

Elevator Control ES Switch



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For more information, visit eaton.com

Danger and Warnings

⚠ DANGER

HAZARDOUS VOLTAGE WILL CAUSE SEVERE INJURY OR DEATH. WORKING ON OR NEAR ENERGIZED CIRCUITS POSES A SERIOUS RISK OF ELECTRICAL SHOCK. DE-ENERGIZE ALL CIRCUITS BEFORE INSTALLING OR SERVICING THIS EQUIPMENT AND FOLLOW ALL PRESCRIBED SAFETY PROCEDURES.

⚠ IMPORTANT

THESE PROCEDURES DO NOT CLAIM TO COVER ALL POSSIBLE DETAILS OR VARIATIONS ENCOUNTERED WITH THE ELEVATOR CONTROL SWITCH ELEVATOR DISCONNECT. NOR DO THEY PROVIDE FOR ALL POSSIBLE CONDITIONS THAT MAY BE ENCOUNTERED. IF FURTHER INFORMATION IS DESIRED OR NEEDED TO ADDRESS ANY PARTICULAR ISSUE NOT COVERED IN THIS DOCUMENT, CONTACT YOUR EATON REPRESENTATIVE. THE INFORMATION IN THIS DOCUMENT DOES NOT RELIEVE THE USER FROM EXERCISING GOOD JUDGMENT, NOR FROM USING SOUND SAFETY PRACTICES.

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⚠ IMPORTANT

FOR THE PURPOSE OF THIS INSTRUCTION LEAFLET, A QUALIFIED PERSON:

- (A) IS FAMILIAR WITH THE SUBJECT EQUIPMENT AND THE HAZARDS INVOLVED WITH THEIR APPLICATION, USE, ADMINISTRATION, AND MAINTENANCE.**
 - (B) IS TRAINED AND AUTHORIZED TO DE-ENERGIZE, CLEAR, GROUND, AND TAG CIRCUITS AND EQUIPMENT IN ACCORDANCE WITH ESTABLISHED SAFETY PRACTICES.**
 - (C) IS TRAINED IN THE PROPER CARE AND USE OF PERSONAL PROTECTIVE EQUIPMENT SUCH AS RUBBER GLOVES, HARD HAT, SAFETY GLASSES OR FACE SHIELDS, ARC-FLASH CLOTHING, ETC., IN ACCORDANCE WITH ESTABLISHED SAFETY PRACTICES.**
 - (D) IS TRAINED TO RENDER FIRST AID.**
 - (E) HAS RECEIVED SAFETY TRAINING TO RECOGNIZE AND AVOID THE HAZARDS INVOLVED.**
 - (F) AS THE SKILLS AND KNOWLEDGE PERTAINING TO THE CONSTRUCTION AND OPERATION OF THIS EQUIPMENT AND ITS INSTALLATION.**
-

Signal Words

The signal words “DANGER,” “WARNING,” “CAUTION” and “NOTICE” (along with their assigned symbol) throughout this manual indicate the degree of hazard the user may encounter.

These symbols and words are defined as:

⚠ DANGER

DANGER: Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING: Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

CAUTION: Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE: Indicates a hazardous situation which, if not avoided, could result in property damage.

Safety Concerns

The following are important safety precautions that Elevator Control Switch elevator disconnect users should observe at all times. This summary is not comprehensive. It is assumed the Elevator Control Switch elevator disconnect user will follow standard safety precautions for working in an electrical environment. For more information on safety precautions and procedures, consult the following sources:

Web Sites:

National Fire Protection Association (NFPA): www.nfpa.org.

Underwriters Laboratories (UL): www.ul.com.

National Electrical Manufacturers Association (NEMA): www.nema.org.

International Electrotechnical Commission (IEC): www.iec.ch.

Overview

The Eaton Elevator Control ES disconnect switch is designed for single cable or hydraulic elevator application to interrupt the incoming AC power upon receiving a signal from the Fire Alarm Control Panel (FACP).

The Elevator Control Switch numbering system assures you get all the right components, with the right ratings, and properly assembled. The unit comes completely assembled for quick installation, eliminating the labor and time needed to assemble individual components. It is also easy to meet Code requirements for selective coordination in a fully fused system. The Eaton Elevator Control ES Switch utilizes Class J fuses that easily coordinate with any upstream fuse by simply using a 2:1 lineside-to-loadside fuse ratio.

The Eaton Elevator Control ES Switch meets prevailing ANSI/ASME, NEC® and NFPA 72 requirements in a UL 98 Listed (enclosed switch) and UL 50 Listed (enclosure) unit. It comes in a standard NEMA 1 enclosure or optional NEMA 3R, 4, or 12 enclosures. It is available in 30, 60, 100, 200 or 400 amp configurations, for 208, 240, 480, or 600 Vac, 3 or 4 wire systems with a UL 98 Listed 200kA assembly short-circuit current rating (SCCR).

Standard Features

- 30-400 amp 600 Vac 3-phase fused power switch
- 200 kA RMS assembly short-circuit current rating
- Shunt trip 120 V
- Control power terminal block
- Ground lug per NEC®
- Class J fuse mounting only (Class J fuses not included)

- Key to test switch
- Pilot light – “ON”
- Mechanically interlocked auxiliary contact for hydraulic elevators with battery backup (5 amp 120 Vac rated)

Optional Features

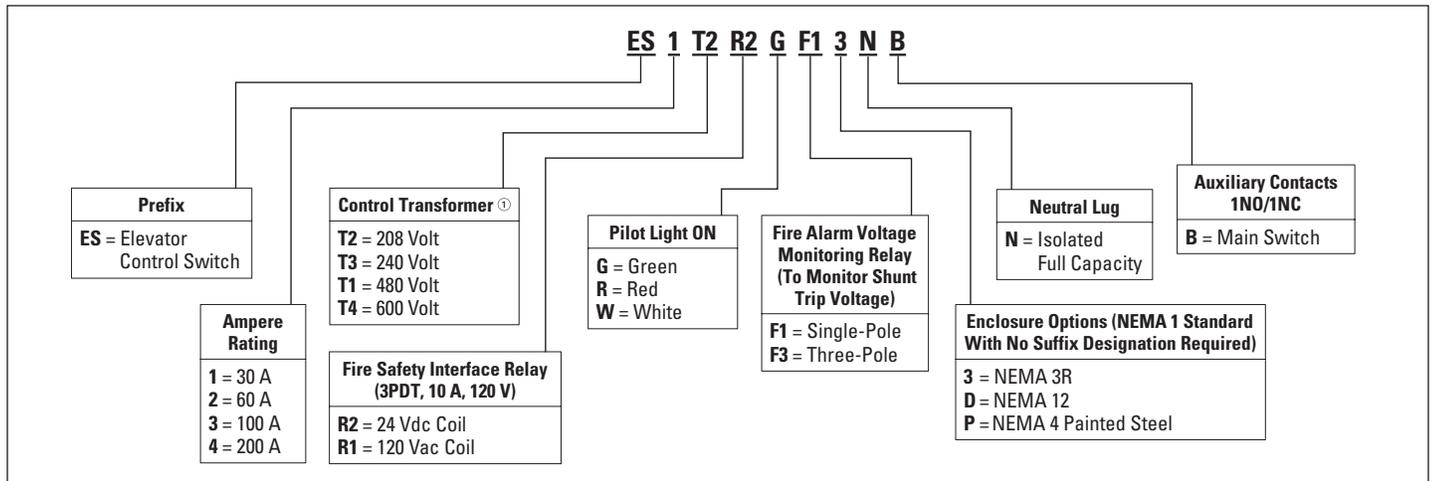
- Control power transformer with fuses and blocks
- Fire safety interface relay
- Isolated neutral lug (oversized 200% rated neutral option available where required by excessive non-linear loads)
- Fire Alarm Voltage Monitoring Relay (to monitor Shunt Trip Voltage)
- NEMA 3R, 4, and 12 enclosures available

