Instruction Leaflet **IL14568**

Effective June 2020
Supersedes April 1984

Size 1 or 2 Type A Thermal Overload Relay, 3 Pole, Ambient Compensated or Non-Compensated

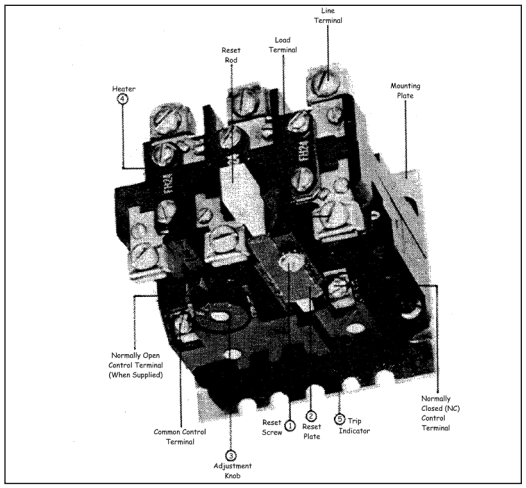


Figure 1. Size 1 overload relay for panel mounting

The relay

The Type A thermal overload relay (OLR) is a bimetallic device which, with the properly selected wire and heaters, will provide motor protection for running and stalled rotor overloads in motor circuits not exceeding 600 volts. The Size 1 and 2 OLR's have a maximum current rating of 26.2 and 45.0 amperes respectively. Ambient compensated OLR's are readily distinguishable by light gray reset rods. Non-ambient compensated OLR's have red reset rods.

Operation

The strip bimetals in the OLR are indirectly heated by the replaceable heater elements (Item 4 in Figure 1) which carry the motor current. Excess heat is generated in these heater elements by an overloaded motor. The heated bimetals deflect to open the normally closed (NC) contact, thereby opening the coil circuit of a magnetic contactor which disconnects the overloaded motor from the line. After approximately 2 minutes, the relay (if hand reset) may be reset by pressing the reset rod. For relays in the auto position, resetting occurs automatically.

Table 1. Catalog number

	Panel mounted		A200 controller mounted	
Type	**Size 1**	**Size 2**	**Size 00-0-1**	**Size 2**
Ambient Compensated	AA13P	AA23P	AA13A	AA23A
Non-ambient Compensated	AN13P	AN23P	AN13A	AN23A

For NO/NC contacts add suffix B

Installation

The OLR must be installed on a vertical surface with the control terminals at the bottom. The relay is accurately calibrated at the factory and should not be tampered with. Installation should be made with the proper wire size (**see heater selection table**) for the application and all wires must be securely fastened. Preferably, the OLR should be located in the same ambient as the motor to be protected and in an area free of drafts. Heater elements are supplied separately and must be properly selected and securely mounted. Three heaters must be used for either single or three phase applications.

This industrial type control is designed to be installed, operated, and maintained by adequately trained workmen. These instructions do not cover all details, variations, or combinations of the equipment, its storage, delivery, installation, check out, safe operation, or maintenance. Care must be exercised to comply with local, state, and national regulations, as well as safety practices, for this class of equipment.

Control circuit contacts

The normally closed (NC) control circuit contact is to be connected in series with the coil of a magnetic contactor. This NC contact is equipped with a follow contact which provides reliable electrical continuity during a tripping condition. A factory installed normally open (NO) control circuit contact (single pole double throw - Form C) is available for remote trip indication applications. AC contact ratings are listed in **Table 2**.

