

# Solid State Overload Relay

NEMA Sizes 3 & 4

**WARNING:** Disconnect all power from the starter and overload relay before installing, modifying, or servicing.

**AVERTISSEMENT:** Couper l'alimentation avant installation, modification, ou entretien.

**CAUTION:** Before installing this product in a nuclear application, determine if it is intended for such use.

**ATTENTION:** Avant d'installer le produit dans une application nucléaire, vérifier si cela est permis.

## Introduction

The ABB Solid State Overload Relay, NEMA Sizes 3 & 4, is shown in Figure 1. The catalog numbers and electrical specifications are listed in Table 1.

## Replacement Installation

The following instructions describe the installation of a Solid State Overload Relay as a replacement for an existing overload relay on a 300-Line starter.

1. Disconnect all sources of power to the starter.
2. Disconnect all control and power wiring from the load side of the existing overload relay.
3. Loosen, but do not remove, the power terminal screws located between the top of the overload relay and the contactor.
4. Remove and save the overload relay mounting screw, located at the bottom right and left corners of the overload relay housing.
5. Remove the overload relay from the starter baseplate.
6. Place the Solid State Overload Relay on the starter baseplate and secure it with the mounting screw.

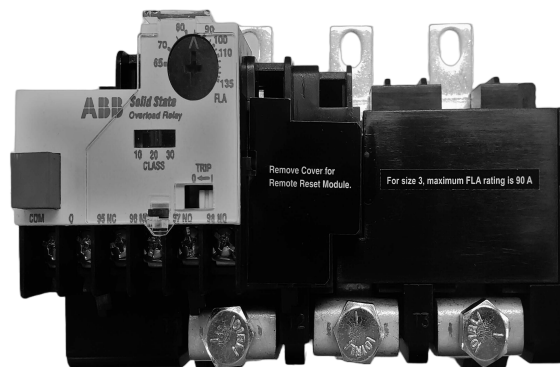


Figure 1. Solid State Overload Relay.

7. Torque the power terminal screws, between the top of the Solid State Overload Relay and the contactor, to 30 lb-in to complete the electrical connections.
8. Connect the control and power wiring to the terminals on the load side of the Solid State Overload Relay, shown in Figure 2.
9. If the Solid State Overload Relay is replacing an existing thermal overload relay and the enclosure has an external reset button, the following adjustments to the external reset button are necessary for proper operation:
  - Screw-type extension – Cut 1 inch off the screw and adjust the knob for a 0.075–0.125 inch gap between the reset button on the Overload Relay and the reset plunger.
  - U-shaped extension – Measure the existing extension length, then order the corresponding ABB replacement part, as given in Table 2.

Catalog Number		NEMA Size	Current Range, amps	Wire Size (75° C, Cu only) AWG #	Max Fuse Size, amps (Class T,H,J,L,R,K)	Max Breaker Rating, amps	Use with ABB Contactor
Starter Mount	Panel Mount						
CR324FXKS	CR324FXKP	3 & 4	17–35	10–3/0	125	125	CR306E/F
CR324FXLS	CR324FXLP	3 & 4	35–70	10–3/0	250	250	CR306E/F
CR324FXMS	CR324FXMP	3 & 4	65–135*	10–3/0	500	400	CR306E/F

NOTE: Maximum fuse and breaker sizes are intended as guidelines. Refer to NEC and local codes for proper fuse and breaker selection.

\* Size 3 not to exceed 90 amperes.

Table 1. Solid State Overload Relay, NEMA Sizes 3 & 4, catalog numbers and electrical specifications.