Agency Information

- UL 98 Enclosed and Dead Front Switch - Guide 96NK3917, File E182262
- NEMA 1, UL 50, listed enclosure cUL per Canadian Standards C22.1
- CAN/CSA C22.2, No. 4 Enclosed Switch

Catalog Number System

The following catalog numbering system defines an Elevator Control Switch construction.



ⓘ 100 VA with Primary and Secondary fusing (120 V Secondary)

Figure 1. Eaton Elevator Control Switch Selector.

Other Options

Optional features include contact closure, i.e. battery lowering/door opening system. The B option offers support for the states of Arizona, Oregon, and Texas requirements to prevent “nuisance” fire alarms by over-riding the “Control Power not Available” signal when the Eaton Elevator Control ES disconnect is manually (intentionally) turned off, and distinctive signaling for ON-OFF-TRIPPED conditions (Option B).

All Eaton Elevator Control elevator disconnect switches are UL-Listed and designed for safe access by qualified personnel. When maintenance or shutdown service is required, no energized parts are exposed inside the enclosure when the disconnect switch is manually turned to the OFF position. For proper maintenance safety precautions, always turn off incoming power to the Eaton Elevator Control ES elevator switch when possible. When servicing any live electrical equipment, always wear appropriate personal protective equipment.

⚠ DANGER

ELECTRICAL SHOCK HAZARD. ELECTRICAL EQUIPMENT MAY CONTAIN HAZARDOUS VOLTAGES. THESE CAN CAUSE ELECTRICAL SHOCK, BURN OR DEATH. ONLY QUALIFIED PERSONNEL SHOULD PERFORM PROCEDURES INVOLVING ELECTRICAL EQUIPMENT. ALWAYS PROPERLY GROUND EQUIPMENT AND LOCKOUT ELECTRIC POWER (DE-ENERGIZE) BEFORE ACCESSING ELECTRICAL EQUIPMENT AND ENCLOSURES. ALL DEADFRONTS AND OTHER SHIELDING MUST BE IN PLACE BEFORE ENERGIZING THIS DISCONNECT SWITCH. TAKE NOTE OF AND FOLLOW ALL SAFETY INSTRUCTIONS IN THIS INSTRUCTION LEAFLET.

Shunt-Trip Operation

The disconnecting means is a shunt-trip operated switch. The control power source for the shunt-trip operator is a 120 Vac supply originating in the Eaton Elevator Control ES switch. Current to the shunt-trip device is switched by an isolation relay, which is in turn controlled by the FACP.

The control signal may be either 24 Vdc from the FACP (Option R2) or a “dry” contact closure in the FACP (Option R1). In the case of a “dry” contact closure, the sensing voltage is 120 Vac originating in the Eaton Elevator Control ES switch.

A key test switch (Option K) is included for testing the shunt-trip circuit.

Supervisory Indication

Additionally, an optional separate relay can be specified to monitor the 120 Vac control power source in the Eaton Elevator Control ES switch. This relay (Option F1 or F3) is used to provide supervisory indication of “Control Power Available” as required by NFPA 72 Section 6.15.4.4.

Table 1. Transformer Fuse Table.

ECS Voltage/ Transformer Voltage	Primary Fuse (amps)	Secondary Fuse (amps)
208/120	FNQ-R-2	FNM-1 1/4
240/120	FNQ-R-2	FNM-1 1/4
480/120	FNQ-R-1	FNM-1 1/4
600/120	FNQ-R-1	FNM-1 1/4

Table 2. Lug Torque Specifications.

Molded Case Switch					Fuse Base				Neutral Mains	
Catalog	Ampacity	Main Lugs (Line)			Wire Size Range	Torque		Wire Size Range	Torque	
Number		Wire Size Range	Torque		Wire Size Range	Wire Size	in lb	Wire Size Range	Torque	
Prefix			Wire Size	in lb		Wire Size	in lb		Wire Size	in lb
ES1	30 Amp	14 - 1/0	14 - 10 AWG	35	2 - 14 AWG	14 - 10 AWG	35	2 - 14 AWG	14 - 10 AWG	35
			8 AWG	40		8 AWG	40		8 AWG	40
			6 - 4 AWG	45		6 AWG	45		6-2 AWG	45
			3 - 4/0	50						
ES2	60 Amp	14 - 1/0	14 - 10 AWG	35	2 - 14 AWG	14 - 10 AWG	35	2 - 14 AWG	14 - 10 AWG	35
			8 AWG	40		8 AWG	40		8 AWG	40
			6 - 4 AWG	45		6 AWG	45		6 - 2 AWG	45
			3 - 4/0	50						
ES3	100 Amp	14 - 1/0	14 - 1/0	50	14 - 1/0	14 - 1/0	50	14 - 1/0	14 - 1/0	50
ES4	200 Amp	4 - 4/0 (3/16 hex recess)	4 - 4/0	120	4 - 300 kcmil (5/16 hex recess)	4 - 300 kcmil	275	6 - 250 kcmil	6 - 250 kcmil	275
ES5	400 Amp	(2) 2 - 500 kcmil	(2) 2 - 500 kcmil	375	(2) 1/0 - 300 kcmil or (1) 750 kcmil	(2) 1/0 - 300 kcmil or (1) 750 kcmil	500	(2) 1/0 - 300 kcmil or (1) 750 kcmil	(2) 1/0 - 300 kcmil or (1) 750 kcmil	500

