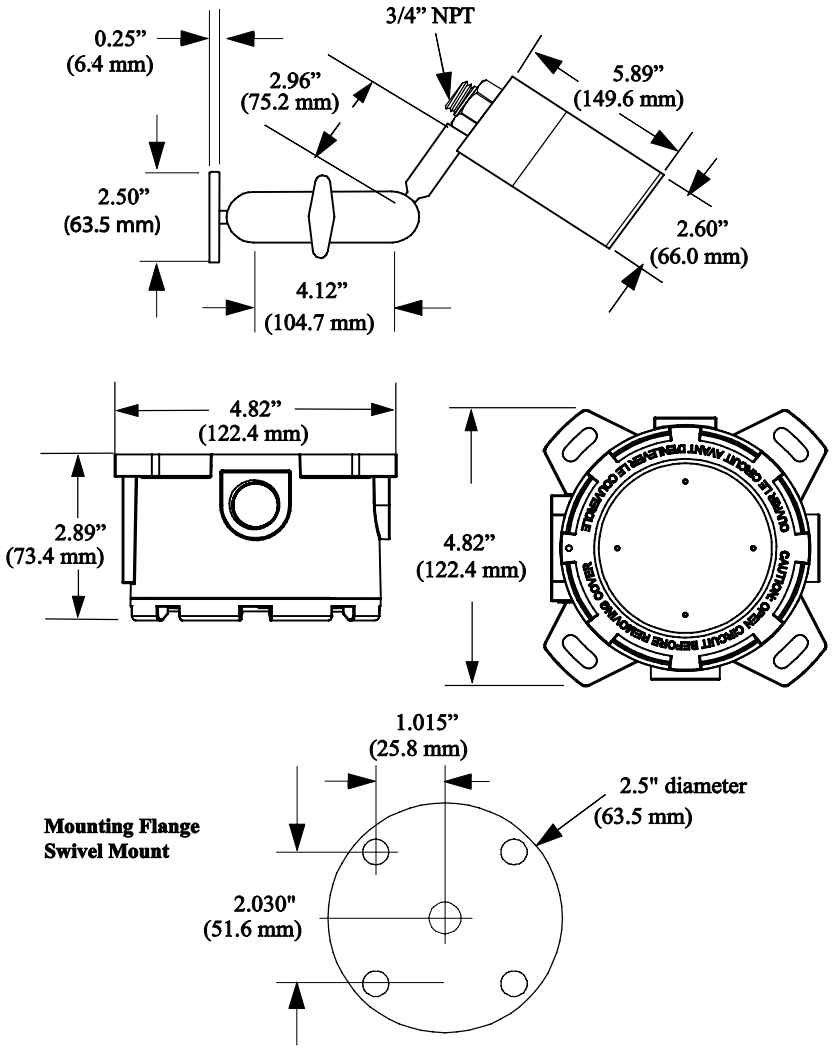


UNPACK

Carefully remove all components from the packaging. Check components against the enclosed packing list and inspect all components for obvious damage such as broken or loose parts.

If you find any components missing or damaged, notify the representative or Net Safety Monitoring immediately.

Figure 2: Dimensional Drawing



FIELD INSTALLATION

WARNING:

- Wiring codes and regulations may vary. Compliance with regulations is the responsibility of the installer. Wiring must comply with applicable regulations relating to the installation of electrical equipment in a hazardous area. If in doubt, consult a qualified official before wiring the system.
- Do not open the housing and expose the electronics in a classified area (Do not open when an explosive atmosphere may be present)

Wiring

For protection against induced power disturbances, it is required to install detector pig tail lead wires in a braided flexible conduit less than 5 feet in length to the termination box. From the termination box to the power supply the recommended detector cable is three conductor for IR3S-A up to 6 conductor for IR3S-R, shielded 18 AWG rated 300 V for distances up to 150 feet; 16 AWG rated 300 V for distances of 150-2000 feet. When cable is installed in conduit, the conduit must not be used to support wiring to other electrical equipment. The maximum distance between the detector and the power supply is limited by the resistance of the connecting wiring, which is a function of the gauge of the wire being used. Refer to "Appendix B, Resistance Table (Ohms)".

Grounding

Proper shielding and grounding procedures, for the specific area must be followed. Consult local electrical code.

Sealing

Water-proof and explosion-proof conduit seals are always recommended to prevent the accumulation of moisture within the junction box. Seals should be located as close to the device as possible and not more than 18 inches (46 cm) away. Explosion-proof installations may require an additional seal where conduit enters a non-hazardous area. When pouring a seal, use a fibre dam to ensure proper formation of the seal. Seals should never be poured at temperatures below freezing.

The jacket and shielding of the cable should be stripped back to permit the seal to form around the individual wires. This will prevent air, gas and water leakage through the inside of the shield and into the enclosure.

It is recommended that explosion-proof drains and conduit breathers be used. Changes in temperature and barometric pressure can cause 'breathing' which allows moist air to enter the conduit. Joints are seldom enough to prevent this 'breathing'.

CONNECTING

The Phoenix can be either an Analog, Analog/Digital, Relay or Digital model. Refer to the following tables for specifics regarding connections for the various models. A termination junction box can be also be supplied by Net Safety if required.

WARNING: Prior to wiring, ensure power is disconnected. Improper wiring can cause damage to the detector.

Non-Isolated and Isolated Power Configuration (IR3S-A or IR3S-AD only)

For current source using Non-isolated configuration, the jumper must remain in the default INT position. The jumper is placed in the EXT position for current sink using Non-isolated configuration.

