

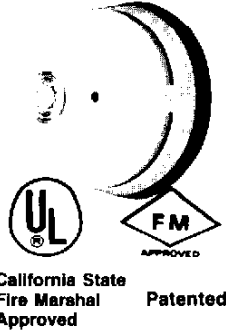


INSTRUCTION MANUAL

Part number 10753, REV 1192

ESL 445CS SERIES PHOTOELECTRONIC SMOKE DETECTORS

MODEL	DESCRIPTION
445CS	Smoke detector
445CST	Smoke detector with 135°F heat sensor
445CSR	Smoke detector with extra Form C alarm contact set
445CSRT	Smoke detector with extra Form C alarm contact set and 135°F heat sensor
445CSH	Smoke detector with isolated 135°F heat sensor



GENERAL DESCRIPTION

ESL 445CS Series photoelectronic, four-wire system smoke detectors with an 85 dB sounder operate on the light scattering principle.

445CS Series are especially suited for occupancies such as hotels, motels and dormitories, where efficient distribution of the alarm signal is essential. The detectors can be used effectively in commercial, industrial and institutional fire alarm systems.

They are intended for four-wire connection to UL Listed 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. An additional alarm relay contact (Form C SPDT) for auxiliary functions and/or an integral heat sensor are available as options on Models 445CST and 445CSRT. Those equipped with the auxiliary alarm contacts (Option R) are listed as suitable for releasing service.

Model 445CSH includes a smoke alarm initiating contact and an electrically isolated heat sensor for connection to a separate alarm initiating circuit.

INSTALLATION

The 445 Series smoke detectors mount to standard single-gang electrical boxes, 4" octagonal (e.g., RACO #125 or equivalent) electrical boxes, or on WIREMOLD No. 5739 fixture boxes. The volume of the electrical box is determined by the number and size of conductors as required by the National Electrical Code (NFPA 70). All wiring must be installed in compliance with the NEC or the local code(s) having jurisdiction.

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.

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.

TESTING THE INSTALLATION

After all connections are completed and the wiring is checked for errors, apply power to the system. There should *not* be an alarm. If there is, power down the system and check each detector and the power supervision unit (if used), 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 (or the power supervision unit), 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. Continue for up to 20 seconds or until an alarm is indicated.

BE SURE TO PROPERLY EXTINGUISH THE SMOKE SOURCE AFTER TESTING!

This is a gross test and is not a reliable indication of the sensitivity of the detector. To insure no significant loss of sensitivity has occurred, you must also utilize the ESL Test Tool Model 401. To do so, place the tool on the side of the detector, between the hinges. The magnet of the test tool will close a reed switch on the printed circuit board which, in turn, will simulate a smoke density greater than the alarm threshold of the smoke detector. Continue the test for 20 seconds or until an alarm occurs. If a successful test, the LED will light and the alarm relay contact (terminals 3 and 4) will close. 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 503-692-4052, then carefully pack it and return it prepaid to the manufacturer. Include an explanation of the suspected failure mode.

SENSITIVITY MEASUREMENT

The actual sensitivity of a detector may be determined by testing in a correlated UL 217/268 smoke test chamber. For a nominal charge ESL will perform this test and, if a detector is found to be outside of the marked sensitivity range, will clean the detector.

Contact ESL Customer Service for details on the return of the product. As an alternate to the above procedure, the Gemini Model 501 Aerosol Generator may be used. Follow the operating instructions supplied with the Gemini. Adjust the Gemini flow meter setting to the lower value in the table below. No alarm should occur with this value. Now adjust the Gemini setting to the higher value and re-conduct the test. The detector should alarm to the second test.

GEMINI FLOW METER SETTINGS

	Sensitivity	Flow Meter Setting
400 SERIES	3.1 + 0.5%/ft.	85
Photoelectronic Detectors	3.1 - 0.5%/ft.	74

Sensitivity measurements should be taken on all detectors towards the end of the first 12 months of operation, and every 24 months subsequent.

If a detector responds incorrectly, contact ESL Customer Service for details on the return of the product.

ESL does *not* endorse the use of pressurized aerosols in detector testing. Pressurized aerosols do not test detector sensitivity with accuracy. In fact, the result of such test may be misleading.

The test feature on ESL smoke detectors provides the most accurate test for minimum smoke sensitivity response.

The ESL product warranty *does not* cover contamination by aerosols.

APPROVALS

The smoke detector is for use in commercial fire protective signaling systems (NFPA 71, 72A, 72B, 72C, or 72D) and in household fire warning systems (NFPA 74).

Listed by Underwriters Laboratories, Inc.; California State Fire Marshal approved (Listing #7257-447:104); Factory Mutual approved (J.I.OK789.AY); State of Maryland approved (Permit #1885); City of Cleveland approved (Docket S-5-88); New York City, Board of Standards and Appeals approved (Calendar #122-73-SA).

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 of 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 de-energizes the power supervision unit, opening the contacts and causing a trouble annunciation at the fire alarm control unit. See Diagram #2.

MAINTENANCE

The 445 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 filtered 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.