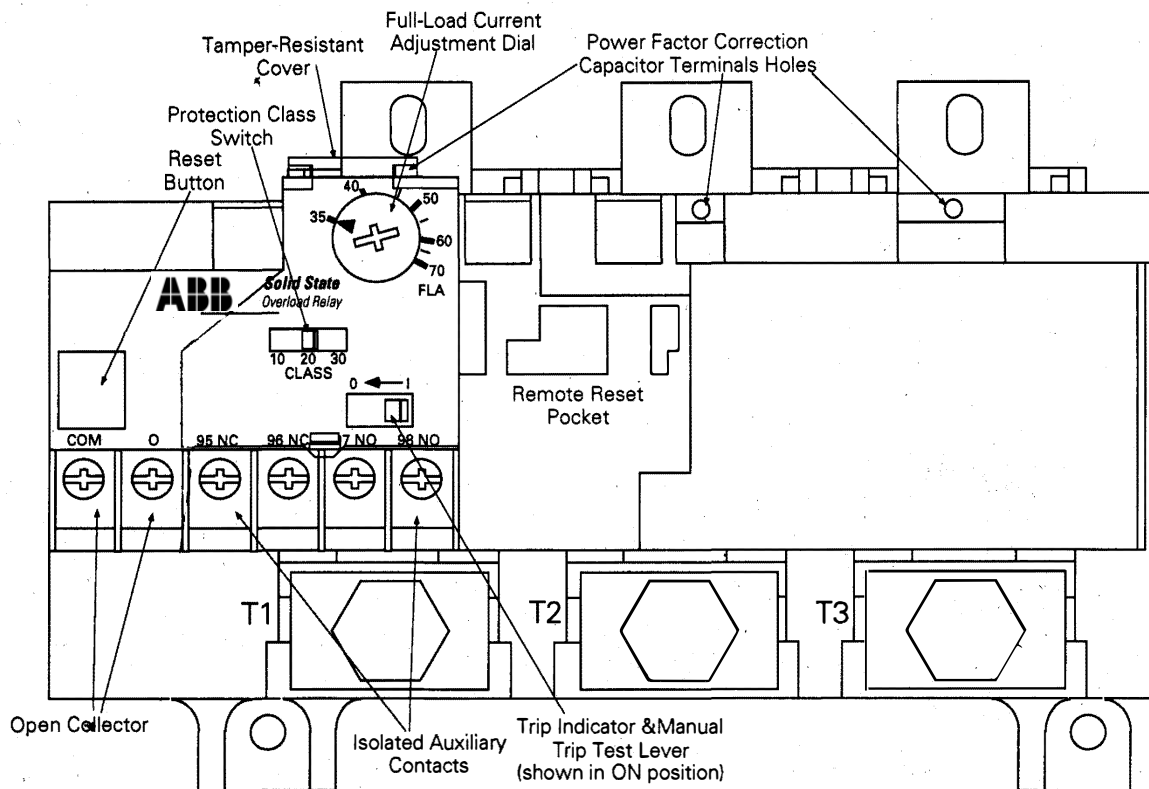


Figure 2. Top face of Solid State Overload Relay, NEMA Size 3 & 4, with controls and features indicated.

Extension Length, in.	Replacement No.
2.12	55-512811G005
1.50	55-512811G002

Table 2. Replacement parts for existing U-shaped extensions.

10. Reconnect power sources to the starter.
11. Fully depress the blue reset button on the Solid State Overload Relay to insure that it is in the reset position. The yellow trip flag will be at its right position, as illustrated in Figure 2.

## Adjusting the Solid State Overload Relay

The following adjustments to the Solid State Overload Relay are illustrated in Figure 2. The adjustments should be performed in the following order.

The settings as the unit is received from the factory are as follows:

- Full-load current at minimum.
- Protection class at 20.

### Full-Load Current Adjustment

This setting is the current beyond which the Solid State Overload Relay will trip. Use the following guidelines to determine the appropriate setting:

- For motors with a service factor of 1.0, set the full-load current on the Solid State Overload Relay to 0.9 times the full-load amps (FLA) rating on the motor's nameplate.

- For motors with a service factor of 1.15–1.25, set the full-load current on the Solid State Overload Relay to the FLA rating on the motor's nameplate.

Press on the tamper-resistant cover above the FLA dial, then lift up near the tab on the other side to remove the cover. Rotate the FLA dial so that the arrow on the dial points to the desired current, as indicated by the ampere markings around the dial. Do not rotate past the marked area. The knob moves in small steps to allow precise adjustment of the full-load current. Replace the tamper-resistant cover to provide additional dust protection. To protect against unauthorized persons' tampering with the settings, insert a wire lock through the locking tabs.

### Phase Loss Sensitivity

The Solid State Overload Relay contains a trip function activated by a phase loss. This protection is activated when one phase loses current and either one of the remaining phase currents exceeds 95% of the minimum FLA of the Overload Relay. A phase loss trip occurs within 3-6 seconds of loss of phase current.

## Protection Class Setting

**CAUTION:** The slide switch must be in one of the three detent positions. If the slide is between one of the detents, the default is protection class 30.

**ATTENTION:** Le bouton de selection de la classe de protection doit être dans une des trois positions stables. Si le bouton se trouve entre deux positions, la classe de protection est fixée à 30 par défaut.

Set the desired protection class to 10, 20, or 30 by sliding the switch to the appropriate detent position. The time-current curves for the protection classes are shown in Figure 3. Select the class appropriate to the particular application.