If a separate power supply is used (Isolated configuration) to isolate current output, the jumper must be placed in the EXT position for source and sink.

See Figure 3 and Figure 4.

Figure 3: Current Output Jumper Placement

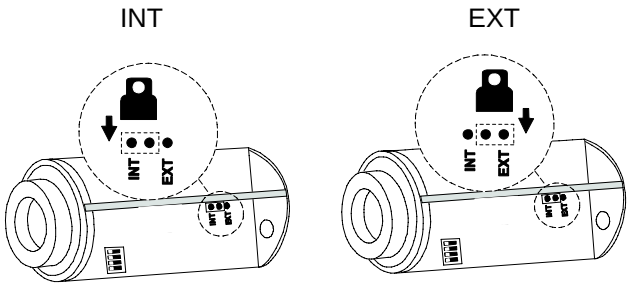


Figure 4: Current Source and Sink

Note the INT and EXT Jumper position for each configuration.

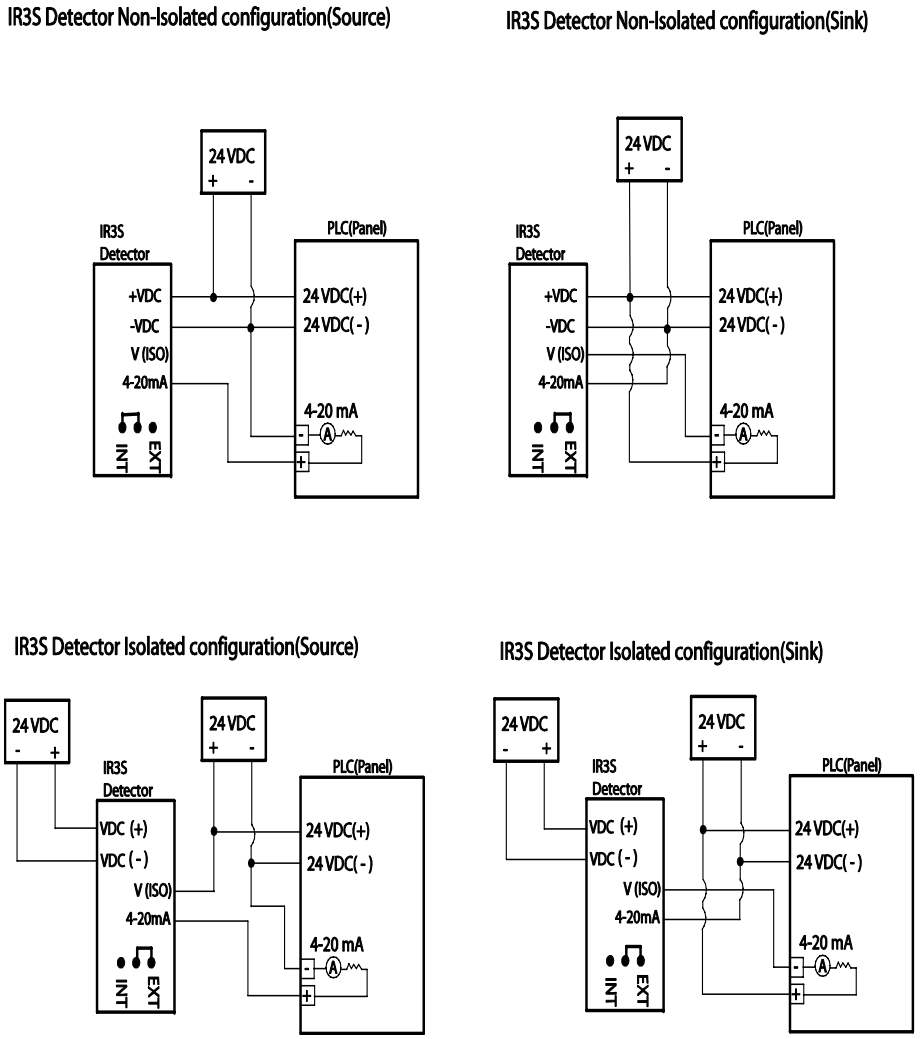


Table 4: Wire Colour Coding — IR3S-A (ANALOG)

FLAME DETECTOR WIRE CODING	
Wire Colour	**Function**
Green	Earth Ground (GND)
Red	Vdc (+)
Black	Com (-)
Purple	Isolated Power (+) (ISO)
Yellow	4-20mA Signal Output

Table 5: Wire Colour Coding — IR3S-R (RELAY)

FLAME DETECTOR WIRE CODING	
Wire Colour	**Function**
Green	Earth Ground (GND)
Red	Vdc (+)
Black	Com (-)
Orange	Alarm Relay
Orange	Alarm Relay
Violet	Fault Relay
Violet	Fault Relay

WARNING: If terminations are being done in a Net Safety Multi-Purpose Junction Box, refer to MAN-0081 for specific terminal designations.

Note: When using a Analog unit (IR3S-A) with the Analog/Relay Junction Box (JB-IR3SAR-A/S), the external magnet can be used to reset the junction box latched alarm . See MAN-0081 for instructions.

WARNING: Analog units use the purple wire (Terminal Marked ISO) to isolate the current output when using a separate power supply. Also see Figure 3 – Current Output Jumper Placement (for IR3S-A or IR3S-AD only).

