A Product of Sentrol, Inc.

**INSTRUCTION MANUAL**
Part Number 10754, Rev B

# ESL 600 SERIES
## IONIZATION SMOKE DETECTORS and BASES

| MODEL | DESCRIPTION | Compatibility Identifier |
|---|---|---|
| 612U | Ionization smoke detector head | S10 |
| 612UD | Ionization smoke detector head for plenum applications | S10 |
| 601U | Universal base—two wire | S00 |
| 602U | Universal base with auxiliary relay contacts—two wire | S03 |
| 602U4 | Universal base—four wire | — |

California State Fire Marshal Approved

### DESCRIPTION
The ESL model 612U ionization smoke detector head is a single-source, dual-zone detector that provides excellent response to both visible and invisible combustion particles of all types of fires with outstanding stability. Its alarm confirmation feature requires the detector to see smoke concentrations above the pre-set threshold for five (5) seconds in order to alarm. The 612U also features an insect screen to further protect against nuisance alarms.

When the detector is mounted to a model 601U or 602U universal base, standard features include a local visual alarm indicator and remote alarm indicator capability.

Local functional testing is done using the magnet in the installation/removal/test tool (ESL Model 605A1). Remote test is possible through contact closure of the proper mounting base terminals.

Model 612U features very low current consumption.

### ELECTRICAL COMPATIBILITY
ESL 600 Series detectors are system fire detectors. When used with models 601U and/or 602U mounting bases in two-wire operation, the detector and controls must have compatibility Listing with Underwriters Laboratories, Inc. For information on detector/control unit compatibility, see ESL Detector Compatibility Index guide.

**WARNING:** SYSTEM MAY NOT OPERATE IF THE DETECTOR IS NOT CONNECTED TO THE CONTROL UNIT INITIATING DEVICE CIRCUIT AS SPECIFIED IN THE DETECTOR OR CONTROL UNIT LITERATURE.

In four-wire operation using model 602U4 mounting base, the voltage range of the detector should equal or exceed the voltage of the control and sufficient current be supplied to insure the operation of the detector(s).

### APPLICATION
Models 612U and 612UD are part of the 600 Series family of fire detectors and accessories. The common base/interchangeable sensing head configuration allows great flexibility in product application. ESL 600 Series fire detectors are suited for commercial, industrial, and institutional fire alarm systems.

The ionization detector head is for general area protection where flaming fires have been determined to be the hazard.

### INSTALLATION OF UNIVERSAL BASE
600 Series detector heads are installed by plugging the head into a universal mounting base and twisting the head clockwise to secure. Bases will mount directly to standard single-gang electrical boxes, 4" octagonal (e.g., RACO #125 or equivalent) and 3.5" octagonal boxes, or to WIREMOLD Nos. 5738, 5738A, or 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.

Each base is equipped with six wire-clamp type terminals and bifurcated contact springs for contact with detector head circuit pins. Each wire clamping plate will accommodate two conductors up to 2.0 mm diameter (#12AWG). Terminals are numbered 1 thru 6.

To install the model 601U mounting base, draw all system wiring through the center opening. Secure the base to the mounting surface using the appropriate mounting holes and hardware. See Diagram #1. System wiring should be connected in accordance with Diagram #2. Sprip 3/8" of insulation from each conductor and insert under the correct screw terminal. The barrier-type terminals are designed to prevent "looping" of wires and provides for supervision of conductors. Tighten each screw as connections are completed.

CHECK ALL WIRING AND MOUNTING CONNECTIONS.

Model 602U and 602U4 mounting base include a relay for auxiliary switching and alarm initiation operations, respectively. Terminals for the relay contacts are accessible from the rear of the base. Each "tunnel" type terminal accepts one wire. Wiring to the contacts must be accomplished before securing the base to the mounting surface. Complete the installation as described above for the model 601U base.

