Pyrotector*

INSTRUCTIONS

Infrared Flame Detector

Model 30-2056E

APPLICATION

The Pyrotector Model 30-2056E Infrared Flame Detector is designed for use in applications where the occurrence of lightning or arc welding within the protected area can cause an ultraviolet fire detector to register a false alarm. The detector is virtually immune to actuation caused by lightning, arc welding, and most other extraneous light sources. It is ideally suited for use in a variety of both indoor and outdoor applications, in nearly any ambient lighting environment, including the full range of artificial lighting. The housing is explosion-proof, watertight, and dust-tight, and conforms to applicable NEMA and NEC requirements. Typical applications that can use the 30-2056E Flame Detector include:

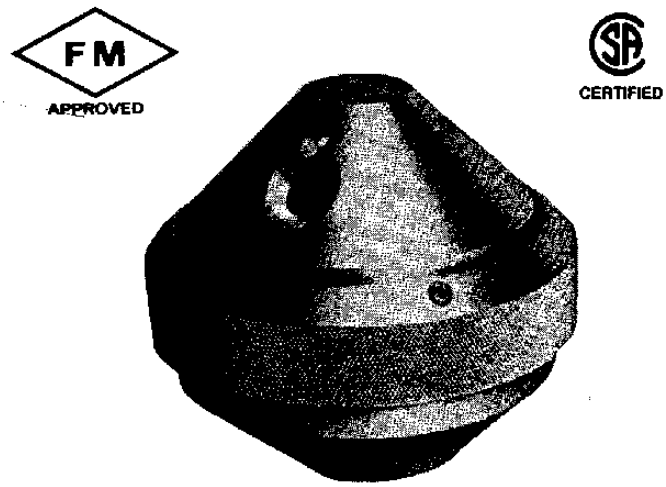
- Hydrocarbon processing plants
- Hazardous storage facilities
- Offshore oil platforms
- Airport facilities
- Fuel loading racks
- Aircraft hangars and maintenance areas (Meets requirements for "Intended Use" per AFR 88-15 for Hangar Applications, as verified by testing at Factory Mutual).

FEATURES

- High immunity to false alarms caused by lightning, arc welding, and sunlight.
- Ultrafast response to large gasoline fires.
- Compatible with standard alarm systems.
- Remote test feature assures reliable response.
- Explosion-proof and watertight housing for use in a variety of applications.

DESCRIPTION

The Model 30-2056E IR Flame Detector is a compact, unitized package containing an IR detection cell, solid state electronics, and a dry contact Form C (SPDT) alarm relay. The detector is engineered to respond to the nominal 4.3 micron band of infrared radiation, which is commonly known as the CO_2 spike. See Figure 1. A characteristic of burning hydrocarbons is the emission of unusually high levels of IR radiation in this narrow portion of the radiation spectrum. On the other hand, extraneous light sources that are capable of triggering an alarm in other types of fire detectors emit very low levels of radiation in this range. By concentrating on this narrow band of the spectral range that is highly specific to burning hydrocarbons, combined with the use of optical filters to discriminate against most extraneous background radiation from a variety of sources including hot objects, the Model 30-2056E is able to provide a high level of reliable fire detection, while being relatively immune to false alarm signals.



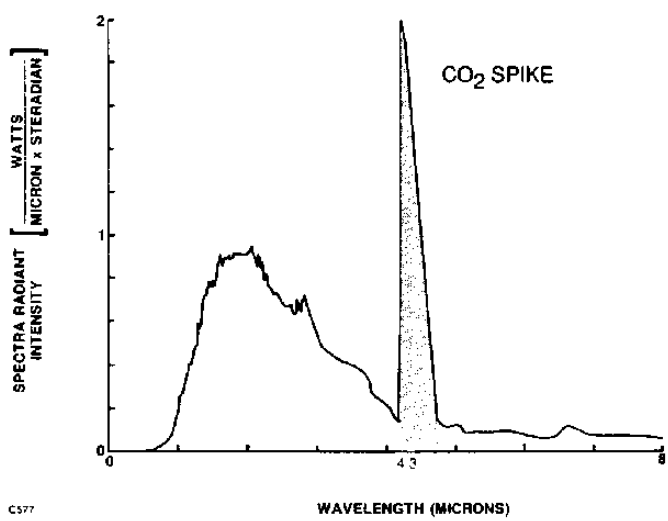


Figure 1–Spectral Sensitivity Range for Hydrocarbon Fires

Pyrotector is a brand name of Detector Electronics Corporation

The detector is compatible with most 24 volt filtered dc 4-wire fire alarm control panels. The detector is equipped with Form C relay contacts and also a solid state output for controlling fire response devices or annunciating a fire alarm condition.