Table 6: Wire Colour Coding—IR3S-AD (ANALOG / DIGITAL)

FLAME DETECTOR WIRE CODING	
Wire Colour	**Function**
Green	Earth Ground (GND)
Red	Vdc (+)
Black	Com (-)
Blue	A (Communication)
Brown	B (Communication)
Purple	Isolated Power (+) (ISO)
Yellow	4-20mA Signal Output

Table 7: Wire Colour Coding — IR3S-D (DIGITAL)

FLAME DETECTOR WIRE CODING	
Wire Colour	**Function**
Green	Earth Ground (GND)
Red	Vdc (+)
Black	Com (-)
Blue	A (Communication)
Brown	B (Communication)

NOTE: Up to 254 Modbus units can be included in the chain. **An End of Line Resistor (120-150 Ohms) MUST be included between the A and B Terminals in the last junction box.**

DETECTOR SETUP

SYSTEM SENSITIVITY

Important Fire Sensitivity Considerations

The desired fire performance standard is to always respond quickly to a real fire and never respond to a false alarm condition. The best performance is obtained through user adjustments to meet the specific application conditions.

Some applications such as the interior of a storage warehouse may have very little infrared or thermal activity and therefore allow the use of full sensitivity and low time delay settings.

Applications exposed to intense sunlight reflected from metallic surfaces or water, hot process bodies, exhaust pipes and flare stacks, may require custom combinations of sensitivity and time delay settings.

It is recommended that initial settings be low sensitivity and 5 second time delay. If false alarms occur, change the time delay to 10 seconds. If false alarms continue, consult the factory for other recommendations, such as Field of View restrictor.

If there are no false alarms after a trial period at the above settings and it is important to alarm on very small or distant fires, then change sensitivity setting to high. If there are still no false alarms and an alarm response to short term transient fire conditions is required, reduce time delay to 3 seconds.

A time delay of zero can only be considered in very controlled applications where instantaneous response is necessary and if there is a tolerance for possible false alarms.

Time Delay Settings of 3, 5 and 10 seconds

The time delay setting defines the length of time that a fire signal must be continuously present for the detector to output a fire alarm. After the fire has persisted for the set delay time, the alarm output will occur within 5 seconds. This secondary delay of up to 5 seconds is not user adjustable.

Sensitivity Setting

The adjustable Sensitivity setting is used to optimize the Phoenix for a particular application.

When selecting Low or High Sensitivity, consider the following:

- Size of potential fire
- Distance between possible fire and detector
- Type of flammable substance to be detected
- Environmental factors

Response time can vary depending on the intensity and type of fire.

See Table 8 for Time Delay and Sensitivity settings.

DIP Switch Access

DIP Switches are used to define various functional settings and are located on the internal electronics module of the Phoenix. Simply slide a DIP Switch to the ON or OFF position (as marked in Figure 5). Also refer to Table 8 for DIP Switch positioning instructions.

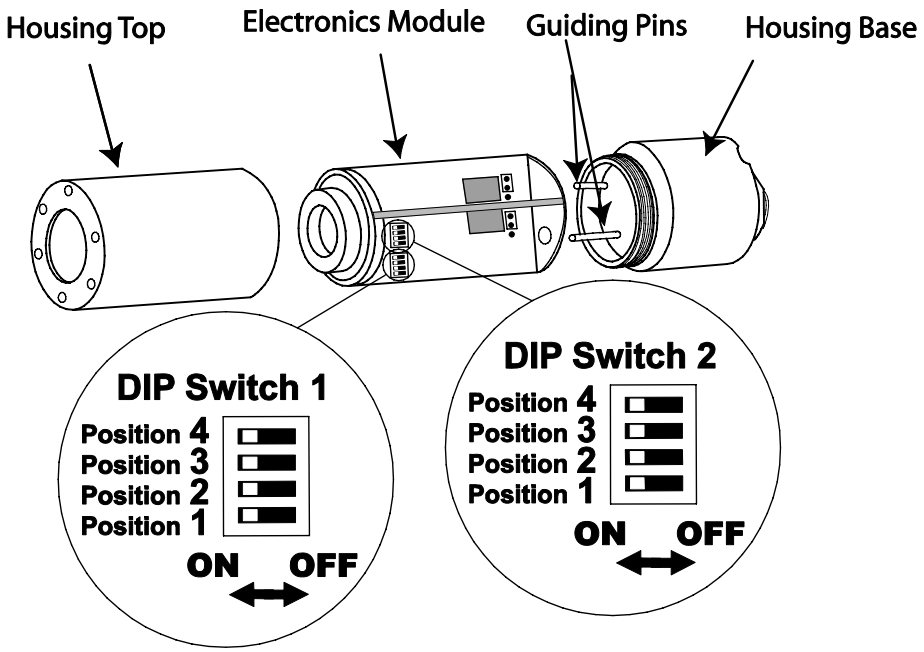
WARNING: Do not open the fire head in a classified area. The area must be de-classified prior to opening the fire head. When open, keep water away from electronics.

WARNING: Do not touch internal components other than the DIP Switches (refer to Appendix A, Electrostatic Sensitive Device (ESD).

Relay
The relay version Phoenix uses two sets of DIP Switches.
DIP Switch #1 is used for defining Sensitivity and Time Delay.
DIP Switch #2 is used for defining the Relay setting; it is only available for relay models and only position 2 is used. See Tables 8 and 9.

Analog
The analog (no relays) Phoenix uses only DIP Switch #1 to define Sensitivity and Time Delay settings. Refer to Table 8 for dip switch positioning instructions.