Typical Control with Wiring Options for Fire Safety Interface

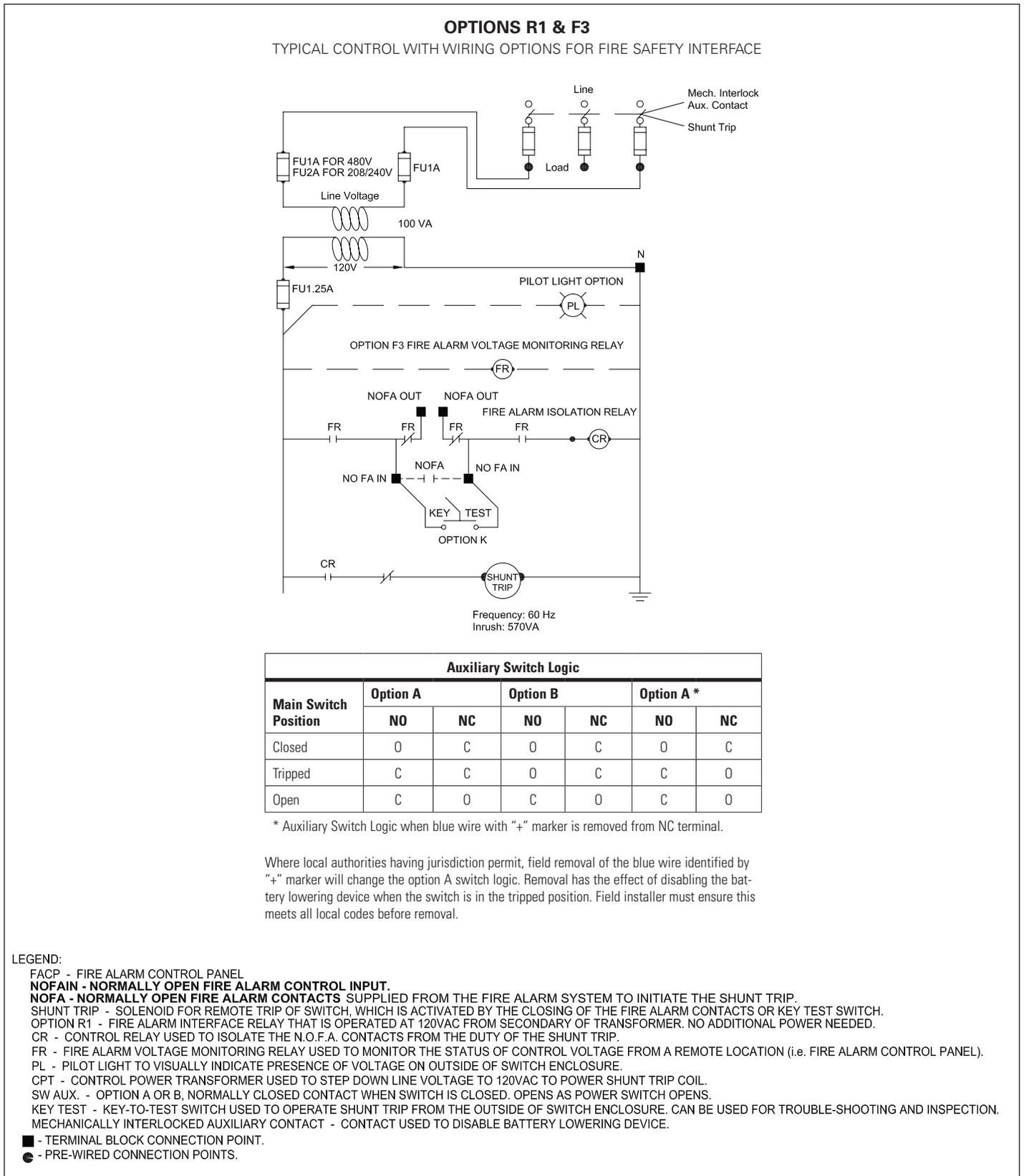


Figure 2. Options R1 and F3.

Typical Control with Wiring Options for Fire Safety Interface (Cont.)

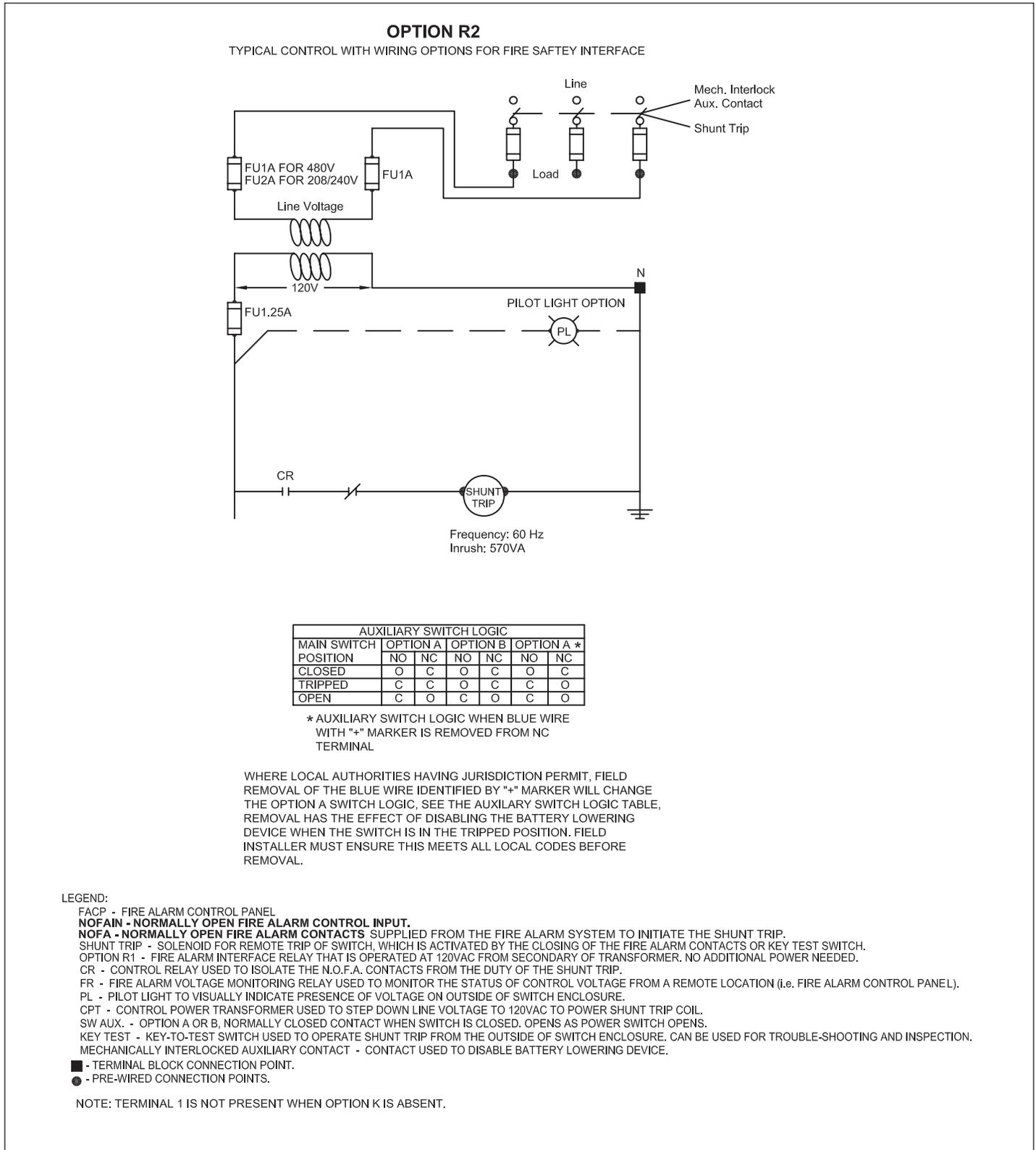


Figure 3. Option R2

Typical Control with Wiring Options for Fire Safety Interface (Cont.)