DETECTOR RESPONSE TIME

The response time of the detector depends on the size of the fire, the rate of propagation, fire type, and the proximity of the fire to the detector. The average response time to a one square foot gasoline fire at 10 feet is 75 milliseconds.

REMOTE TESTING

The detector has a remote test feature that allows the operator to test the detection circuitry for proper function and also check the optical integrity of the lens from a location that is remote from the detector installation. To initiate the test, the operator places the system in bypass and simply presses a test switch located at the control panel. This actuates an integral IR radiation source that is mounted outside the detector lens, resulting in the simulation of a flickering fire. Upon detection of the simulated fire, the detector latches into an alarm condition to indicate that it is operating correctly. The detector can then be reset to the normal operating mode from the control panel by interrupting power to the unit for a minimum of 3 seconds.

The IR source lamp is also illuminated during an alarm condition to serve as an integral visual alarm indicator.

CONE OF VISION

The detector has a nominal 90 degree cone of vision. However, the detector can be rotated up to 360° so that the area to be protected is within its cone of vision. The direction of the viewing angle can easily be set or changed without special tools, additional hardware, or mounting components.

THEORY OF OPERATION

The electromagnetic emission of a hydrocarbon fire is characterized by a strong band in the 4.3 micron range. This band, known as the CO_2 spike, is caused by the emission of energy generated by excited CO_2 molecules. Since this is the dominant feature of the spectral emission for hydrocarbon fires, the IR sensor is designed to be highly sensitive to radiant energy in the 4.3 micron range.

The detection cell is a specially developed pyro-electric cell with an integral optical filter window, which restricts incoming light to the wavelength band of 4.1 to 4.7 microns (the CO_2 spike). The detection cell responds by generating a signal that is proportional to the radiation being detected.

The electronic circuitry that processes the signal from the detection cell consists of two channels. One channel checks for flicker response, ignoring signals from spurious light sources. The flicker rate and count requirements are factory set for levels characteristic of a hydrocarbon fire (three flickers within 3 to 6 seconds). A flickering signal that exceeds the preset alarm threshold will result in actuation of the alarm relay.

The other channel looks for large signal response. For example the presence of a gasoline fire measuring one square foot at 10 feet from the detector will cause this channel to energize the alarm relay in less than 75 milliseconds. The factory set sensitivity level of the detector has been carefully selected to enable the detector to provide positive flame recognition, while being relatively free from false alarms.

SPECIFICATIONS

OPERATING VOLTAGE —
18 to 30 volts dc, with maximum ripple 0.5 vpp at 60 to 120 Hz.

OPERATING CURRENT —
Standby: 16 milliamperes.
Alarm: 65 milliamperes maximum.
Test: 150 milliamperes.

RELAY CONTACT RATING —
1 ampere at 26 vdc, Form C contacts.

SPECTRAL SENSITIVITY RANGE —
4.1 to 4.7 microns.

RESPONSE TIME —
Detector responds to a 1 ft^2 gasoline fire (at zero axis to the detector) in 75 milliseconds at 10 feet, 3 to 6 seconds at 35 feet. See Figures 2 and 3.

CONE OF VISION —
90 degrees nominal, with sensitivity reduced to 70% at 45 ± 2 degrees of zero axis. See Figure 4.

TEMPERATURE RANGE —
Operating: –40°F to +158°F (–40°C to +70°C).
Storage: –67°F to +185°F (–55°C to +85°C).

DIMENSIONS —
See Figure 5.

