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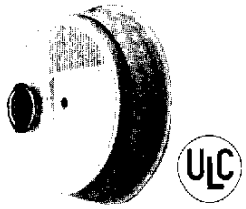
# INSTRUCTION MANUAL

Part Number 10175, Rev. B

# ESL 446 SERIES PHOTOELECTRONIC SMOKE DETECTORS



| Model Number | 12v/24v Operation | Thermal | Isolated Thermal | Auxiliary Contacts | Audible |
|---|---|---|---|---|---|
| 446C | ✔ | | | | |
| 446CT | ✔ | ✔ | | | |
| 446CR | ✔ | | | ✔ | |
| 446CRT | ✔ | ✔ | | ✔ | |
| 446CS | ✔ | | | | ✔ |
| 446CST | ✔ | ✔ | | | ✔ |
| 446CSR | ✔ | | | ✔ | ✔ |
| 446CSRT | ✔ | ✔ | | ✔ | ✔ |
| 446CSH | ✔ | | ✔ | | ✔ |
| 446AT | 6v/12v | ✔ | | | |

## GENERAL DESCRIPTION

ESL 446 Series photoelectronic, four-wire systems smoke detectors operate on the light scattering principle. The 446 Series is suitable for residential, commercial, industrial and institutional occupancies.

They are intended for four-wire connection to ULC Listed 6, 12 and 24 volt DC fire alarm control units. Each detector has one Form A (SPST-NO) alarm relay contact for connection to an alarm initiating circuit. *Those equipped with the auxiliary alarm contacts (Option R) are listed as suitable for releasing service.*

## INSTALLATION

The 446 Series smoke detectors mount to standard single-gang electrical boxes, 4" octagonal (e.g. RACO #125 or equivalent) electrical boxes, WIREMOLD No. 5739 fixture boxes or equivalents. The volume of the electrical box is determined by the number and size of conductors as required by the Canadian National Electrical Code, Part 1. All wiring must be installed in compliance with the code and the Standard for Installation of Fire Alarm Systems, CAN4-S524-M82.

All field wiring connections are made to a terminal block on the printed circuit board. Access this area by inserting the blade of an 1/8" screwdriver in the small slot on the detector base, opposite the hinge. Gently depress the cover release tab and swing the cover open. Remove the terminal block cover by gently pulling straight out. Dress all system wiring through the opening in the base of the smoke detector. Secure the detector to the mounting surface using the appropriate mounting holes and hardware. Strip 3/8" of insulation from each conductor and insert under the appropriate screw terminal. The barrier-type terminal block will accommodate one wire of 14 AWG to 22 AWG under each side of each screw/clamping plate. This design prevents "looping" of wires and provides for supervision of conductors. See Diagram #2 WIRING for correct terminal usage.

CHECK ALL WIRING AND MOUNTING CONNECTIONS. Dress wiring neatly and re-install the terminal block cover. Close and securely latch the detector cover.

## TESTING THE INSTALLATION

After all connections are completed and the wiring is checked for errors, apply power to the system. There should be no alarm. If an alarm is reported, check to verify if an actual alarm has occurred or if there is a problem with the installation. If it is not an actual alarm, power down the system and check each detector for correct wiring. If no alarm has occurred, check each detector's LED to verify that it is pulsing at approximately one pulse every seven seconds. Go to the last detector and check the smoke detector power with a volt meter for the specified voltage. To test each detector for alarm operation, hold a smoldering punk stick or cotton wick near the smoke entry areas and blow gently directing the smoke into the detector. **BE SURE TO PROPERLY EXTINGUISH THE SMOKE SOURCE AFTER TESTING!** You can also use Home Safeguard's canned smoke to test; follow the manufacturer's instructions carefully. Continue for up to 20 seconds or until an alarm is indicated.

This is a gross test and is not a reliable indication of the sensitivity of the detector. If it is a successful test the LED will light steady. To reset the detector, operate the system reset switch for 2 to 3 seconds to remove power from the detectors. Control unit alarm and all ancillary functions should be verified for a complete test of each detector. Follow this procedure for the remaining detectors.

TEST EVERY DETECTOR FOR PROPER OPERATION. This testing procedure should be conducted annually by qualified personnel. If a detector fails to function properly, obtain a Return Authorization Number by calling 1-800-648-7422 or 1-503-692-4052, then carefully pack it and return it prepaid to the manufacturer. Include an explanation of the suspected failure mode.