ELECTRICAL SPECIFICATIONS

SMOKE DETECTORS—All Models

Standby Voltage*	10.2-33 VDC or VFWR
Standby Current	40 μ A @ 12 V; 100 μ A @ 24 V
Alarm Voltage*	10.2-33 VDC or VFWR
Alarm Current	40 mA @ 12V, 60 mA @ 24V
Reverse Polarity Voltage*	10.2-33 VDC or VFWR
Reverse Polarity "ON" Current	25 mA
Reverse Polarity Average Current	12.5 mA
Contact Ratings (resistive)	
Models 445CS, 445CST, 445CSH	— 1 Ampere @ 30 VDC or 120 VAC
Models 445CSR, 445CSRT	— 2 Amperes @ 30 VDC or 120 VAC
POWER SUPERVISION UNITS	MODEL 204-12/24V
Operating Voltage	8.5-33 VDC
Operating Current	14 mA @ 12 V; 28 mA @ 24 V
Contact Rating (resistive)	2 Ampere @ 26 VDC or 115 VAC

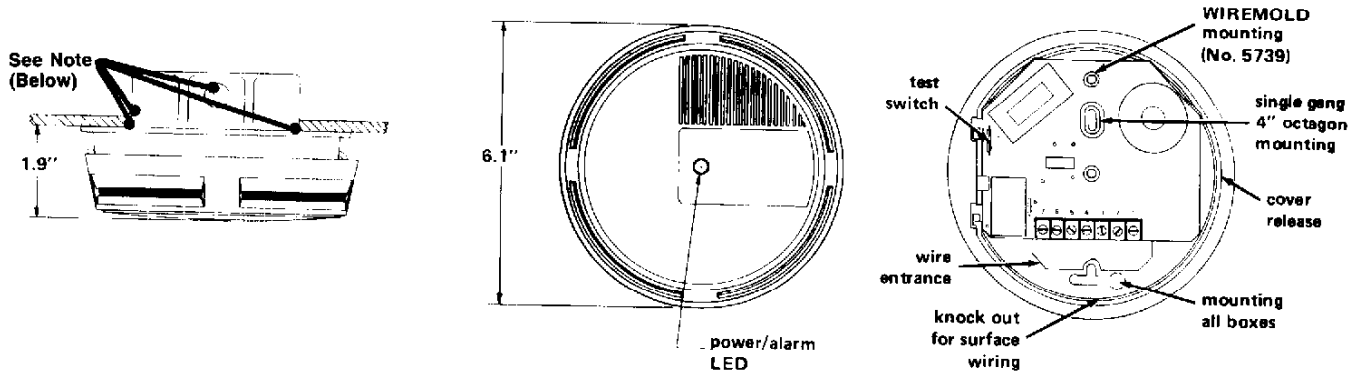
* VDC — Filtered DC, 10% Ripple maximum
VFWR — Unfiltered Full Wave Rectified

OPERATIONAL DATA

Horn Loudness	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	Alarm — Steady
Electronic Alarm Latch	Reset by momentary power interruption	
Sensitivity to Smoke	3.1 \pm 0.5%/ft.	

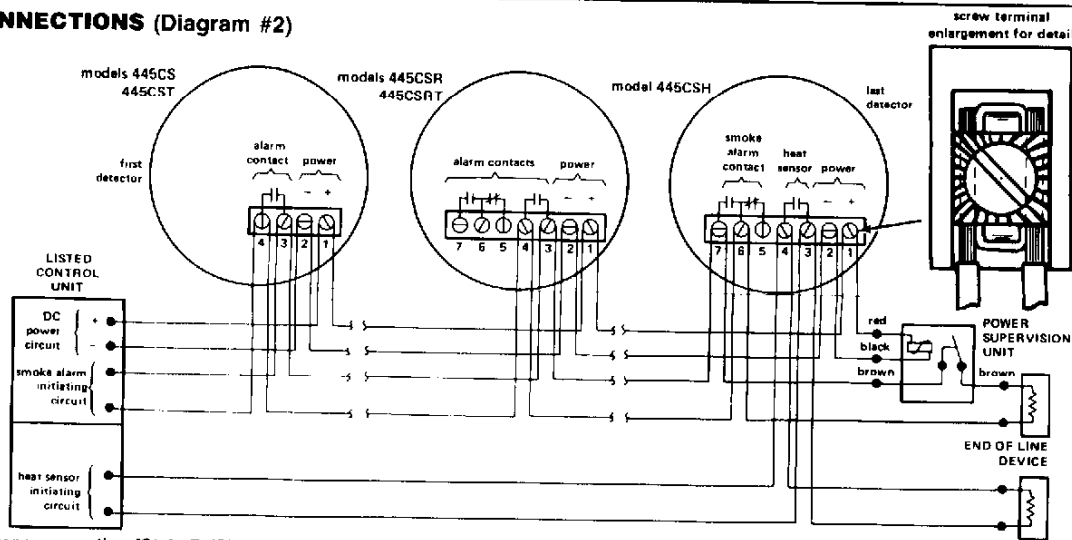
INSTALLATION (Diagram #1)

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 the control unit instructions.

CAUTION: DO NOT use looped wire under screw terminals. These terminals are designed to prevent looping of an 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.

SMOOTH CEILING SPACING

On smooth ceilings, spacing of 30 feet (9.1 meters) may be used as a guide. Other spacing may be used depending on ceiling height, high air movement, and other conditions or response requirements.

In all installations, good engineering judgment should govern.

Consult National Fire Protection Association Publications', "NFPA 72E, Standard on Automatic Fire Detectors," and, where applicable, "NFPA 74, Standard for the Installation, Maintenance, and Use of Household Fire Warning Equipment."

ESL
A Product of Sentrol, Inc.

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