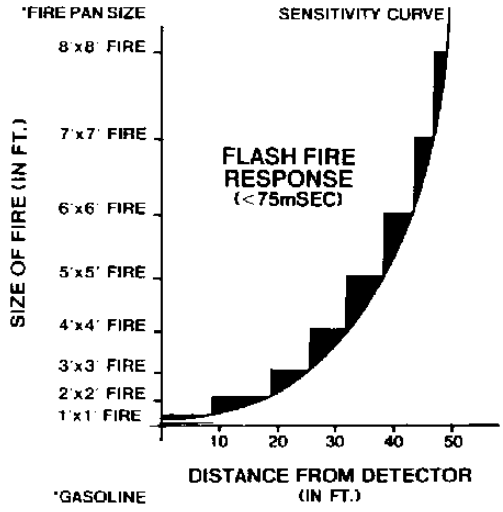


Figure 2–Typical Response–Large Signal

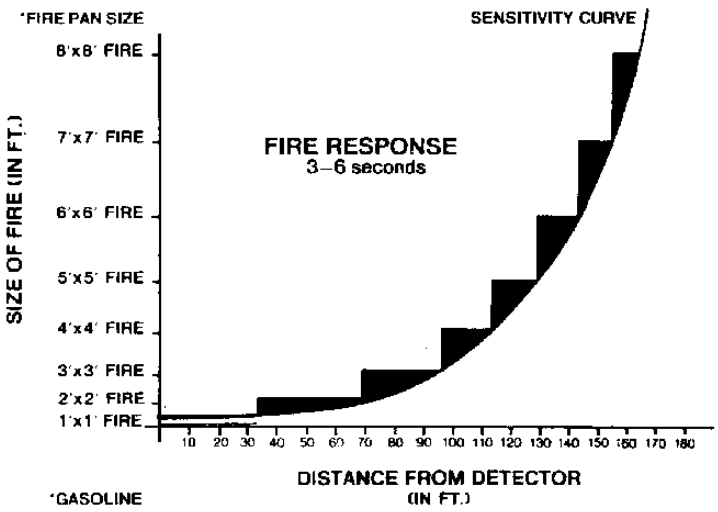


Figure 3–Typical Response–Flickering Signal

ENCLOSURE —
Explosion-proof and watertight, corrosion resistant, hard anodized aluminum 6061 T6 (standard).
FM and CSA approved.
Explosion-proof: Class I, Div. 1, Groups A, B, C, D. Class II, Div. 1, Groups E, F, G.
Watertight: NEMA 4
Conduit fitting: 3/4 inch NPT (Female).

A housing with metric threads is available as an option.

SHOCK AND VIBRATION —
Shock: 10 g.
Vibration: 0.02 inch at 10 to 30 Hz.

WEIGHT —
3.0 pounds.

Note 2: California State Fire Marshal Listing:
No. 7210-1218: 103
NYC Standards of Appeals, City of Cleveland.

Note 1: Specifications are subject to change without notice. Please contact the factory for verification.

