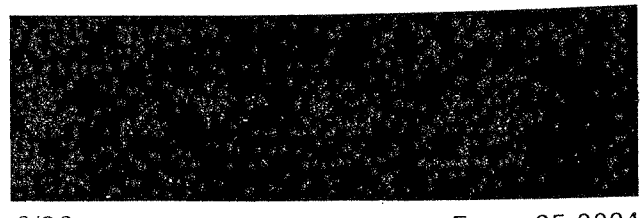
DET TRONICS

INSTRUCTIONS

Flame Safeguard System

R9006 Controller

C9506 Scanner



6/86 Form 65-8024

WARRANTY POLICY

Detector Electronics Corporation ultraviolet detectors are manufactured from high quality components and the completed device is rigorously inspected and tested before shipment; however, any electronic device is subject to failure beyond the control of the manufacturer. To insure system reliability, it is important for the user to maintain the system as recommended by the instruction manuals and to determine the frequency of functional checking of the system required for each specific installation. The more frequent the checking, the greater the system reliability. For the highest reliability, a completely redundant system is necessary. The manufacturer warrants its products against defective parts and workmanship, and will replace or repair equipment returned to the manufacturer for these reasons within 12 months after purchase date. See manufacturer's Standard Terms and Conditions on the invoice for complete details. Please note that no other warranties, written or implied, will be honored by the manufacturer.

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DET TRONICS

INSTRUCTIONS
Flame Safeguard System
R9006 Controller
C9506 Scanner

SYSTEM APPLICATION

Detector Electronics flame safeguard systems provide recognition and continuous monitoring of fossil fuel flames in semiautomatically controlled boilers and furnaces. The R9006 Controller monitors signals from one C9506 Flame Scanner and provides relay switching within four seconds of flame loss.

The C9506 Ultraviolet Flame Scanner responds to ultraviolet (UV) radiation wavelengths between 1850 and 2650 angstroms, which is emitted by gaseous and liquid fuel flames.

FEATURES

- Flame On relay is de-energized when flame signal drops below preset threshold.
- Four second maximum response to flame failure.
- External output for connecting flame intensity voltmeter (0 to 10 vdc).
- Front panel LEDs indicate power and flame presence.
- Field adjustable sensitivity.
- Designed for FM and CSA approval.

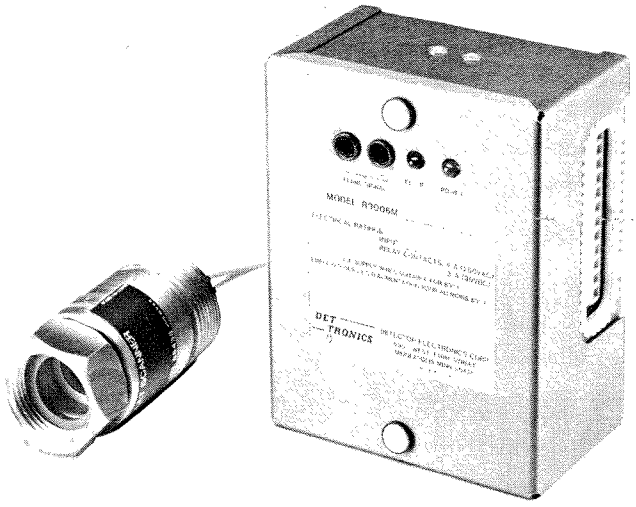
SYSTEM DESCRIPTION

The R9006 Controller (Figure 1) processes signals from one flame scanner and energizes the Flame On relay in response to flame verification. The green POWER LED indicates that the controller is on. The red FLAME LED is illuminated when the flame intensity signal exceeds the flame-on threshold and the Flame relay is energized.

THEORY OF OPERATION

The primary function of the flame safeguard system is to verify the presence of a burner flame. The R9006 Controller monitors the signal from the flame scanner and energizes Flame On relay K1 when the scanner signal exceeds the flame on threshold.

Referring to Figure 2:



- Scanner signal pulses are transmitted to the integrator buffer circuit in the R9006.
- The flame signal is sent to the terminals on the faceplate for connection to a remote meter.