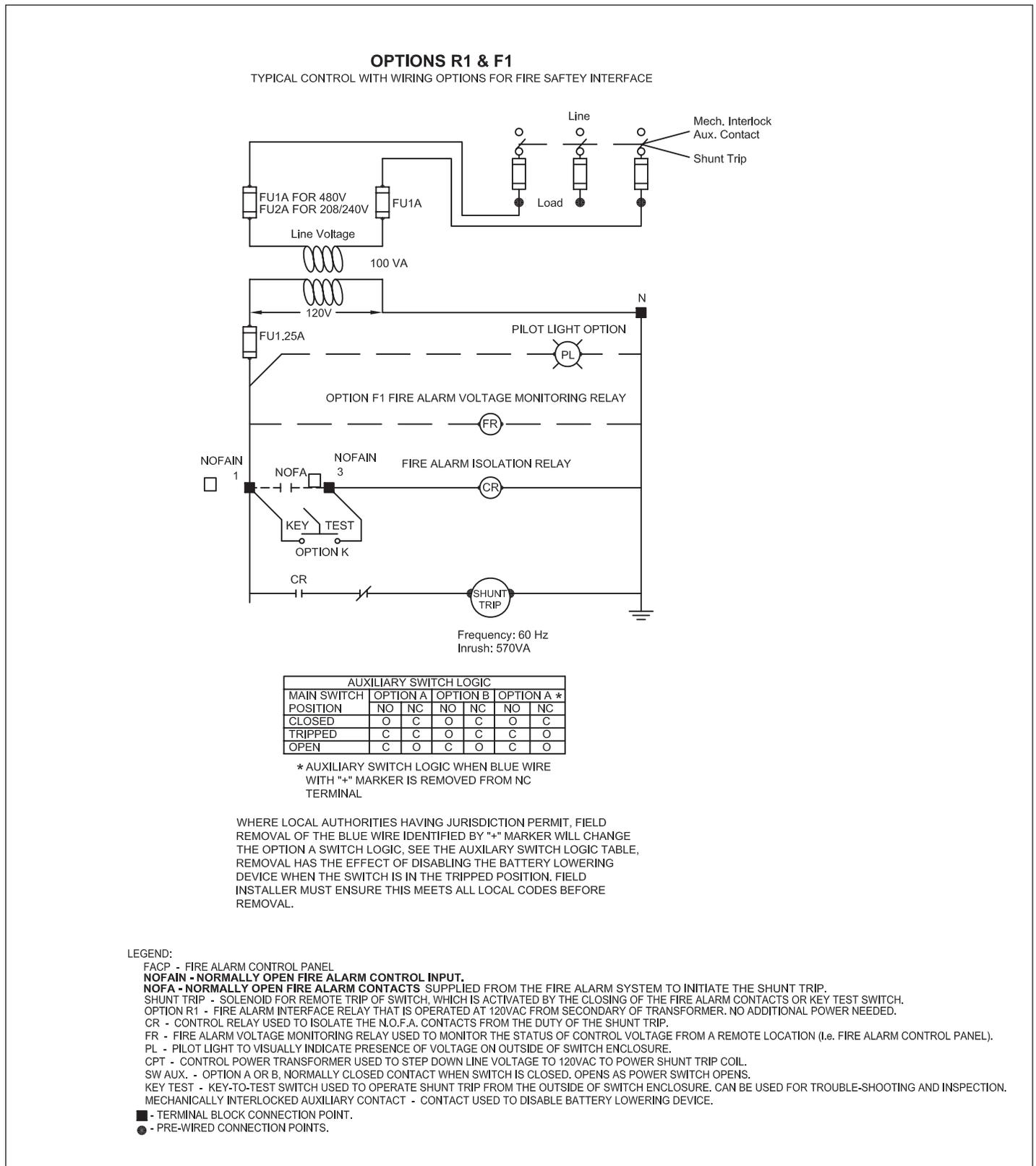


Figure 4. Options R1 and F1

Typical Control with Wiring Options for Fire Safety Interface (Cont.)