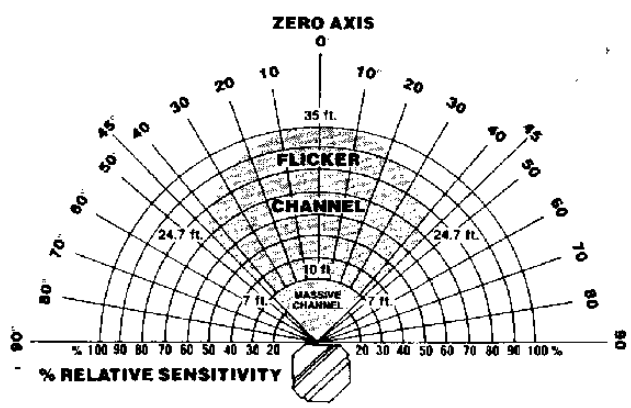


Figure 4–Cone of Vision of Detector

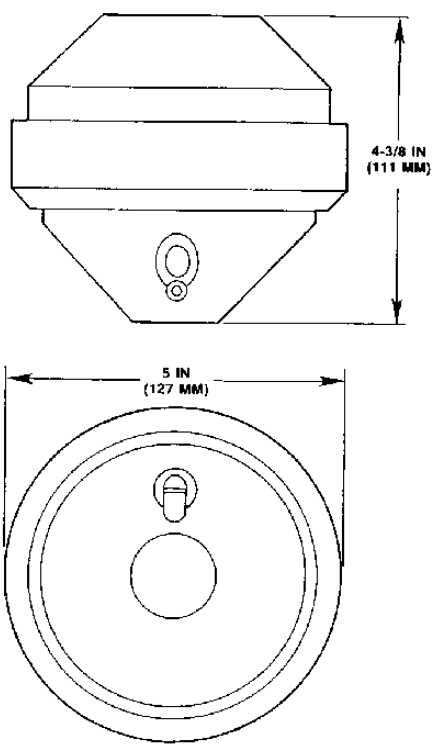


Figure 5–Dimensions of 30-2056E

INSTALLATION

The installer should provide a 3/4 inch conduit with an appropriate junction box at the point where the detector is to be located. This conduit must be grounded. All wiring cables to the detectors must be shielded and the shields must be grounded. The use of conduit seals is recommended (see Figure 7).

CAUTION

To prevent ignition of a hazardous atmosphere, do not remove the cover while power is applied to the detector.

1. Provide a shielded wiring cable (14 AWG recommended) with a minimum of 6 inches service loop at the junction box.

NOTE

Be certain that all wiring complies with local wiring codes. If necessary, consult a qualified official.

2. Attach the detector to the junction box, bringing the wires into the junction box. Install the conduit seal. Use care not to damage the wires by twisting them when connections are wrenched tight. Unit and junction box **must** be grounded.

3. Connect the external wiring to the detector as illustrated in Figure 6.

4. Place the cover on the junction box. Be sure the O-ring is in place and that no wires are trapped between body halves.

5. To ensure proper coverage of the surveillance area, orient the detector so that the lens faces the center of the area to be protected.

6. Clean the test lamp and sensor lens with a clean lint-free cloth. Wet with alcohol only.

To change the viewing angle of the detector, loosen the set screws and retaining ring. The detector can be adjusted by rotating the front body half 180 degrees clockwise or counterclockwise from its present position. After the detector has been adjusted, tighten the retaining ring and the three set screws.

MAINTENANCE

To assure maximum detector sensitivity, the lens must be kept free of dirt or other contaminating film.

The detector should be tested regularly. If it fails a test, clean the lens and test again. If the detector fails again, it should be removed and replaced. The defective detector should be sent to the factory for repairs.

NOTE

Remove power to the detector before cleaning the lens or disconnecting external wiring.

TESTING THE DETECTOR

The detector is provided with an integral test feature. A remote test switch along with a test light or buzzer must be provided at the control panel. See Figure 6.

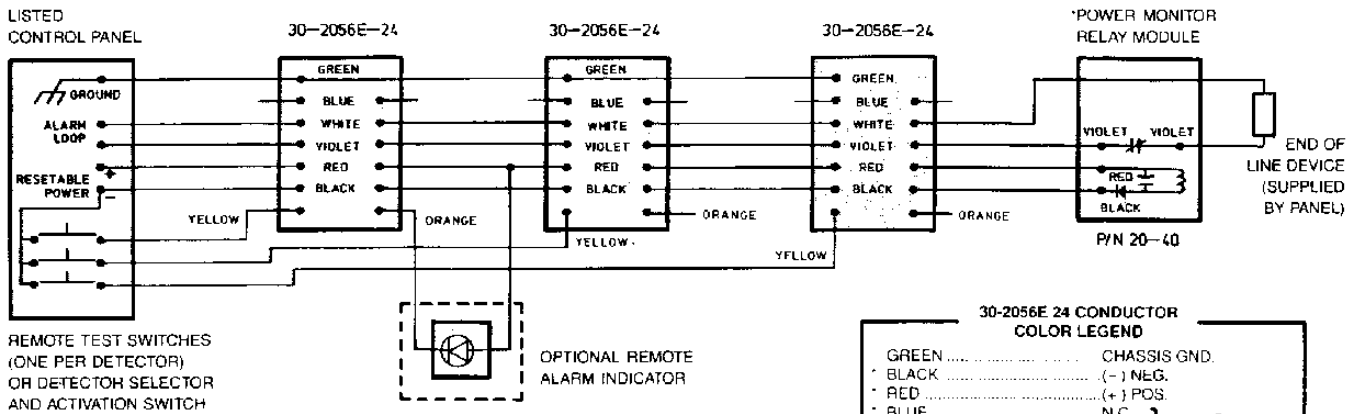
1. Disconnect or bypass all response devices such as alarms, actuators, etc.