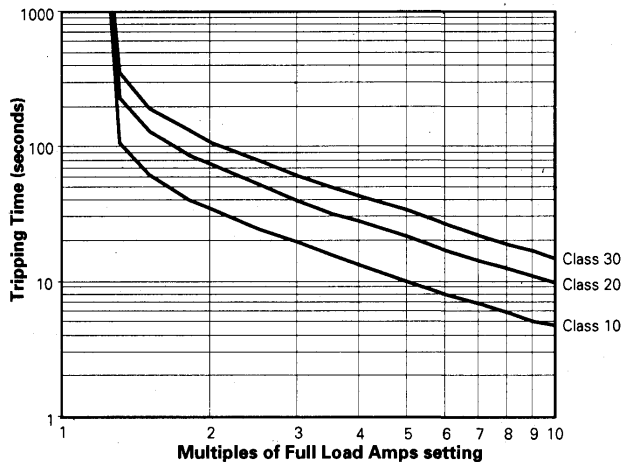


Figure 3. Time-current curves (cold state) for the protection classes.

## Test for Welded Contacts

The following procedure can be performed periodically to insure that the Solid State Overload Relay contacts have not welded because of a short circuit in the control circuit.

1. Disconnect all power and control wiring from the Solid State Overload Relay.
2. Place a bell set or resistance-measuring instrument across the NC relay terminals (95 and 96).
3. Depress and release the reset button to insure that the Solid State Overload Relay is reset. In this condition, there should be continuity between the terminals.
4. Slide the mechanical trip test lever from right to left to trip the Solid State Overload Relay. There should be no continuity, indicating that the contacts are operating normally. *If continuity is indicated with the relay tripped, the relay is defective and must be replaced.*
5. If the contacts work properly, reconnect power and control wiring and reset the Solid State Overload Relay for normal operation.

## Additional Features

### Reset Button

Depress the reset button fully and release to reset the Solid State Overload Relay after a trip. For motor protection purposes, the reset occurs on the upstroke of

the reset button. It is also designed so that even if the reset button is continually held down, the Solid State Overload Relay will still trip normally.

### Power Factor Correction Capacitor Terminals

Capacitors connected to these terminals are in the motor circuit when the motor is on and out of the circuit when the motor is turned off. The holes are tapped for a #8-32 thread.

### Remote Reset Pocket

The Remote Reset module (catalog number CR324XRRM02 for 120 Vac, CR324XRRM48 for 24 Vdc) is an optional, field-installable accessory. With this device, the Solid State Overload Relay can be remotely reset after a trip by applying the appropriate voltage across the Remote Reset module terminals.

Installation instructions for the Remote Reset module are found in GEH-6474.

### Trip Indicator and Manual Trip Test Lever

When the trip indicator is to the right, indicated by 1, the Solid State Overload Relay contacts are in the normal position. When the relay is tripped, the indicator moves to the left, indicated by 0. To manually test the Relay, move the indicator manually to the left.

### Isolated Auxiliary Contacts

The Solid State Overload Relay provides one pair of normally open (NO) and one pair of normally closed (NC) isolated contacts to allow for diagnostic use or for alarm signaling when the Relay trips. Contacts are rated at A600, Q600.

The terminals accept AWG #22-14, 60/75° C copper wire only. Tighten the terminal screws to 12 lb-in.

### Open Collector

With this feature connected as illustrated in Figure 4, it is possible to differentiate between overload and phase loss trips. The terminals are marked COM for common and O for output. After an overload trip, the output appears as during normal operation. There is no output following a phase loss trip. Nominal rating is +24 Vdc at 25 mA NPN, suitable to drive a PLC input. The terminals accept AWG #22-14, 60/75° C copper wire only. Tighten the terminal screws to 12 lb-in.

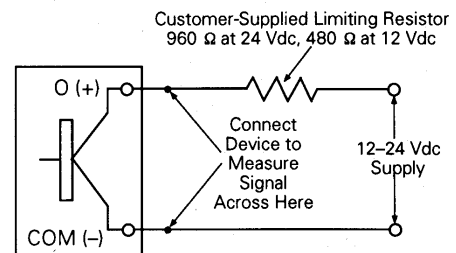


Figure 4. Open collector wired for trip-type differentiation.

## Dimensions

The dimensions of the Solid State Overload Relay when mounted are shown in Figure 5 for starter mounting and in Figure 6 for panel mounting.