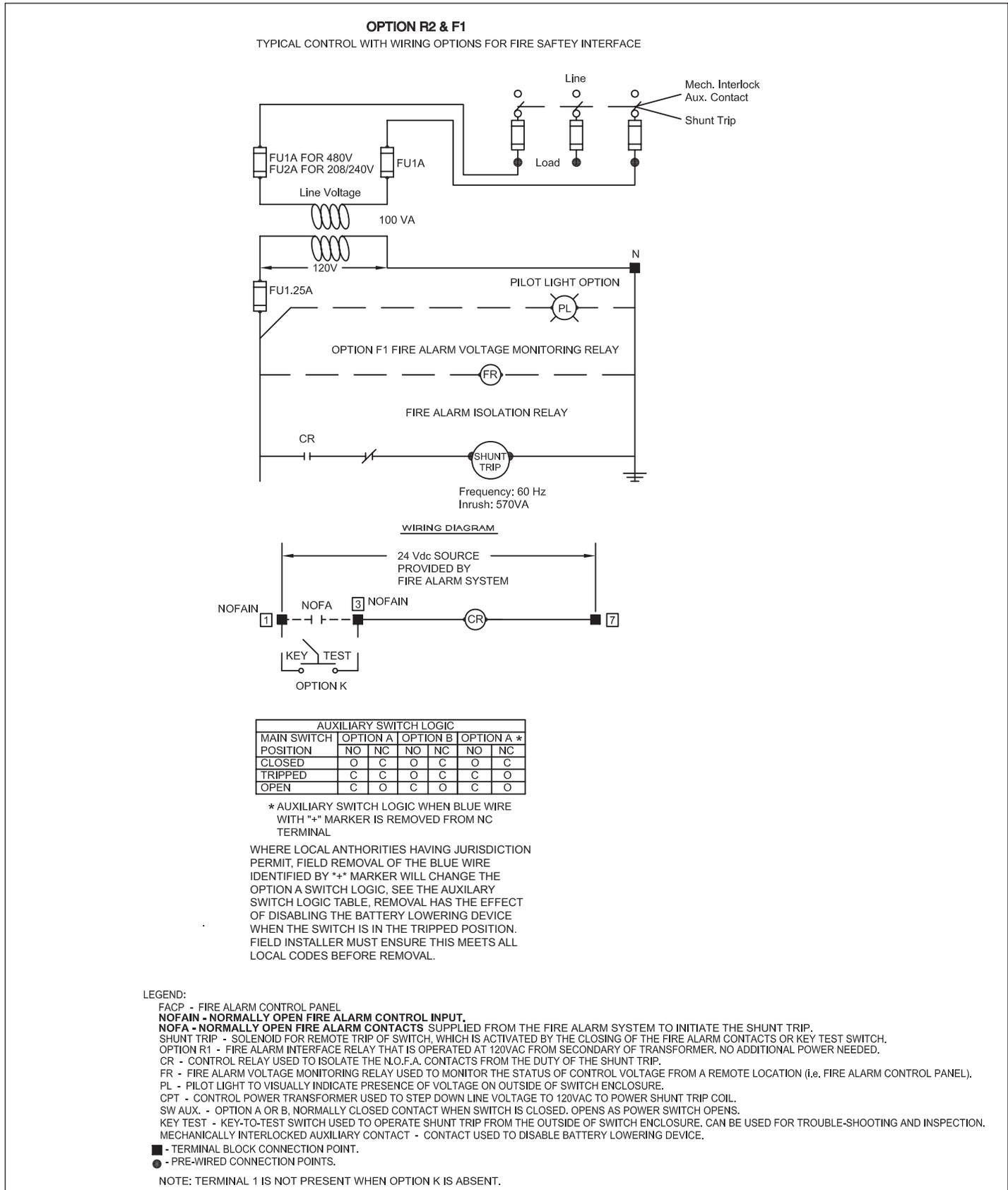


Figure 5. Options R2 and F1

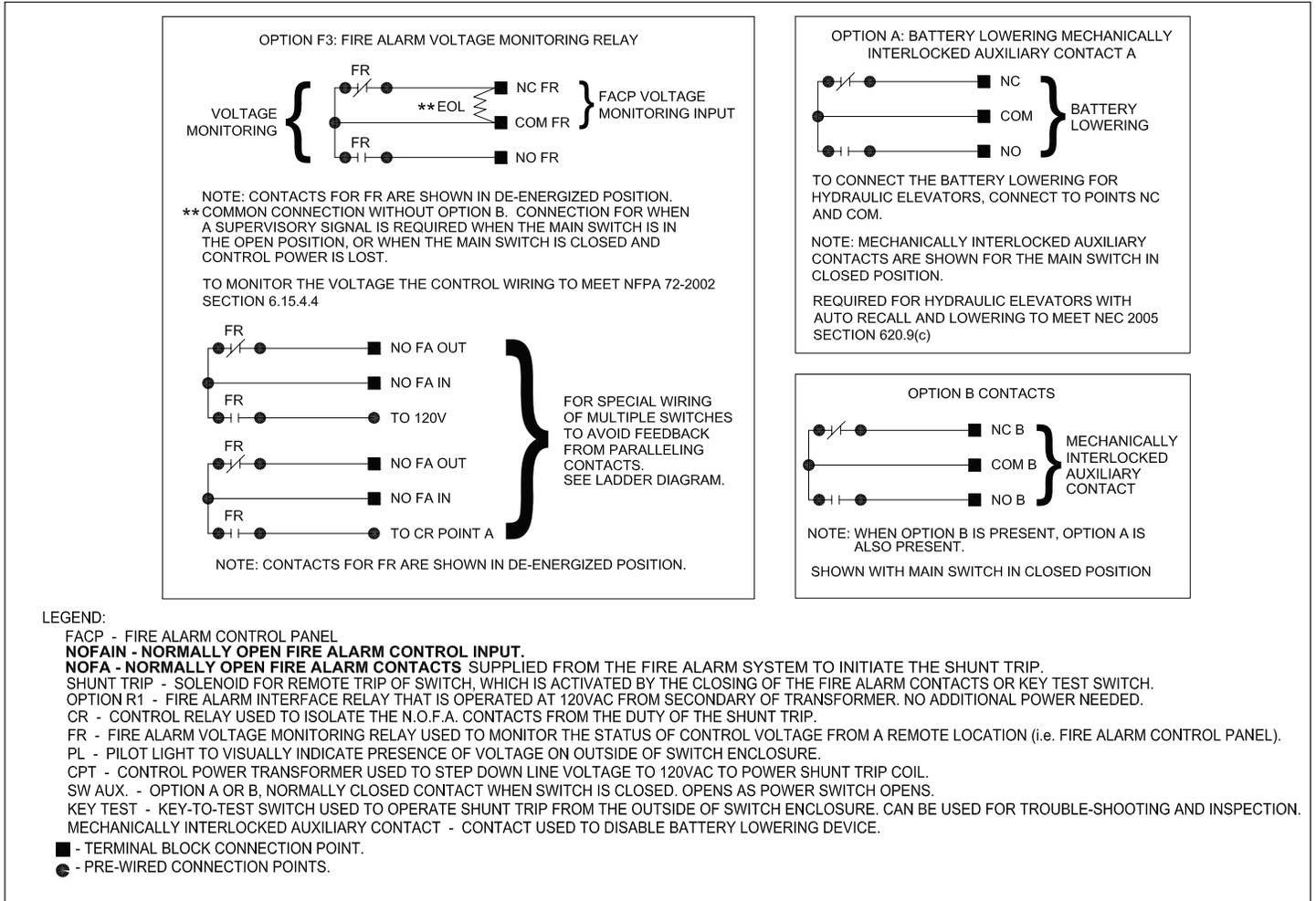
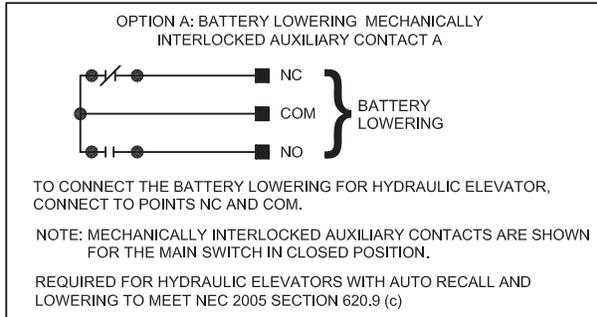
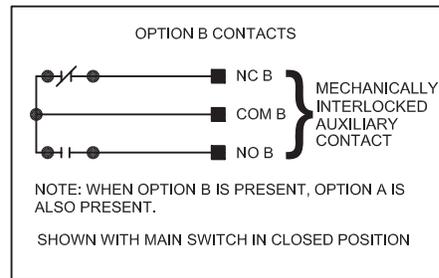
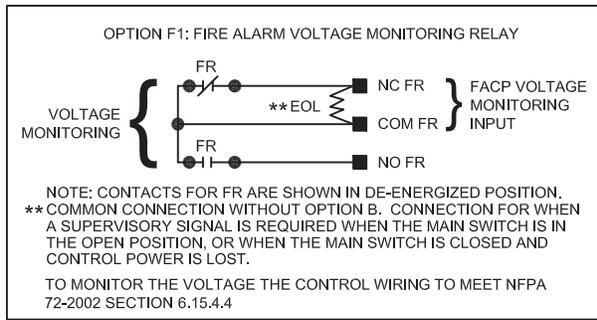


Figure 6. Option F3.