Figure 5: DIP Switch Location



Note: The above figure is a general representation of the IR3S selectable DIP Switch positions.

Table 8: Time Delay and Sensitivity Settings (DIP Switch #1)

DIP Switch #1	Time Delay		Sensitivity settings	
	Position 1	Position 2	Position 3	Sensitivity
0 Seconds	ON	ON	ON	High
3 Seconds	ON	OFF	OFF	Low (**default**)
5 Seconds (**default**)	OFF	ON		
10 Seconds	OFF	OFF		

NOTE: Default settings are 5 second Time Delay and Low Sensitivity.

RELAY SETTINGS (IR3S-R ONLY)

Coil Status Setting

The Fire relay can be set to Normally Energized or Normally De-energized using DIP Switch #2, Position 2. Refer to Table 9.

NOTE: The Fault relay is fixed as Energized and both relays are fixed as Non-Latching.

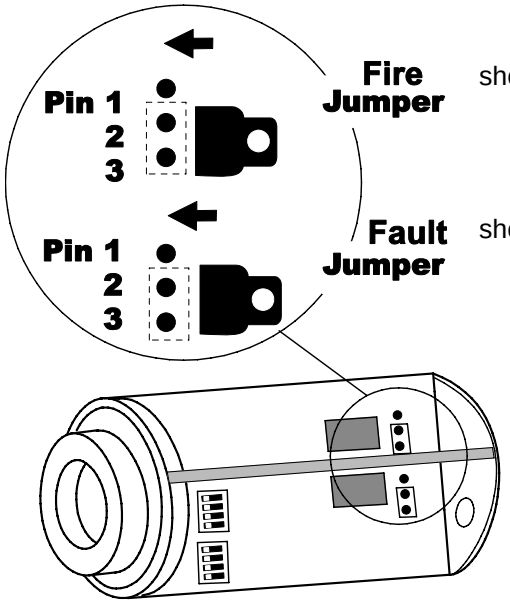
Table 9: Relay Setting (Dip Switch #2)

DIP Switch #2	DIP Setting	Relay Coil Status	Alarm
Position 2	OFF	Normally Energized	Fire
	ON	Normally De-energized (**factory default**)	

Relay Contact Setting

The Fire and Fault relay contacts can be selected as Normally Open or Normally Closed using Jumpers. Simply position the Jumper over two of the pins to define the Normally Open/Closed Fire or Fault relay contacts (refer to Figure 6 and Table 10 for settings).

Figure 6: Normally Open or Normally Closed Jumpers.



Note each jumper default position based on the IR3S orientation above.

Table 10: Relay Contacts

Jumper Position	Function
Pin 1 & 2	Normally Closed (NC)
Pin 2 & 3	Normally Open (NO) (**factory default**)

Table 11: Fire Alarm Relay States

Relay State	Unpowered	Powered	Alarm (FIRE)
Energized/NO	OPEN	CLOSED	OPEN
Energized/NC	CLOSED	OPEN	CLOSED
De-energized/NO	OPEN	OPEN	CLOSED
De-energized/NC	CLOSED	CLOSED	OPEN

Table 12: Fault Alarm Relay States

Relay State	Unpowered	Powered	Alarm (FAULT)
Energized/NO	OPEN	CLOSED	OPEN
Energized/NC	CLOSED	OPEN	CLOSED

MODBUS RTU (IR3S-D & AD)

Install Phoenix PC Set Up Software

In order to program various settings required for the Modbus RTU protocol, user-interface software is required.

The software is available for download at:
http://www.net-safety.com/resources/nsm_phoenix_setup.zip

1. Go to the web address given above. Save the file on your desktop, and then extract the file.
2. Double click on Setup.exe and run the Phoenix set up software to install it; the Setup Wizard will guide the user in completing the install. A shortcut will then be placed on the desktop.

WARNING: An RS-232 to RS-485 converter is required to communicate with the detector and perform Modbus set up. An external power supply (12 V or 24 V depending on the converter used) is required to power up the detector during Modbus set up.

Table 13: Wiring for Modbus Detector Set Up

Converter	Detector
A	Blue wire
B	Brown wire
Gnd	Black wire
A+	Red wire

Note: On the Analog /Digital model (AD), ignore the yellow and purple wires for set up.

Table 14: Available Baud Rates

Baud rate 4800bps
Baud rate 9600bps
Baud rate 14.4kbps
Baud rate 19.2kbps (**default**)
Baud rate 28.8kbps
Baud rate 38.4kbps
Baud rate 57.6kbps

Note: Baud rate 2400 is not available at this time.

Modbus Set Up

A node address must be assigned and a baud rate specified for each Phoenix in the chain, one at a time. The baud rate is set using the Phoenix Set Up software; the address is also set using this software and a DIP Switch must be used to confirm the address assignment.

The Modbus Phoenix uses DIP Switch #1, Position 4 to confirm the address assignment for each detector (refer to Table 15 for detailed information).