**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.

### INSTALLATION OF THE DETECTOR HEAD
After all detector bases are installed, including the end-of-line device, check the system wiring for continuity. A manually operated switch between Terminals 1 and 2 establishes continuity across the alarm initiating circuit at initial installation. The switch is in the closed position on new bases and is automatically opened when an ESL 600 Series sensing head is plugged in. If a detector head is removed for service, the switch may be reset using a small screwdriver, thus re-establishing circuit continuity.

To install a detector head, insert and rotate the head clockwise until it is properly aligned and "sets" into the base. Then rotate an additional 15° and it will automatically lock in to place.

### REMOVAL OF THE DETECTOR HEAD
Each detector base is equipped with a molded locking tab to prevent unauthorized removal of the detector head. To remove the detector head, insert a small screwdriver blade into the slot on the side of the base while simutaneously turning the detector head counterclockwise. If the detector mounting location does not warrant use of the locking feature, it is recommended that the locking tab be removed prior to installation. To remove the tab, insert a small screwdriver behind the tab, force it outward and take it off.

### 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 for correct wiring. If no alarm has occurred, go to the last detector and check the smoke detector power with a volt meter for the specified voltage.

Disconnect alarm signal devices, releasing service devices, and extinguishing systems prior to detector tests. Be sure to reconnect all devices at the conclusion of testing.

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 installation/removal and test tool model 605A1. To do so, position the tool over the detector so that the alarm indicating lamp may be seen through the opening in the tool apron. 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. To reset the detector, operate the system reset switch for 2 to 3 seconds to remove power from the detectors.

For remote test of the model 612U, use the model 606U2 test station. Turn the key switch to the "TEST" position and hold for at least 20 seconds. If a successful test the remote alarm LED of the 606U2 test station will light. Reset as described above.

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 |
|---|---|---|
| 612U | 2.0 – 1.0%/ft. | 89 |
| Ionization Detector | 2.0 – 1.0%/ft. | 56 |
| 612UD | 1.0 – 0.2%/ft. | 63 |
| Ionization Detector | 1.0 – 0.2%/ft. | 56 |

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

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

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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.

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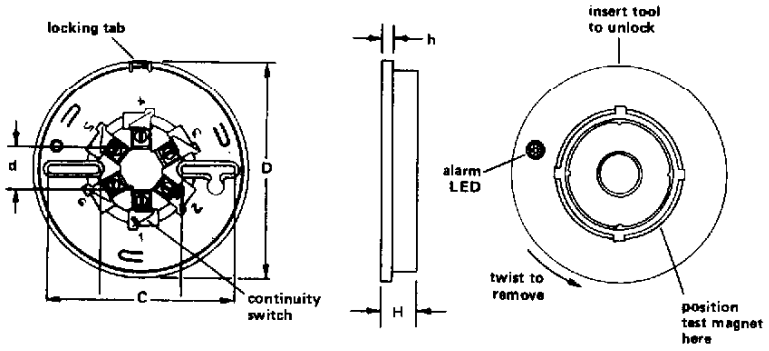
### APPROVALS
The smoke detector is for use in commercial fire protective signaling systems (NFPA 71, 72A, 72B, 72C, or 72D) and in household fire warning systems (NFPA 74). These detectors meet the requirements of NFPA Standard 72E, Automatic Fire Detectors.

Listed by Underwriters Laboratories, Inc. (UL 268) and 612UD (UL 268A); California State Fire Marshal approved (Listing #7256-447:116). State of Maryland approved (Permit #1885) and 612UD (Permit #1905); City of Cleveland approved (Docket S-5-88).

### MAINTENANCE
Disconnect power before attempting to service the detector. ESL 600 Series detectors are designed to require little maintenance. Once a year (more often in dusty environments), use a vacuum and/or a low pressure oil-free (filtered) air line to loosen and remove dust from the screen surrounding the sensing area. 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.

## INSTALLATION (Diagram #1)




**BASES**

| | | |
|---|---|---|
| D | = 4-3/4" | 120 mm |
| C | = 1-15/16–3-15/16 | 50-100 mm |
| d | = 3/4" | 19 mm |
| H | = 3/4" | 19 mm |
| h | = 1/4" | 6 mm |

Weight = 85 grams; 3 oz.