LEGEND:

- FACP - FIRE ALARM CONTROL PANEL
 - NOFAIN - NORMALLY OPEN FIRE ALARM CONTROL INPUT.**
 - NOFA - NORMALLY OPEN FIRE ALARM CONTACTS** SUPPLIED FROM THE FIRE ALARM SYSTEM TO INITIATE THE SHUNT TRIP.
 - SHUNT TRIP - SOLENOID FOR REMOTE TRIP OF SWITCH, WHICH IS ACTIVATED BY THE CLOSING OF THE FIRE ALARM CONTACTS OR KEY TEST SWITCH.
 - OPTION R1 - FIRE ALARM INTERFACE RELAY THAT IS OPERATED AT 120VAC FROM SECONDARY OF TRANSFORMER. NO ADDITIONAL POWER NEEDED.
 - CR - CONTROL RELAY USED TO ISOLATE THE N.O.F.A. CONTACTS FROM THE DUTY OF THE SHUNT TRIP.
 - FR - FIRE ALARM VOLTAGE MONITORING RELAY USED TO MONITOR THE STATUS OF CONTROL VOLTAGE FROM A REMOTE LOCATION (i.e. FIRE ALARM CONTROL PANEL).
 - PL - PILOT LIGHT TO VISUALLY INDICATE PRESENCE OF VOLTAGE ON OUTSIDE OF SWITCH ENCLOSURE.
 - CPT - CONTROL POWER TRANSFORMER USED TO STEP DOWN LINE VOLTAGE TO 120VAC TO POWER SHUNT TRIP COIL.
 - SW AUX. - OPTION A OR B, NORMALLY CLOSED CONTACT WHEN SWITCH IS CLOSED. OPENS AS POWER SWITCH OPENS.
 - KEY TEST - KEY-TO-TEST SWITCH USED TO OPERATE SHUNT TRIP FROM THE OUTSIDE OF SWITCH ENCLOSURE. CAN BE USED FOR TROUBLE-SHOOTING AND INSPECTION.
 - MECHANICALLY INTERLOCKED AUXILIARY CONTACT - CONTACT USED TO DISABLE BATTERY LOWERING DEVICE.
 - - TERMINAL BLOCK CONNECTION POINT.
 - - PRE-WIRED CONNECTION POINTS.
- NOTE: TERMINAL 1 IS NOT PRESENT WHEN OPTION K IS ABSENT.

Figure 7. Option F1

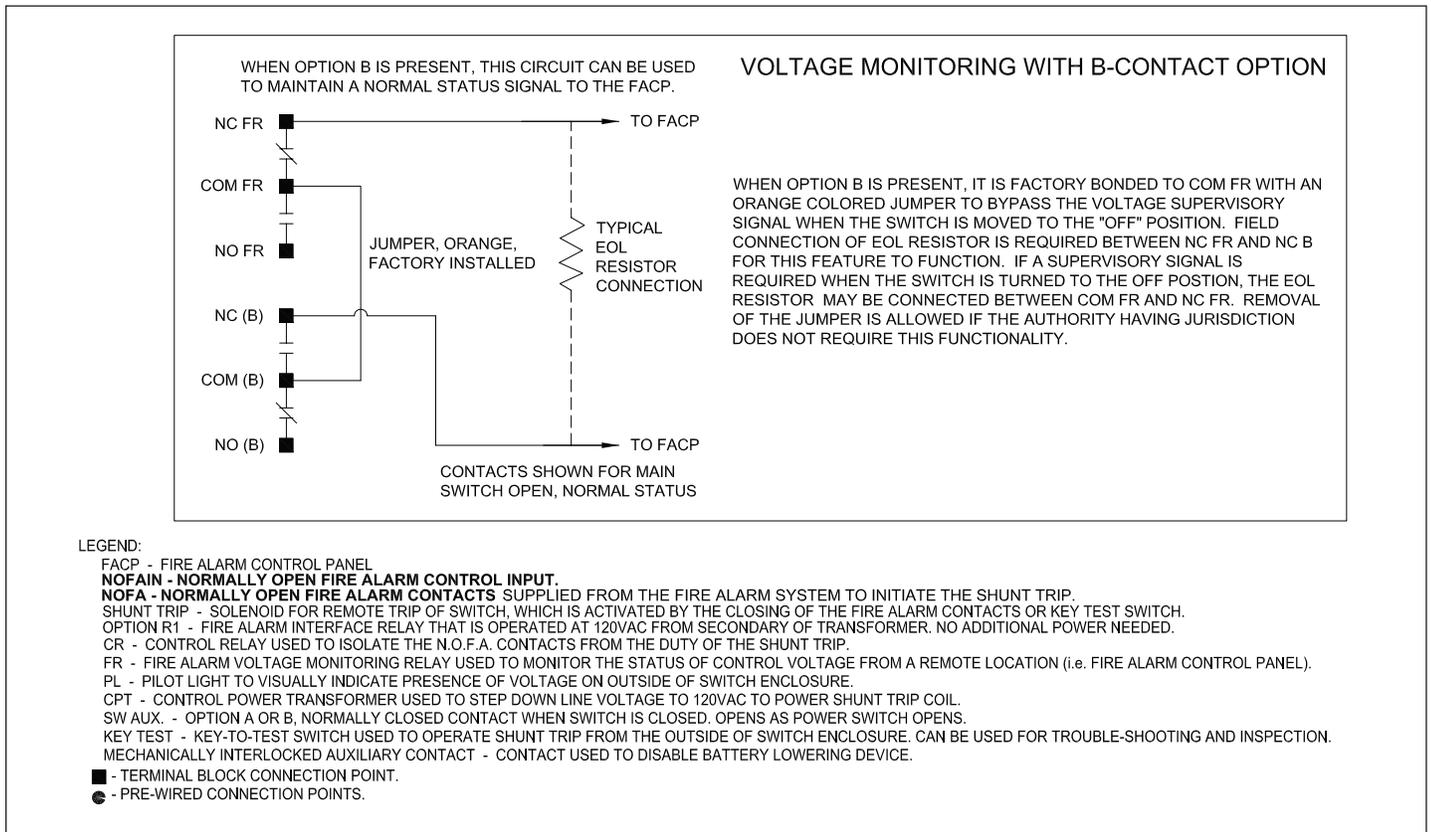


Figure 8. Voltage Monitoring with B-Contact Option.