Table 15: Digital Modbus RTU Setting (DIP Switch #1, Position 4)

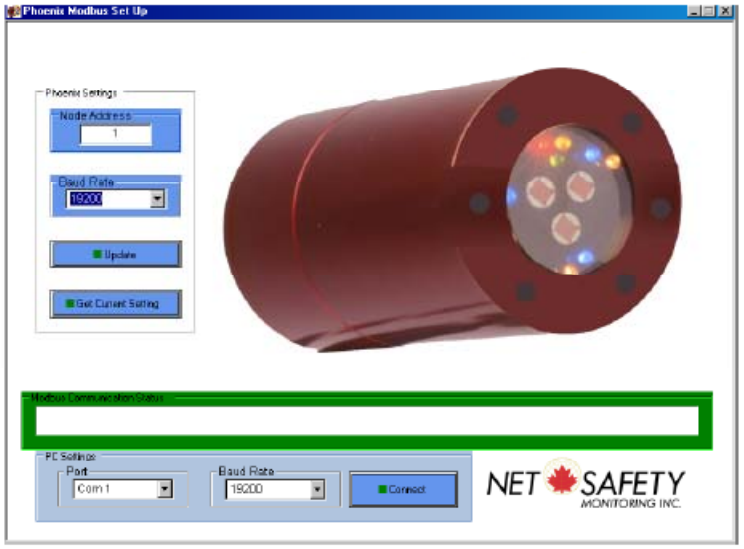
DIP Switch #1	Modbus RTU Setting	
Position 4	ON	Confirm address set up once power recycled
	OFF	Reset Node Address (**default is Address 1**)

1. Ensure Position 4 of DIP Switch #1, is set to OFF.
2. Connect a Phoenix using a RS-232 to RS-485 Converter.
3. Start the Phoenix Modbus Set Up program.
4. Set up the computer communication by selecting a **Port** and **Baud Rate** under the PC Settings at the bottom of the screen.
5. Click on the **Connect** button at the bottom of the screen (the button will then change to "Connected").
6. Click on the **Get Current Settings** button (if necessary, make a note of existing settings).
7. The message **OK** should appear under Modbus Communication Status.
8. Under Phoenix Settings enter the new Node Address for the detector.
9. Select the Baud Rate for the detector (refer to Table 14).
10. Click on the **Update** button under the Phoenix Settings.
11. The message **OK** should appear under Modbus Communication Status.
12. Close Phoenix Modbus Set UP software (close connection).
13. Turn off power to the detector.
14. Move Position 4 of DIP Switch #1, to the ON position (this will confirm the address set up).
15. Turn on power to the detector and repeat for all detectors in the chain.

Note: Each time a change is made to the RTU setting (DIP #1, Position 4), power to the detector must be cycled.

TIP: Make a note of the newly assigned Node Address for each unit.

Figure 7: Phoenix Modbus Set Up



Get Current Setting

Click to display the current Modbus set up of the connected Phoenix.

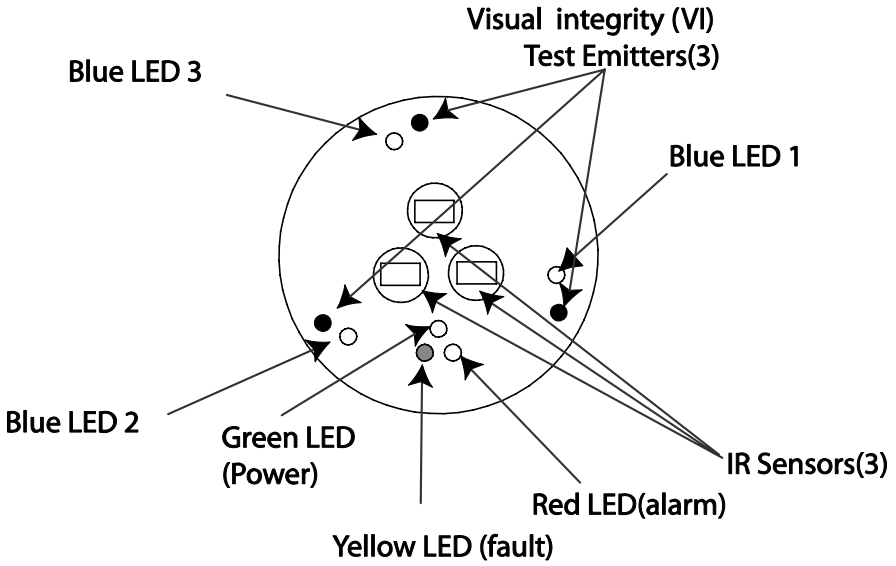
Modbus Set Up Failure/Reset

If the Modbus Set Up fails or the connected Phoenix is not recognized (the message **Failed** will appear under Modbus Communication Status when the Connect button is pressed), the connected detector needs to be reset.

1. Turn off power to the unit.
2. Move DIP Switch #1, Position 4 to OFF.
3. Turn on power to the unit.
4. The connected device (detector) returns to default Node Address 1.
5. Repeat the Modbus Set Up process.

DETECTOR FUNCTIONALITY

Figure 8: Detector Viewing Window



START UP PROCEDURE

Once powered up, the Phoenix begins a start up routine. The three Blue LEDs are Solid, and the Green LED Flashes. After approximately 30 seconds the Blue LEDs will turn off and the Green LED will turn solid, indicating normal operation. During start up, the current output is 3.0 mA for approximately 30 seconds at which time the unit begins normal operation and current output increases to 4.0 mA.

MONITOR

The Detector's status can be determined by monitoring the current output and the IR Sensor LEDs or Coloured Condition LEDs. Refer to Tables 16 and 17.

Condition Status—Current Output

The following table defines the current output status for the Phoenix during various detector conditions.

Table 16: Current Output Status

Condition	Current Output
No Power Fault	0 mA
VI Test Failure - VI Testing (Warning)	2.0 mA
Start delay/Start up	3.0 mA
Normal Operation	4.0 mA
Warning – Infrared Activity	16 mA
Fire Alarm	20 mA

Condition Status—LEDs

There are six (6) LEDs used to indicate the status and condition of the detector.