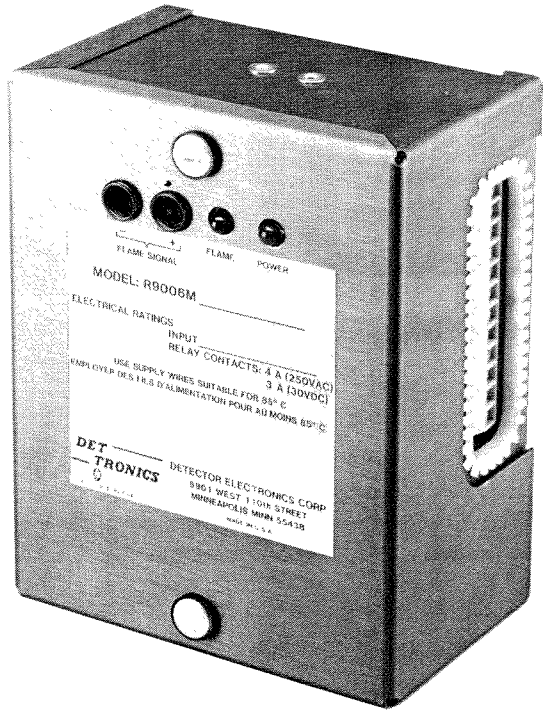


Figure 1—R9006 Flame Safeguard Controller

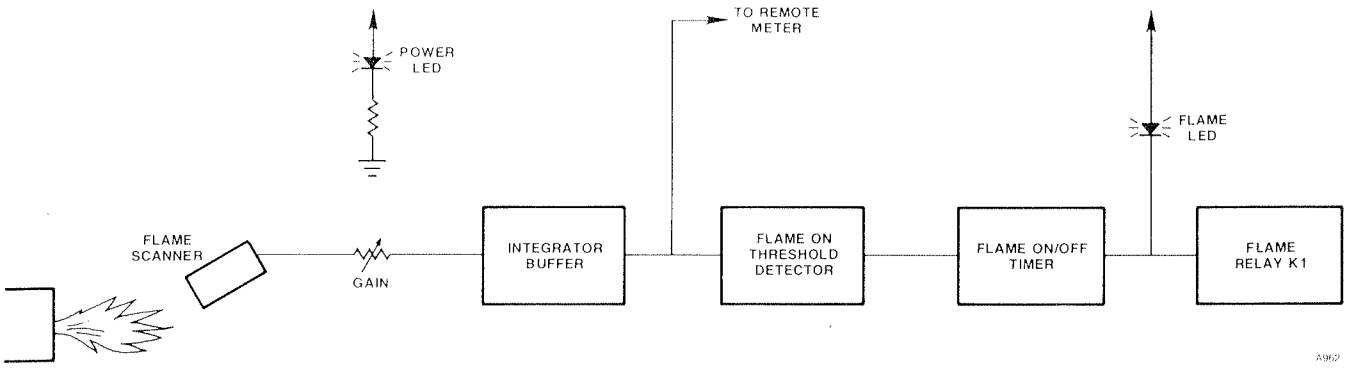


Figure 2—Flame Response Circuitry Block Diagram

- The flame signal is sent to the flame on threshold detector.

  —When the flame signal exceeds the factory-set flame on threshold, the signal is passed to the flame on timer.

  —When the flame signal drops below the flame on threshold, no signal is passed to the timer.

- Flame relay K1 is energized and the red FLAME LED is illuminated when the flame signal exceeds the factory-set flame on threshold for over 1.0 second.

- Flame relay K1 is de-energized within 4 seconds of flame loss.

- Front panel indicators reflect normal system operation when:

  —The green POWER LED is illuminated.

  —The red FLAME LED is illuminated, indicating that the flame on threshold has been exceeded and K1 is energized.

SPECIFICATIONS

R9006 CONTROLLER

SIGNAL INPUTS—
One flame sensor input.

OUTPUTS—
Two Form C contacts rated for 3 amperes resistive at 30 vdc, 4 amperes resistive at 250 vac.

Meter outputs, 0 to 10 vdc (maximum signal at 10 vdc).

INPUT VOLTAGES—
Two options available:
102 to 132 vac, 45 to 65 Hz.
204 to 264 vac, 46 to 65 Hz.

POWER CONSUMPTION—
1.2 VA at 120 or 240 vac.

TEMPERATURE RANGE—
Operating: −4°F to +185°F (−20°C to +85°C).
Storage: −50°F to +257°F (−46°C to +125°C).