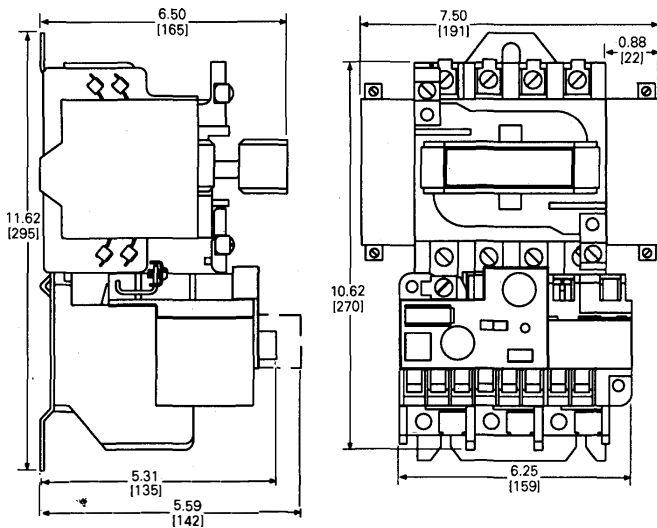


Figure 5. Dimensions in inches [mm] for a starter-mounted Solid State Overload Relay.

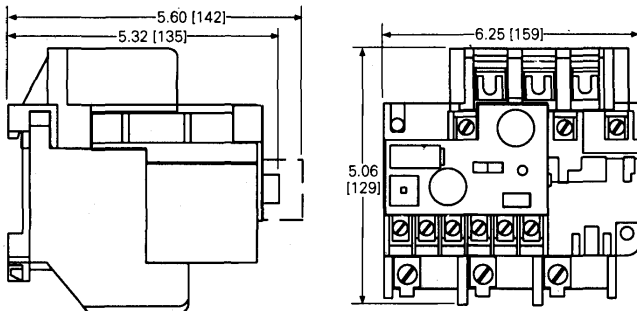


Figure 6. Dimensions in inches [mm] for a panel-mounted Relay.

## Wiring Diagrams

Figure 7 is a typical three-phase wiring diagram, while Figure 8 is a typical single-phase wiring diagram (drawing number 55-216176).

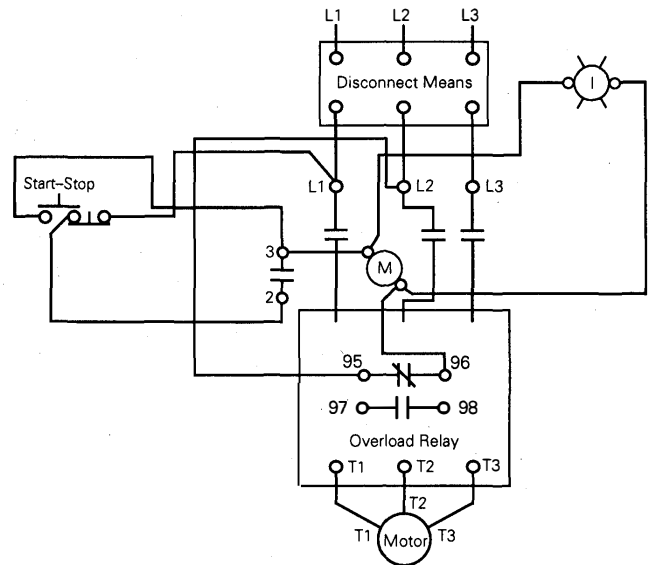


Figure 7. Typical three-phase wiring diagram.

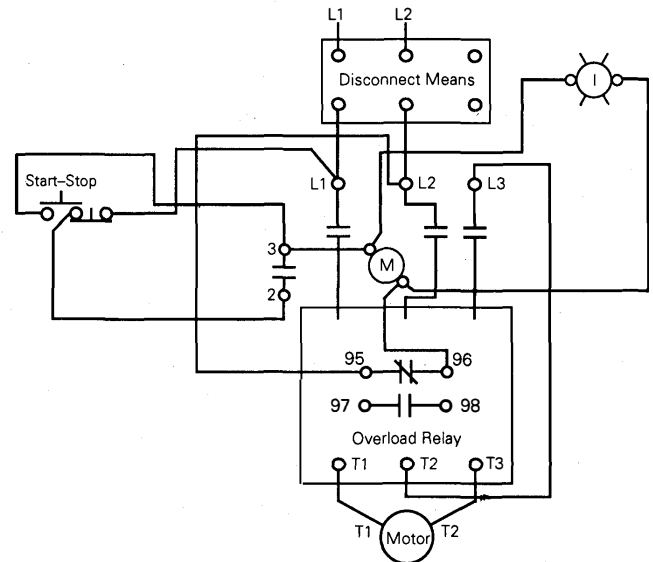


Figure 8. Typical single-phase wiring diagram.

These instructions do not cover all details or variations in equipment nor do they provide for every possible contingency that may be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise that are not covered sufficiently for the purchaser's purposes, the matter should be referred to your local ABB Sales Office.