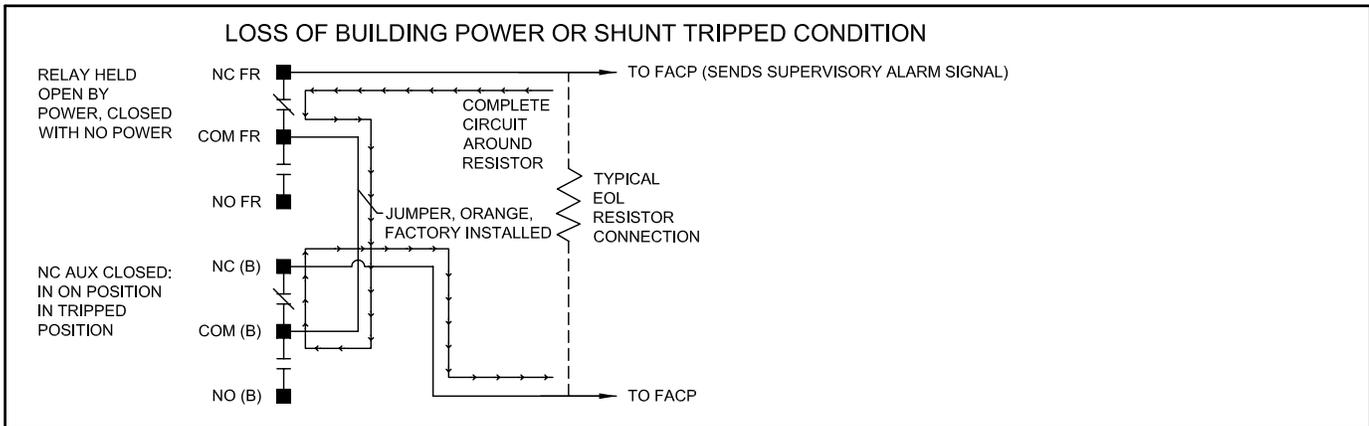
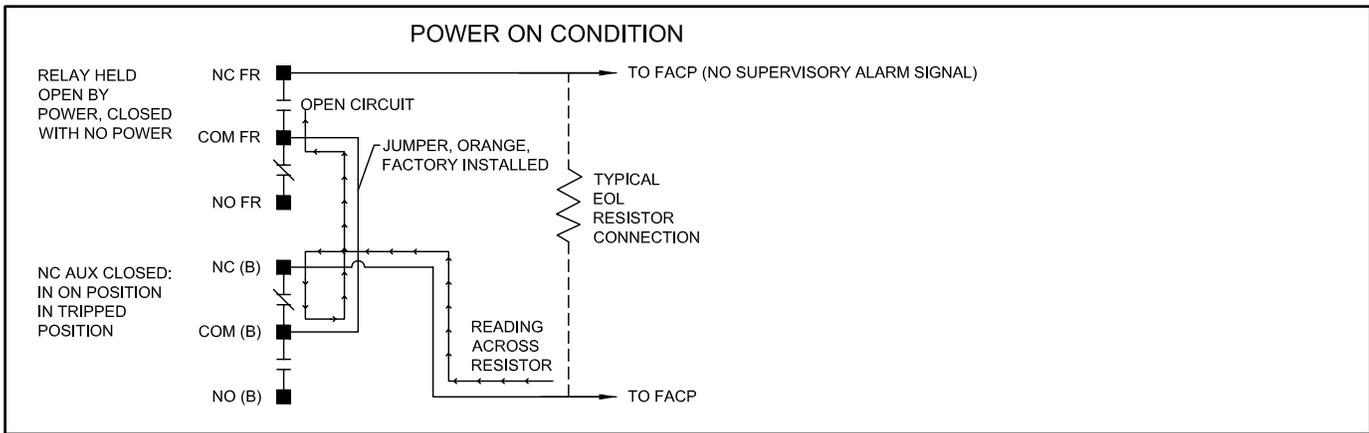
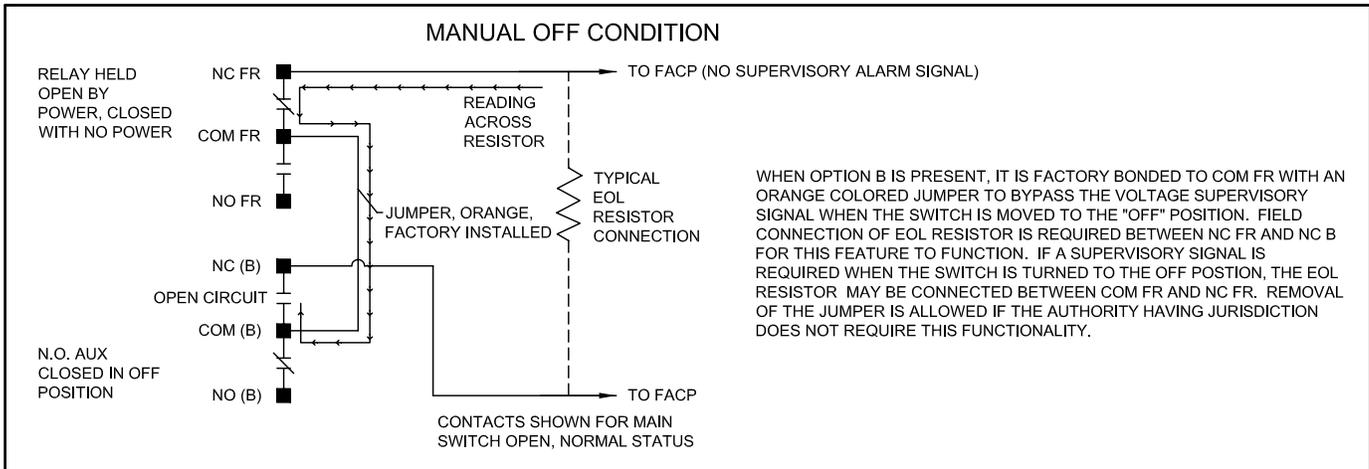


Figure 9. Common Wiring Scheme for AZ, TX, and OR Applications. Elevator Control Option B Detail.

⚠ DANGER

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Maintenance

To properly maintain the Eaton Elevator Control ES Switch, the operation of all components should be tested on an annual basis by a qualified person.

- Take the necessary precautions to notify the occupants of the building that the elevator is under maintenance and has been taken out of service.
- Verify that power is on.
- Activate the Fire Alarm system contacts for the shunt trip.

Note: A Fire Alarm Technician may be required to exercise this step. If a key test switch is included with the Elevator Control ES switch, it can be used to shunt trip the unit without the Fire Alarm system.
- This will energize the Fire Alarm Isolation Relay and close relay contact points 4 and 7.
- The closure of points 4 and 7 will energize the shunt trip coil, open the contacts of the switch, and place the switch and handle into the "TRIP" position.
- Verify that power has been disconnected and the handle is in the "TRIP" position.
- Pull to the "RESET" position and allow handle to go to the "OFF" position.
- Push to the "ON" position.
- Verify that power has been restored.
- The above sequence verifies that the contents of the Eaton Elevator Control ES Switch are operating properly. If the above sequence is unable to be completed, please contact Eaton.

Preventative Maintenance Measures

- Periodically check lug torque values and keep them in specification.
- An annual review of the Eaton Elevator Control ES Switch is recommended. Preventative maintenance should include a thermal scan to uncover any portion generating excessive heat that indicates an underlying problem.
- Any unexpected temperature increase, not related to load variations or ambient temperature could signal a lug torque issue.
- Maximum temperature at any lug should never exceed 75°C under any operating condition or load.
- Keep switch exterior and interior clean. Always follow prevailing safety rules when servicing this product throughout the year.

Frequently Asked Questions

For more information or if you have additional questions, please contact EatonCare. 877-ETN-CARE (877-386-2273).

1. What UL-Listings and Agency Standards does the Eaton Elevator Control ES have?

- NFPA-70 (NEC®) 2008 Edition- Section 620.51(A)-(C), 620.62, 620.91(C)
- Canadian Electric Code Part 1 (2006 Edition) Section 38-051, 38-062
- ANSI/ASME A17.1-2007 - Section 2.8.3.3.2 NFPA-72 2007 Edition - Section 6.16.4.4

All work shall be performed in accordance with the latest edition of applicable standards, codes, and laws.

2. What kind of fuses does Eaton recommend?

LPJ_SP or LPJ_SPI (indication version) dual-element, time-delay Class J fuses. The panel's holders only accept this class of fuse. The fuses are current limiting for good short-circuit and motor overload protection, and minimizing are flash hazards. For general fuse sizing the NEC® Article 430.52 allows sizing time-delay fuses used in motor branch circuits to be sized for up to 175% of the motor full load amps.