HUMIDITY—
5 to 95% relative (non-condensing).

SHIPPING WEIGHT—
1 lb (0.5 kilogram).

FLAME RECOGNITION TIME—
1 second maximum.

APPROVALS—
Designed for CSA and FM approval.

MECHANICAL—
Housing is blue anodized aluminum.

MOUNTING—
Panel mount using two No. 8-32 UNC screws.

DIMENSIONS—
See Figure 3.

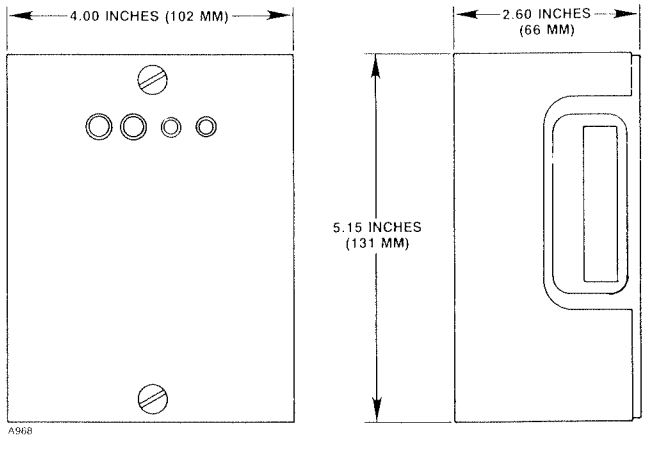


Figure 3—R9006 Dimensions in Inches (Millimeters)

C9506 FLAME SCANNER

ELECTRICAL—
8 foot non-shielded conductors, insulation rated 600 volts ac at 257°F (125°C) dry.

MECHANICAL
Mounting connector diameter is 1.0 inch (for mounting on 1.0 inch NPT sight pipe).

Wiring connector is 1.25 inches (for connection to reducer and then conduit).

TEMPERATURE—
Operating: −4°F to +257°F (−20°C to +125°C).
Storage: −50°F to +140°F (−46°C to +60°C).

HUMIDITY—
5 to 95% relative (non-condensing).

DIMENSIONS—
See Figure 4.

SHIPPING WEIGHT
7 oz (0.2 kilogram).

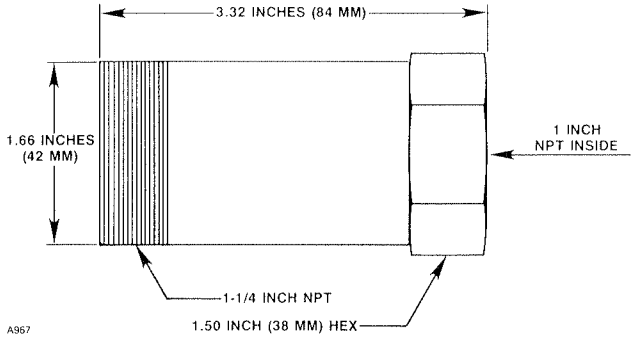


Figure 4—C9506 Dimensions in Inches (Millimeters)

INSTALLATION

FLAME SCANNER MOUNTING

1. Choose a sighting location where the scanner will have an unobstructed view of the flame under all firing conditions. Greatest ultraviolet radiation is produced near the base of the flame in the area immediately ahead of the burner. A scanner monitoring a pilot flame must sight at a point where pilot and main flames intersect to ensure that a detectable pilot flame will reliably ignite the main flame.

   In multiple burner furnaces, choose a sighting angle with the best possible view of the flame to be monitored and the poorest possible view of other flames in the furnace. The sight pipe should be inclined slightly downward toward the bottom of the furnace so that unburned particles or condensed moisture will not fall or drain into the sensor assembly.

2. Prepare holes in the burner front and windbox to clear the sight pipe at the angle of approach selected. Select a length of 1-inch standard pipe (with NPT thread on one end) no longer than is necessary to place the scanner in an unobstructed and accessible area.

3. Place a reducer tee fitting and close nipple at the end of the sight pipe (refer to Figure 5). Attach the purge air source to the tee. The purge air supply must be oil-free and dry. The air pressure should be slightly greater than furnace pressure to keep debris out of the sight pipe and away from the sensor tube surface. Special precautions should be taken in pressurized furnace applications. Consult the factory for further assistance.