Table 17: Status LEDs

LED Status	IR Sensor LEDs			Coloured Condition LEDs		
	Blue 1 LED	Blue 2 LED	Blue 3 LED	Green LED (Power)	Red LED (Alarm)	Yellow LED (Fault)
Power up >30 second start delay	Solid	Solid	Solid	Flashing	off	off
Normal operation	off	off	off	Solid	off	off
VI Test failure	Flashing	Flashing	Flashing	Solid	off	Flashing
VI Test OK	off	off	off	Solid	off	off
Warning-Infrared Activity	Flashing	Flashing	Flashing	Solid	off	off
Fire Alarm	Solid	Solid	Solid	Solid	Solid	off

Table 18: RTU Status (Register 40001) Read Only

RTUfire_power_up	0x0001	0000 0000 0000 0001B	Power up delay
RTUfire_vi_fault	0x0002	0000 0000 0000 0010B	Failed self test
RTUfire_normal	0x0004	0000 0000 0000 0100B	Fire heads normal operation
RTUfire_fault	0x0008	0000 0000 0000 1000B	Fire heads fault
RTUfire_warning	0x0040	0000 0000 0100 0000B	Infrared activity
RTUfire_alarm	0x0080	0000 0000 1000 0000B	Fire Alarm

Automatic Digital Zoom (ADZ)

If a fire is located at an extreme distance, the infrared characteristics may not be at levels needed for accurate detection. If the sensor data acquired is weak, the Automatic Digital Zoom (ADZ) will increase the gain of the sensor amplifiers until the sensors can measure the infrared characteristics of the fire. The three detection wavelengths have been specifically selected to ensure the greatest degree of fire recognition with the least amount of false fire detection.

TESTING

Automatic Visual Integrity (VI) Test

To evaluate the cleanliness of the lens and verify the function of the detection circuits, the Phoenix performs an automatic Visual Integrity (VI) test every 3 minutes.

If accumulation of material on the surface of the lens reaches a factory calibrated preset level, which could substantially reduce flame detection sensitivity, the Phoenix will transmit a VI fault signal indicating that the cause of the fault should be investigated and, if necessary, the window cleaned. Refer to Table 19 for fault types and possible solutions.

Note: Unusual heavy oil accumulations may not be easily detected by the internal VI Test, but are easily identified by an observer during regular inspections.

MAINTAIN

Monitoring the VI fault signal is only part of the necessary routine to ensure the safe operating condition of the detector. If conditions exist, whereby foreign materials could accumulate on the detector's lens, maintenance routines should include regular visual inspection of the detector and cleaning when necessary, by qualified personnel.

Clean The Window/Lens

WARNING: Always bypass Alarm Output and disconnect external response equipment when performing cleaning and maintenance tasks.

When cleaning the window/lens, use the cloth and the cleaning solution provided with the detector. Use only the cleaning solution provided, as some cleaners may leave a residue or film that blocks IR radiation.

O-ring

The rubber o-ring on the detector housing is used to ensure the detector is watertight. The housing should be opened periodically and the o-ring inspected for breaks, cracks or dryness. To test the o-ring, remove it from the detector housing and stretch it slightly. If cracks are visible, the o-ring should be replaced. If it feels dry to the touch, a thin coating of lubricant should be applied (such as polyalphaolefin grease). When re-installing the o-ring, be sure that it is properly seated in the groove on the housing.

The o-ring must be properly installed and in good condition to prevent water from entering the detector and causing failure. The life expectancy of rubber o- rings varies depending on the type and amount of contaminants present in the area. The person who maintains the system must rely on experience and common sense to determine how frequent the rings should be inspected. A coating of lubricant should also be applied to the enclosure threads before reassembling the detector to help prevent moisture from entering.

TROUBLE SHOOT

The occurrence of a fault condition may be due to various factors. In order to determine the possible cause of the problem, keep accurate records of these occurrences including time, date, weather conditions, activities in area, etc. See the table below for possible solutions.

Table 19: Possible Problems and Solutions

Current O/P	Green	Yellow	Red	Blue 1	Blue 2	Blue 3	Possible Problem	Possible Solution
0 mA	Off	Off	Off	Off	Off	Off	Faulty power supply/ wiring or failure of electronic component(s).	Check wiring, check power supply. Consult factory
0 mA	On	Off	Off	Off	Off	Off	Shorted signal output/ faulty wiring or failure of electronic component(s).	Check current loop wiring. Verify that the unit is IR3S-A or IR3S-AD. Consult factory.
2.0 mA	Solid	Flashing	Off	Flashing	Flashing	Flashing	VI (visual integrity) fault; dirty lens, obstruction, failed IR source or sensor.	Clean Lens (use Net Safety Monitoring Lens cleaner only) Check IR source bulbs; they should be on every 3 minutes to indicate a VI test. Simulate a fire test to verify sensors are operational.
Phoenix Modbus Set Up Software Error Messages								
Wr Failed							Wrong COM port or Baud rate selected for System/Detector communication DIP Switch improperly set	Change the COM port or Baud rate (refer to " Modbus Set Up ") Ensure DIP #1, Position 4 is set to OFF (refer to " Modbus Set Up")
Failed							Wrong COM port or Baud rate selected for Computer	Change the COM port or Baud rate (refer to " Modbus Set Up Failure/Reset")

HOW TO RETURN EQUIPMENT

A Material Return Authorization number is required in order to return equipment. Please contact Net Safety Monitoring at **(403) 219-0688** before returning equipment or consult our Service Department to possibly avoid returning equipment.