## ELECTRICAL SPECIFICATIONS

| | |
|---|---|
| Standby Voltage * | 8.5–44 VDC |
| Standby Current | 50 μA Max. |
| Equivalent Capacitance | 0.001 μF Max. |
| Alarm Voltage | 33 VDC Max. |
| Alarm Current | 50 mA ±10% @ 24 VDC |
| Alarm Current @ 10 VDC | 40 mA Min. |

To insure reset, reduce detector voltage to 4.0 volts or less, or current to 1 mA or less. Reset time: 1 second Max.

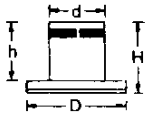
Contact Rating (resistive)—
602U Base 1A @ 30 VDC

* VDC — Filtered; 10% Maximum Ripple

## OPERATIONAL DATA

Dimensions with 601U, 602U, or 602U4 base

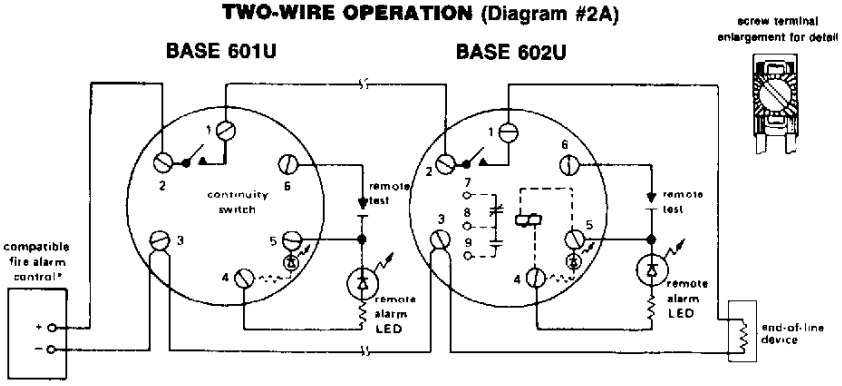
D = 4-3/4" 120 mm
H = 3-3/8" 86 mm
d = 3" 76 mm
h = 2-1/2" 63 mm




Weight without base = 200 grams; 7 oz.
Operating Temperature Range 32°F to 120°F; 0°C to 50°C
Operating Humidity Range 5–95% RH
Operating Air Velocity Range to 1.5 meters/sec; 300 feet/min
Altitude Range —400 to 5,000 m.;—1,300 to 15,000 ft.
Radioactive Source 0.9 μ Ci (1.0 μ Ci max.) Americium 241
Sensitivity—Gray Smoke
Model 612U— 2.0% + 1.0,-1.2%/ft.
Model 612UD— 1.0 ± 0.2%/ft.

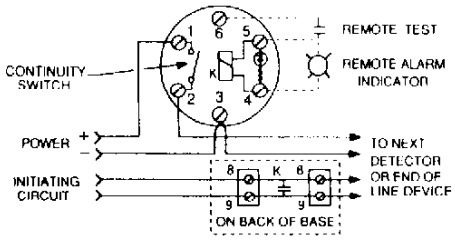
## WIRING CONNECTIONS

### TWO-WIRE OPERATION (Diagram #2A)




### FOUR-WIRE OPERATION (Diagram #2B)

BASE 602U4




SENTROL, INC. — UL FILE S2690

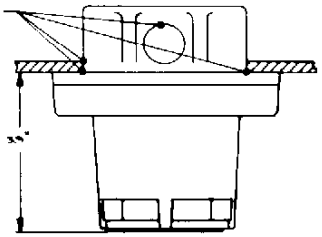
ESL 1500 Series Control Unit with BMB, ZEM. Styles B or D wiring.
**Maximum** line resistance = **100 ohms.**
Compatibility Identifier is **C01.**

Compatible Detectors are Models 612U, 612UD; Compatibility Identifier S10; maximum 40 detectors per circuit.

For remote alarm indication, use ESL Model 606U1.
For remote test and alarm indication, use ESL Model 606U2.

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 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.




**NOTE:** Postive 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.

## 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."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