4. Verify the proper location by viewing through the sight pipe.

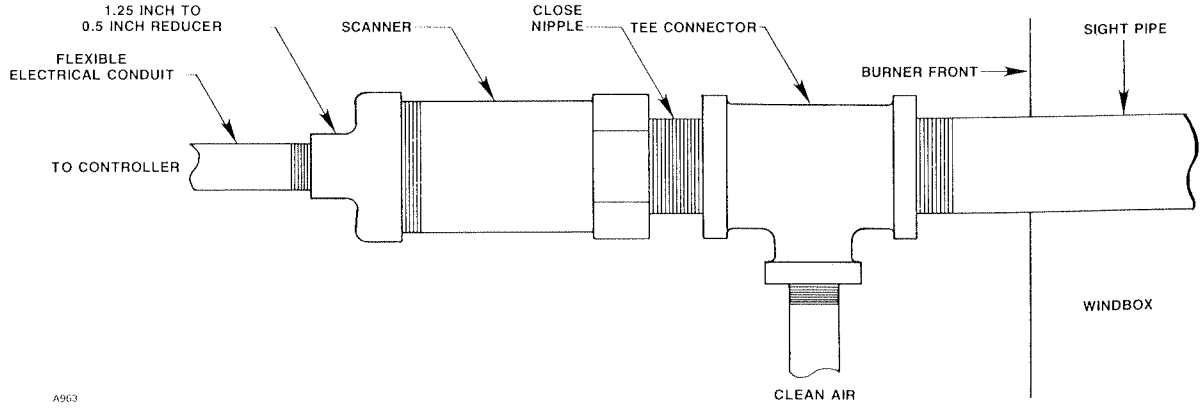


Figure 5—Scanner Mounting

5. Thread the sensor assembly onto the close nipple until tight.

6. Tack weld the sight pipe to the burner front at the selected location and angle. Due to heat expansion, it is recommended that the sight pipe is not fixed at the burner wall.

7. In many instances it is convenient to attach the sight pipe to a swivel mount (part number Q2625) that, in turn, is attached to the sight pipe mounting surface. This mount allows angular adjustment within a cone of approximately 40 degrees.

8. Electrical connections are made on the threaded end of the scanner housing. This threaded end is 1.25 inches NPT. The use of a 1.25 inch to 0.5 inch reducer is recommended so that 0.5 inch flexible metal conduit can be used. Terminate the electrical connections at a junction box and splice the leadwires to conductors extending to the controller. For a watertight connection, use an appropriate fitting and a liquid-tight conduit arranged to angle downward from the scanner. For any wiring runs on or near hot surfaces, use wire rated for the higher temperatures.

CONTROLLER WIRING

1. The electrical connections of the R9006M Controller are shown in Figure 6.

2. The controller is equipped with screw terminals, which are designed for a maximum of one No. 16 AWG leadwire. Rather than connect a greater number of leadwires, make splices in a junction box. Do not make splices in conduit or fittings. Splices should be made with approved insulated crimp connectors, at insulated terminal posts or by soldering the connection and insulating with electrical tape.

3. For any wiring runs on or near hot surfaces, use appropriately rated wire.

4. Wire in accordance with National Electrical Code and local code requirements.

SIGNAL ADJUSTMENT

1. Ignite the flame(s) to be monitored following the normal burner lightoff procedure.

2. The sensitivity potentiometer is located on the circuit board of the R9006M Controller. The potentiometer is accessible with the controller cover removed (see Figure 6).

3. To adjust the flame signal:

   a. Monitor the flame intensity output from the jacks on the faceplate of the controller with a dc voltmeter.

   b. Observe the meter reading while adjusting the sensitivity potentiometer as outlined in the following instructions.

   c. With sensitivity controls set at maximum (fully clockwise) and a low to moderate flame signal, there will be minor fluctuations in the reading. For reliable operation, a signal reading should not drop below 4 volts. For best performance and early indication of any condition causing signal deterioration, the maximum signal reading should be adjusted to between 7 and 8 volts using the sensitivity potentiometer.

   d. An inadequate signal will usually be the result of improper sighting. Vary the angle of the sight pipe to achieve the highest signal voltage reading.