If you are required to return equipment, include the following information:

1. A Material Return Authorization number (provided over the phone to you by Net Safety).
2. A detailed description of the problem. The more specific you are regarding the problem, the quicker our Service department can determine and correct the problem.
3. A company name, contact name and telephone number.
4. A Purchase Order, from your company, authorizing repairs or request for quote.
5. Ship all equipment, prepaid to:

   Net Safety Monitoring Inc
   2721 Hopewell Place NE
   Calgary, Alberta, Canada
   T1Y 7J7

6. Mark all packages: **RETURN for REPAIR**

Waybills, for shipments from outside Canada, must state:

Equipment being returned for repair
All charges to be billed to the sender

Also, please ensure a duplicate copy of the packing slip is enclosed inside the box indicating item 1-4 along with the courier and account number for returning the goods.

All Equipment must be Shipped prepaid. Collect shipments will not be accepted.

Pack items to protect them from damage and use anti-static bags or aluminum- backed cardboard as protection from electrostatic discharge.

Appendix A:ELECTROSTATIC SENSITIVE DEVICE (ESD)

Electrostatic discharge (ESD) is the transfer, between bodies, of an electrostatic charge caused by direct contact or induced by an electrostatic field.

The most common cause of ESD is physical contact. Touching an object can cause a discharge of electrostatic energy—ESD! If the charge is sufficient and occurs near electronic components, it can damage or destroy those components.

In some cases, damage is instantaneous and an immediate malfunction occurs. However, symptoms are not always immediate—performance may be marginal or seemingly normal for an indefinite period of time, followed by a sudden failure.

To eliminate potential ESD damage, review the following guidelines:

- Handle boards by metal shields—taking care not to touch electronic components
- Wear grounded wrist or foot straps, or ESD shoes or heel grounders to dissipate unwanted static energy
- Prior to handling boards, dispel any charge in your body or equipment
- Ensure components are transported and stored in static safe packaging
- When returning boards, carefully package in the original carton and static protective wrapping
- Ensure ALL personnel are educated and trained in ESD Control Procedures

In general, exercise accepted and proven precautions normally observed when handling electrostatic sensitive devices.

A warning label is placed on the packaging, identifying product using electrostatic sensitive semiconductor devices.

Appendix B:RESISTANCE TABLE (OHMS)

Distance (Feet)	AWG #20	AWG #18	AWG #16	AWG #14	AWG #12	AWG #10	AWG #8
100	1.02	0.64	0.40	0.25	0.16	0.10	0.06
200	2.03	1.28	0.80	0.51	0.32	0.20	0.13
300	3.05	1.92	1.20	0.76	0.48	0.30	0.19
400	4.06	2.55	1.61	1.01	0.64	0.40	0.25
500	5.08	3.20	2.01	1.26	0.79	0.50	0.31
600	6.09	3.83	2.41	1.52	0.95	0.60	0.38
700	7.11	4.47	2.81	1.77	1.11	0.70	0.44
800	8.12	5.11	3.21	2.02	1.27	0.80	0.50
900	9.14	5.75	3.61	2.27	1.43	0.90	0.57
1000	10.20	6.39	4.02	2.53	1.59	1.09	0.63
1250	12.70	7.99	5.03	3.16	1.99	1.25	0.79
1500	15.20	9.58	6.02	3.79	2.38	1.50	0.94
1750	17.80	11.20	7.03	4.42	2.78	1.75	1.10
2000	20.30	12.80	8.03	5.05	3.18	2.00	1.26
2250	22.80	14.40	9.03	5.68	3.57	2.25	1.41
2500	25.40	16.00	10.00	6.31	3.97	2.50	1.57
3000	30.50	19.20	12.00	7.58	4.76	3.00	1.88
3500	35.50	22.40	14.10	8.84	5.56	3.50	2.21
4000	40.60	25.50	16.10	10.00	6.35	4.00	2.51
4500	45.70	28.70	18.10	11.40	7.15	4.50	2.82
5000	50.10	32.00	20.10	12.60	7.94	5.00	3.14
5500	55.80	35.10	22.10	13.91	8.73	5.50	3.46
6000	61.00	38.30	24.10	15.20	9.53	6.00	3.77
6500	66.00	41.50	26.10	16.40	10.30	6.50	4.08
7000	71.10	44.70	28.10	17.70	11.10	7.00	4.40
7500	76.10	47.90	30.10	19.00	12.00	7.49	4.71
8000	81.20	51.10	23.10	20.20	12.70	7.99	5.03
9000	91.40	57.50	36.10	22.70	14.30	8.99	5.65
10 000	102.00	63.90	40.20	25.30	15.90	9.99	6.28

Note: Resistance shown is one way. This figure should be doubled when determining closed loop resistance.