3. How does the Mechanical Auxiliary Contact Option (Option A) work?

The "A" Option is a set of auxiliary contacts that are mechanically interlocked to the main switch. The contacts are used to enable or disable the Battery Lowering Device (BLD) for maintenance per NFPA code. It is important to note that these contacts can differentiate between manually turned OFF or shunted OFF (see table below). The most common contact is the "NC," normally closed.

Table 3.

Auxiliary Switch Logic						
Main Switch Position	Option A		Option B		Option A *	
	NO	NC	NO	NC	NO	NC
Closed	O	C	O	C	O	C
Tripped	C	C	O	C	C	O
Open	C	O	C	O	C	O

* Auxiliary Switch Logic when blue wire with "+" marker is removed from NC terminal.

4. How does the Mechanical Auxiliary Contact Option (Option B) work?

The "B" Option provides a second set of auxiliary contacts that are mechanically interlocked to the main switch. These contacts are generally used to monitor the status of the switch. It is important to note that these contacts will follow the state of the external handle (see table below and Figure 5).

Table 4.

Main Switch	Contact State		FACP
	NO	NC	NCFR/NCB
OFF, Power Avail	Open	Closed	Open
ON, Power Avail	Closed	Open	Open
OFF, No Power	Open	Closed	Open
ON, No Power	Closed	Open	Closed

5. How does the Special Wiring Option for maintaining Normal Status Signal to the FACP work?

For Arizona and other areas requiring this feature, internal wiring between the molded case switch's auxiliary contacts and the fire relay's contacts implements a logic circuit that monitors the availability of shunt-trip power. The FR relay closes only if the main switch is ON and the shunt-trip power fails. They will not close if the main switch is manually turned OFF for maintenance, the Series B contact will open, thus preventing a false alarm. (Refer to Table 4 and Figure 5).

6. Does the instantaneous trip feature built into the molded case switch create the potential to strand passengers when used on circuits with hydraulic elevators and auxiliary battery lowering?

No, the Battery Lowering Device (BLD) remains operational under a shunt-trip condition. The shunt-trip mechanism within the switch is utilized, not the instantaneous trip feature of the switch. The proper fuse selection will prevent instantaneous trip. Even in the event of an instantaneous trip condition, the alarm relay will respond the same as when the switch is shunted off. There is no potential for stranding passengers when units are installed with the Mechanical Interlock Auxiliary Contact Option (Option A, battery back-up feature).

7. During a power loss, will the state of the switch change state (F1 or F3 option)?

The Eaton Elevator Control ES switch will not change state. The Eaton Elevator Control ES Voltage Monitoring Relay (F1 or F3 Option) does meet NFPA 72 (National Fire Alarm Code) requiring control circuits to be monitored for presence of voltage. The unit is wired to sense the voltage available to initiate the shunt-trip. It will change state if a power loss occurs. It does not rely on the shunt-trip itself. It will send a signal to the FACP upon power loss.

8. How does the Eaton Elevator Control ES switch decide when the elevator needs to be lowered?

The Eaton Elevator Control ES switch does not make that decision. It provides a signaling means to the fire alarm controller and BLD. The Elevator Control switch receives a signal from the FACP to shunt-trip, which in some cases results in the use of the Battery Lowering Device (BLD).

9. Does the Eaton Elevator Control ES switch require any periodic maintenance?

While no specific maintenance is called for, it is always a good practice to annually inspect the unit for any loose fuse clips or connections, or accumulation of foreign material. See "Maintenance" in this document for more details.

10. How do you hook up the dry contacts for the battery back-up (BLD) option?

This will depend on how the Mechanical Auxiliary Contact (Option A) will be connected. The A Option will follow the truth table noted below. The most common connection will be between NC and COM.

Table 5.

Main Switch Position	Auxiliary Switch Logic					
	Option A		Option B		Option A *	
	NO	NC	NO	NC	NO	NC
Closed	0	C	0	C	0	C
Tripped	C	C	0	C	C	0
Open	C	0	C	0	C	0

* Auxiliary Switch Logic when blue wire with "+" marker is removed from NC terminal.

Where local authorities having jurisdiction permit, field removal of the blue wire identified by "+" marker will change the Option A switch logic. Removal has the effect of disabling the battery lowering device when the switch is in the tripped position. Field installer must ensure this meets all local codes before removal.

11. Where do you land the shunt-trip control wires on the terminal strip?

For the R1 Option (120Vac), land the wires on Terminals 1 and 3 or NOFAIN and NOFAIN (Normally Open Fire Alarm IN). For the R2 (24Vdc) option, land the positive on Terminal 1 and the closure on Terminal 3, with the return on Terminal 7.

12. Where does the fire alarm get connected for monitoring the status of the switch?

This is commonly referred to as the FR relay and is Option F1 or F3. NCFR/COM FR is the most common. If an end of line (EOL) resistor is used, install it parallel to the wires.

13. If an Eaton Elevator Control ES switch is ordered with a wrong component, can the component be changed in the field?

No. To comply with UL guidelines, product modifications can only be completed by authorized factory personnel. Other modifications will void the Eaton UL listing. One exception is the B-option. It can be ordered and field installed; the part number is ECSBKIT.

14. Can the Eaton Elevator Control ES switch be used as a service entrance switch?

The Eaton Elevator Control ES switch is UL-Listed per UL 98. Yes, it can be used as a service entrance if properly labeled as such and proper ground bond requirements are met.

15. Can the Eaton Elevator Control ES switch be fed in reverse with the line from the bottom and load out the top of the switch?

No, the Eaton Elevator Control ES switch will not properly function.

16. Can the Eaton Elevator Control ES switch be used in an application where no fire alarm exists and can a smoke detector be connected instead?

No, this is not in accordance with the fire code. Commercial smoke detectors must be connected through the FACP.

17. Does the FR Relay (Option F1 or F3) change state during a power loss?

Yes, the FR relay will change state. The FR relay is designed to monitor voltage that is available for the shunt-trip. This is a requirement of NFPA 72.

18. Is the operating handle of the Eaton Elevator Control ES switch lockable in the "OFF" position only?

From the factory the handle can only be locked in the "OFF" position and can accommodate a maximum of three padlocks. Field modification to drill the shroud can allow locking in the "ON" position. Check with your local AHJ for requirements. The switch will shunt trip as usual, even with the handle locked ON.

19. What enclosures are available for the Eaton Elevator Control ES Switch?

All ratings of the Eaton Elevator Control ES switch come standard with a UL (NEMA) Type 1 enclosure. Optional enclosures include UL (NEMA) type 3R, 4, and 12. Consult the factory for other options.

20. Is a CPT always required in an Eaton Elevator Control ES switch?

Yes, to meet NFPA codes, a CPT will be required to supply the 120Vac for shunt-tripping.

21. I lost the keyswitch, can I get another?

Yes. The part number is E22KS2 if the back of the switch says E22. If the back of the switch says M22, the part number is M22-ES-MS1.

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