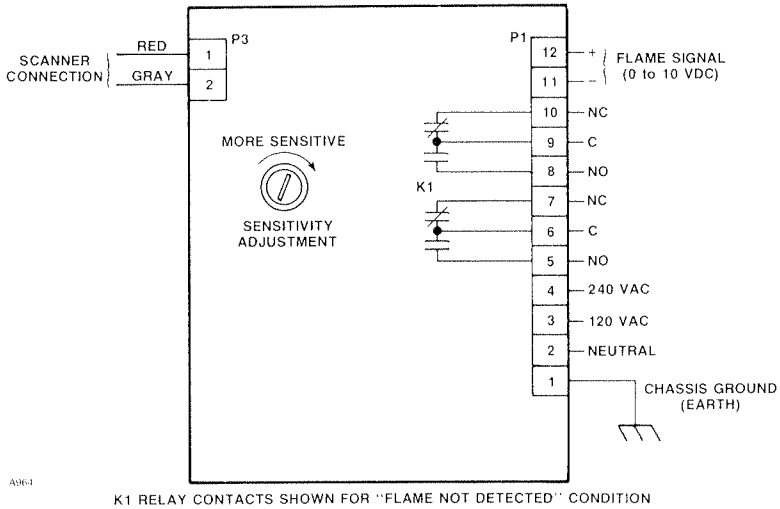


Figure 6—Controller Wiring

e. If the scanner is used to monitor both pilot and main flames, adequate flame signal from each should be verified with the other flame shut off. If a good signal can be acquired from both flames only at two different sighting angles, either the sight pipe should be relocated to a more appropriate sighting area or the use of two scanner/controllers should be considered.

f. In multiple burner furnaces where individual flame discrimination is required, it is possible that a strong signal may be received from an interfering flame as well as from the flame of interest. The best way to correct this condition is to restrict the size of the viewing orifice on the scanner so that the signal intensity from both flames is reduced. Assuming that the monitored flame, which has an optimized sighting angle, will provide a greater signal than an adjacent flame, a reduction of signal strength (by restricting the viewing orifice) will permit the differences in signal level from the two flames to be recognized. The unwanted signal can then be "tuned out" by adjusting the sensitivity control.

Satisfactory operation can be obtained with an attenuated signal reading as low as 3-3/4 to 4 volts.

4. *IMPORTANT: The electric spark used to ignite a pilot flame is an emitter of ultraviolet radiation.*

To ensure that the sighting arrangement does not permit the detection of direct or reflected spark energy, it should be determined that a flame signal reading of no more than 1 volt is obtained with fuel sources shut off and spark energized. Re-align the sensor or optically shield the igniter, if necessary, to avoid spark detection.

5. *IMPORTANT: A sensor responsive to a pilot flame is not properly applied if it detects a flame that is too small to reliably ignite the main burner.*

This can be checked by reducing the pilot flame size to the smallest that can be detected (sensitivity set to maximum) and then determining that such reduced flame will readily ignite the main burner fuel.

CAUTION

If ignition of main flame does not occur at once, or is slower than usual, shut off fuel immediately, readjust the sensor to sight further out, and repeat the test.

If pilot flame signal is relatively strong, the viewing orifice should be restricted.

6. *IMPORTANT: When satisfactory sighting has been achieved, the sight pipe should be permanently welded in place at the burner front to maintain the selected position. If a swivel mount is used, tack weld it to prevent further movement.*

7. After proper signal adjustment has been determined, flame failure response should be checked by closing manual fuel shutoff valves during burner operation. Shutdown and alarm should occur not more than 4 seconds after the flame goes out.

DEVICE REPAIR AND RETURN

Prior to returning devices or components, contact the nearest local Detector Electronics office so that an RMI (Return Material Identification) number can be assigned. A written statement describing the malfunction must accompany the returned device or component to expedite finding the cause of the failure, thereby reducing the time and cost of the repair to the customer.

Return all equipment transportation prepaid to the Minneapolis location.

Office locations

Detector Electronics Corporation
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ORDERING INFORMATION

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Field Support Group
6901 West 110th Street
Minneapolis, Minnesota 55438 USA
Telephone (612) 941-5665
Telex 29-0562 DETRONICS BLTN or 6879043 DETEL UW
Cable Detronics

OPTION

Q2625 Swivel Mount for angular adjustment of the sight pipe.

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