Appendix C: SPECIFICATION

Models	IR3S-A (Analog)	I3RS-R (Relay)	IR3S-AD (Analog/Digital)
Operating Voltage	10 to 32 VDC measured at the detector		
Power Consumption (@ 24Vdc)	Nominal 30mA/ 0.72W Maximum 64mA/ 1.44W	De-Energized: Nominal 39mA/0.96W. Maximum 73mA/ 1.68W Energized: Nominal- 51mA, =1.20w). Maximum- 86mA, 2.16W	Nominal 30mA/ 0.72W Maximum 64mA/ 1.44W
Power Consumption (@ 12Vdc)	Nominal 45mA/ 0.60W Maximum 113mA/ 1.32W	De-Energized: Nominal- 66mA/0.84W. Maximum- 138mA/ 1.68W Energized: Nominal- 93mA, =1.08w) Maximum- 165mA, 2.04W	Nominal 45mA/ 0.60W Maximum 113mA/ 1.32W
In Rush Current (at 24Vdc)	Up to 2.6 A for 2.ms (varies with power supply)		
Output	0 to 20 mA – Into a max loop impedance of 800Ohms @ 32Vdc or 150Ohms @ 11.0Vdc. Non-Isolated loop supply	Normally open/Normally closed contacts rated for 5A @ 30Vdc/125Vac. Selectable energized/ de-energized Fire relay. Fault relay fixed as energized and both Fire & Fault relays fixed as non-latching	0 to 20 mA – Into a max loop impedance of 800Ohms @ 32Vdc or 150Ohms @ 11.0Vdc. Non-Isolated loop supply. RS-485 RTU Modbus protocol.
Field of View	**FM Performance tested**: 100° horizontal / 100° vertical @ 50% of the on-axis detection distance for N-Heptane. See Table 2 for more information. 70° horizontal / 70° vertical at a distance of 200ft(Not FM Performance tested) See Table 3.		
Spectral Range	The IR3S fire detector measures at three distinct Infrared Wavelengths		
Time Delay	DIP switch selectable 0, 3, 5, 10 seconds,		
Sensitivity Settings	Two (2) adjustable setting via DIP switch (High/Low)		
Temperature/ RH	FM Certified (-40°C to +75°C / -40°F to 167°F). Operational (-50°C to +75°C / -58°F to 167°F). 0 – 95% RH non condensing		
Metallurgy & IP/Nema Ratings	Aluminum or SS316 (factory sealed housing). IP66 and NEMA 4X		
Weight (with swivel)	2.1Kg /4.5lbs (SS316 Option @ 3.4Kg/ 7.5lbs)		
Approvals	Performance certified to: Class3260, ANSI/NEMA 250, and IEC60529. FM APPROVED C SP US Class I, Div 1, Grps BCD, T5. Ex d IIB+H2 T5. Class I, Zone 1, Grps IIB+H2, T5; Nema 4X, IP66. For **CANADA ONLY**, Class I, Div 1, Grps A (Canada ONLY – with special cementing), BCD, T5. Ex d IIB+H2 T5.		

NOTE: Performance certified by FM with maximum sensitivity setting and zero second time delay.

Appendix D:IR3S DATA

False Alarm Immunity			
False Alarm Source	**Distance (ft/m)**	**Modulated**	**Unmodulated**
Sunlight direct	--------	No Alarm	No Alarm
Sunlight indirect	--------	No Alarm	No Alarm
Arc Welder	10/3.0	No Alarm	No Alarm
1500 Watt heater	10/3.0	No Alarm	No Alarm
40 Watt Fluorescent Lights	10/3.0	No Alarm	No Alarm
500 Watt Halogen Light	10/3.0	No Alarm	No Alarm
250 Watt Incandescent Light	10/3.0	No Alarm	No Alarm
250 Watt Sodium Vapor Lamp	10/3.0	No Alarm	No Alarm
70 Watt Sodium Vapor Lamp	10/3.0	No Alarm	No Alarm
250 Watt Metal Halide Lamp	10/3.0	No Alarm	No Alarm

Response Testing w/ Un-modulated False Alarm Stimuli Present			
False Alarm Source	**False Alarm Source Distance (ft/m)**	**Fire Source**	**Fire Source Distance (ft/m)**
Sunlight direct	----------	16" Propane Plume	25/7.62
Sunlight indirect	----------	16" Propane Plume	25/7.62
Arc Welding	10/3.0	16" Propane Plume	25/7.62
1500 Watt heater	10/3.0	16" Propane Plume	25/7.62
40 Watt Fluorescent Lights	10/3.0	16" Propane Plume	25/7.62
500 Watt Halogen Light	10/3.0	16" Propane Plume	25/7.62
250 Watt Incandescent Light	10/3.0	16" Propane Plume	25/7.62
250 Watt Sodium Vapor Lamp	10/3.0	16" Propane Plume	25/7.62
70 Watt Sodium Vapor Lamp	10/3.0	16" Propane Plume	25/7.62
250 Watt Metal Halide Lamp	10/3.0	16" Propane Plume	25/7.62

Response Testing w/ Modulated False Alarm Stimuli Present			
Fire Alarm Source	**Distance (ft/m)**	**Fire Source**	**Fire Source Distance (ft/m)**
Sunlight direct	----------	16" Propane Plume	25/7.62
Sunlight indirect	----------	16" Propane Plume	25/7.62
Arc Welding	10/3.0	16" Propane Plume	25/7.62
1500 Watt heater	10/3.0	16" Propane Plume	25/7.62
40 Watt Fluorescent Lights	10/3.0	16" Propane Plume	25/7.62
500 Watt Halogen Light	10/3.0	16" Propane Plume	25/7.62
250 Watt Incandescent Light	10/3.0	16" Propane Plume	25/7.62
250 Watt Sodium Vapor Lamp	10/3.0	16" Propane Plume	25/7.62
70 Watt Sodium Vapor Lamp	10/3.0	16" Propane Plume	25/7.62
250 Watt Metal Halide Lamp	10/3.0	16" Propane Plume	25/7.62

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NET SAFETY MONITORING INC.