## ELECTRICAL SPECIFICATIONS (NOMINAL)*

| | Model | | |
|---|---|---|---|
| | 446AT | 446C, 446CT, 446CR, 446CRT | 446CS, 446CST, 446CSR, 446CSRT, 446CSH |
| Standby Voltage** | 6-12 VDC/VFWR | 10-30 VDC/VFWR | 12-30 VDC/VFWR |
| Standby Current | 500µA @ 6 V<br>1.5mA @ 12 V | 40µA @ 12 V<br>100µA @ 24 V | 40µA @ 12 V<br>100µA @ 24 V |
| Alarm Voltage** | 6-12 VDC/VFWR | 10-30 VDC/VFWR | 12-30 VDC/VFWR |
| Alarm Current | 50mA @ 6 V<br>60mA @ 12 V | 15mA @ 12 V<br>30mA @ 24 V | 40mA @ 12 V<br>60mA @ 24 V |
| Reverse Polarity Voltage** | | | 12-30 VDC/VFWR |
| Reverse Polarity "ON" current | | | 25mA |
| Reverse Polarity Average Current | | | 12.5mA |
| Contact Rating (resistive) | 1 Ampere @ 30 VDC/120VAC | 446C, 446CT<br>1 Ampere @ 30 VDC/ 120 VAC | 446CS, 446CST, 446CSH<br>1 Ampere @ 30 VDC/ 120 VDC |
| | | 446CR, 446CRT<br>2 Amperes @ 30 VDC/ 120 VAC | 446CSR, 446CSRT<br>2 Amperes @ 30 VDC/ 120 VAC |

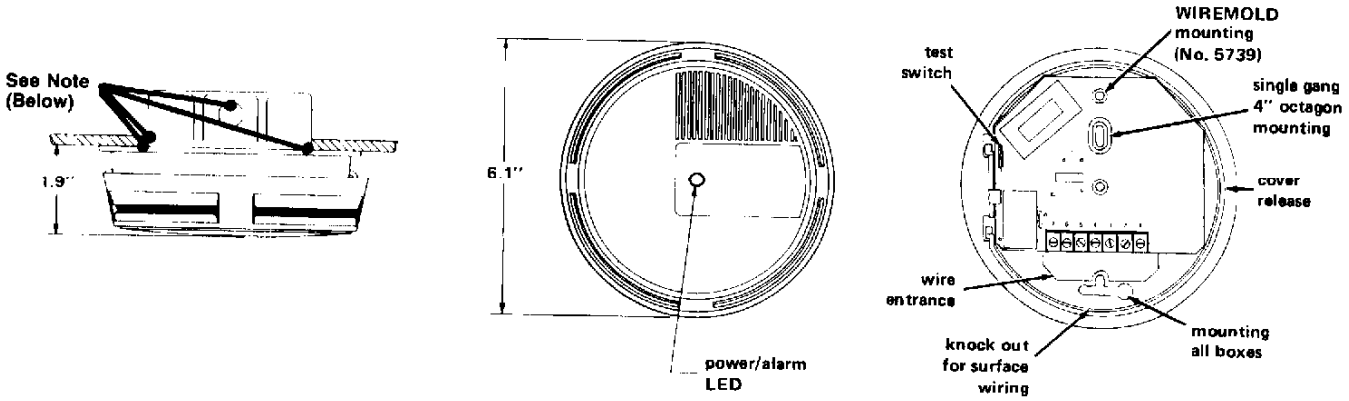
* Actual Maximum — Minimum is +10%; −15% of nominal
**VDC — Filtered DC, 10% Ripple Maximum
VFWR — Unfiltered Full Wave Rectified

## OPERATIONAL DATA

| | | |
|---|---|---|
| Horn Loudness (where applicable) | 85 dB @ 10 ft. | |
| Operating Temperature Range | 0°C to 50°C; 32°F to 120°F | |
| Operating Humidity Range | 0 to 95% RH | |
| Detector Size: Diameter | 6.1 in. | 15.5 cm |
| Height | 2.0 in. | 5.0 cm |
| Weight | 8.8 oz. | 0.25 kg |
| Power/Alarm Indicator LED | Standby — Flashing<br>Alarm — Steady | |
| Electronic Alarm Latch | Reset by momentary power interruption | |
| Sensitivity to Smoke | 3.1 ± 0.5%/ft nominal | |