2. Press the test switch. The detector should respond within 6 seconds.

3. Interrupt power for a minimum of 3 seconds to reset the detector.

4. Test each additional detector in the loop in the same manner.

5. Return the system to normal operation.



ALTERNATE CONFIGURATIONS

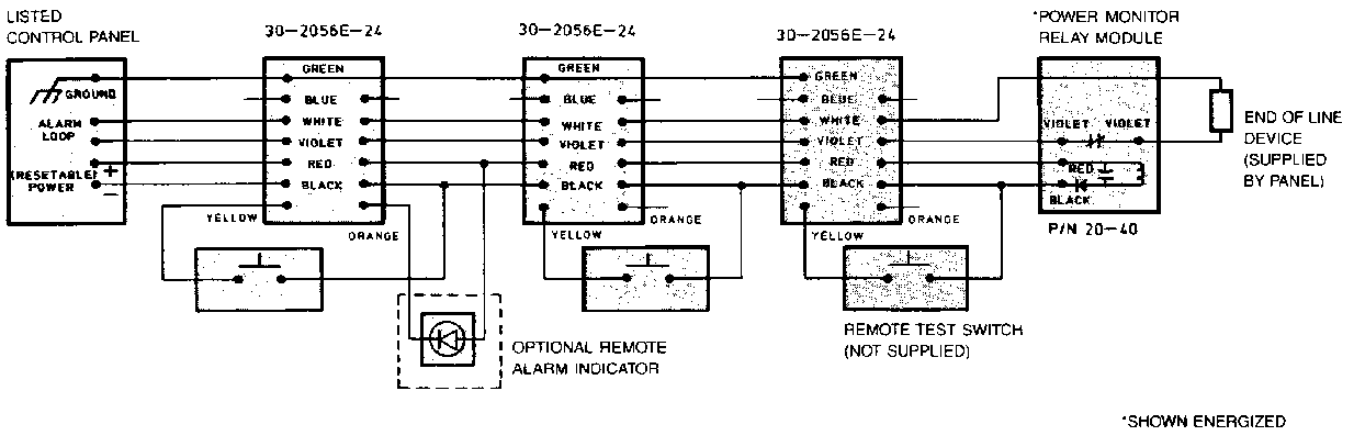


Figure 6–Wiring Diagram

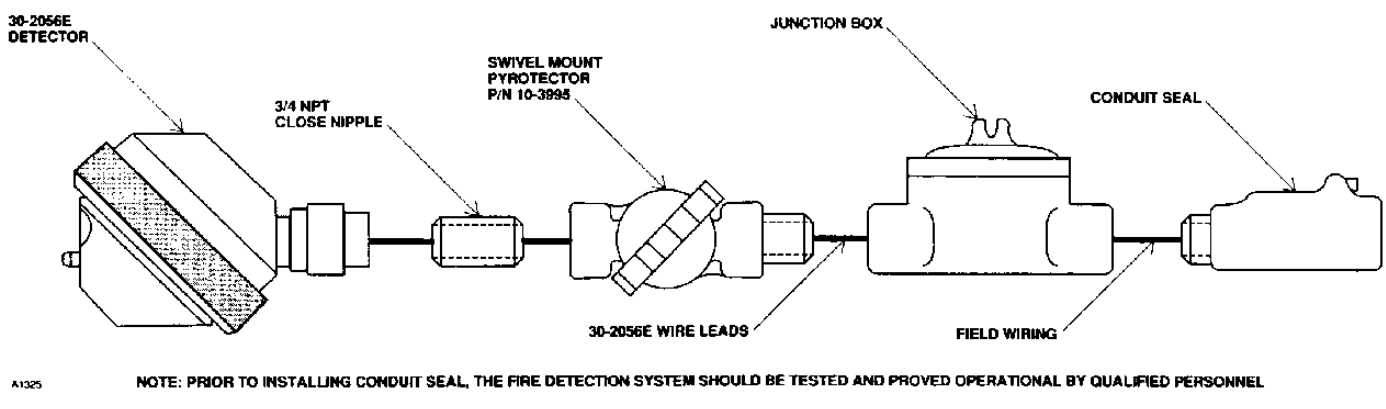


Figure 7 — Typical Installation of 30-2056E