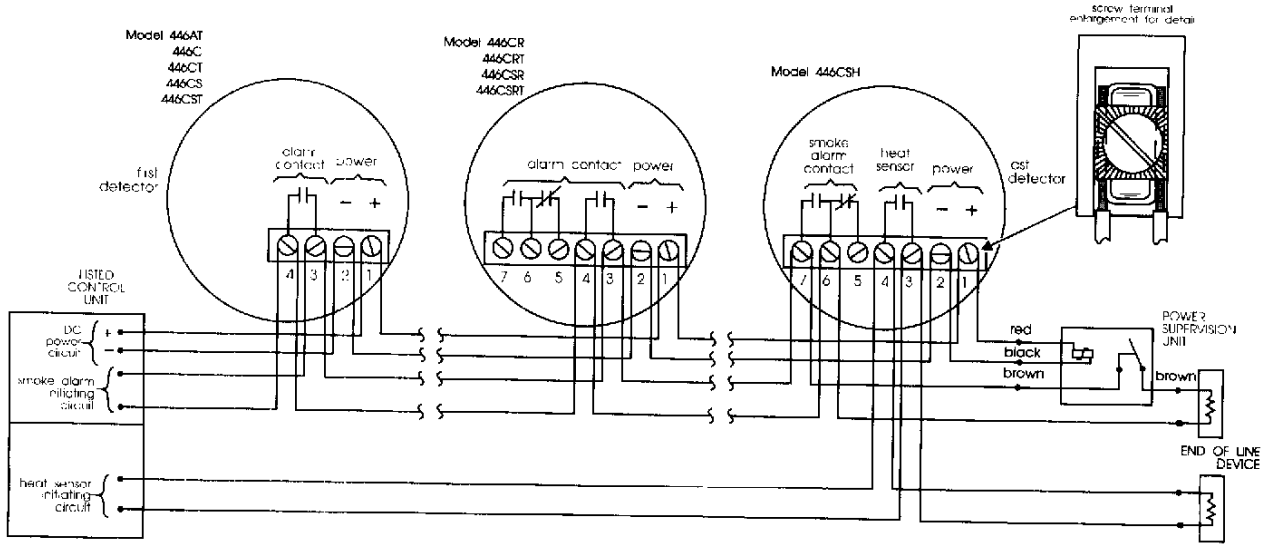
## INSTALLATION (Diagram #1)

**FLUSH MOUNTING ON 4" OCTAGON BOX**




**NOTE:** **Positive air pressure from wire openings, conduit, mounting boxes, irregular mounting surfaces, or plenums causing air movement through and away from the detector may prevent proper operation. Seal all such openings causing unwanted air flow using UL Listed Expanding Foam or Duxseal.**

## WIRING CONNECTIONS (Diagram #2)




Emergency operation (Style D (Class A)) Return initiating circuit wiring to appropriate control unit terminals and connect the end of line devices per control unit instructions.

**CAUTION:** DO NOT use looped wire under screw terminals. These terminals are designed to prevent looping of unbroken wire around or under a terminal screw in a manner that would permit the looped wire to remain unbroken during installation. This would preclude supervision if the wire were to dislodge from the terminal.

## MAINTENANCE

The 446 Series smoke detectors are designed to require little maintenance. Once a year (more often in dusty environments), open the detector cover and use a vacuum and/or compressed air to loosen and remove dust from the screen surrounding the optical sensing mechanism. For detectors installed in hostile (dusty) environments, it may be necessary to purge the chamber with canned or clean, dry compressed air. It is important to notify all concerned parties when any maintenance or testing of a fire alarm system is to occur. Always test each detector after cleaning.

**DO NOT** attempt to adjust or alter the detector.

## SUPERVISION OF SYSTEM WIRING

The detector's power is supervised by installing a power supervision unit for the appropriate control unit voltage at the end of the detector power circuit. The contacts for the supervision unit are wired in series with the system's alarm initiating circuit, and are closed when energized.

A break in the detector power circuit or a loss of power deenergizes the power supervision unit, opening the contacts and causing a trouble annunciation at the fire alarm control unit. See Diagram #2.

| **POWER SUPERVISION UNITS** | **MODEL 204A** | **MODEL 204C** |
|---|---|---|
| Operating Voltage | 6-18 VDC | 17-30 VDC |
| Operating Current | 40 mA @ 12 V | 10 mA @ 24 V |
| Contact Rating (resistive) | 1 Ampere @ 30 VDC/120 VAC | |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**Sentrol, Inc.**
**Corporate Headquarters:**
12345 SW Leveton Drive
Tualatin, OR 97062
503-692-4052

U.S. & Canada: 800-547-2556
Technical Support: 800-648-7424