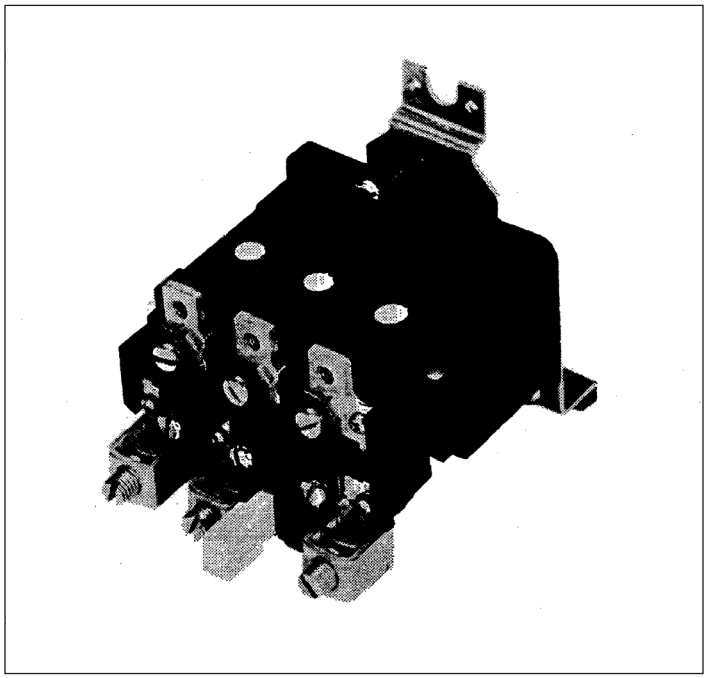


Figure 2. Size 2 overload relay for A200 controller mounting

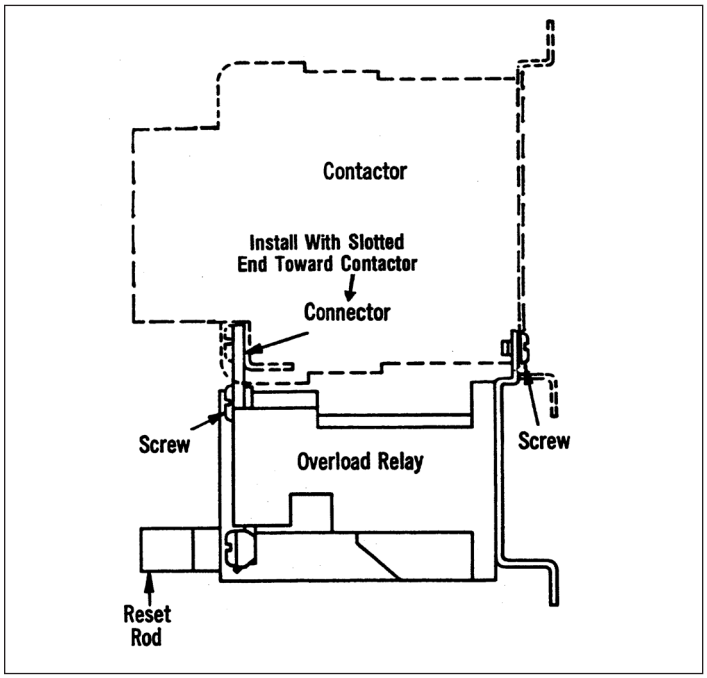


Figure 3. Overload relay mounted on A200 controller

Table 2. Control contact ratings

AC volts	Normally closed		Normally open	
	Make	Break	Make	Break
24-120 120-600	20A 2400 VA	2A 240 VA	5A 600 VA	0.5A 60 VA

Manual Or Automatic Reset

The overload relay is normally furnished set for "HAND" reset operation. The relay may be set for either "HAND" or "AUTO" slightly loosening the reset screw (1), holding the reset plate (2), moving the plate to the proper position marked on the molded case (away from the panel for "Hand" reset and toward the panel for "Auto" reset) and retightening the screw. **(See Figure 1.)**

Automatic reset should not be used with 2-wire control circuits where automatic starting of the motor may be hazardous.

Adjustable Trip

The trip rating of a specific heater element can be adjusted over a range of approximately 85% to 115%. This is accomplished by turning the adjustment knob (3) on the top of the relay to the respective stop position. This to alleviate nuisance tripping; or conversely, to gain closer protection when desired.

Trip Indication

The Type A overload relay gives an immediate visible indication of trip. When an overload occurs, which causes the relay to operate, a trip indicator (5) projects out through a small opening at the bottom of the relay. **(See Figure 1.)**

Ambient Compensation

Ambient compensated OLR's have substantially the same trip characteristics for ambient temperatures from -40°C to 75°C (-40°F to 167°F). Because of a compensating bimetal, which maintains a constant travel to trip distance independent of ambient conditions, operation of this bimetallic relay is responsive only to heat generated by the motor overcurrent passing through the heater element. The compensating feature is fully automatic and no adjustments are required over normal fluctuations in ambient temperatures. Overload relays having ambient compensation can be identified by light gray reset rods whereas non-compensated overload relays have red reset rods.

Table 3. Power circuit terminals

NEMA Size	Wire Size
1	#14 - 8 AWG
2	#14 - 3 AWG

Wire with copper conductors only

Table 4. Recommended driving torque

Location (Qty.)	Driving Torque (lb.-in.)
Main Power Connections (6)	18 - 20 (Size 1) 45 - 50 (Size 2)
Control Connections (2)	8 - 9
Heater Mtg. Screws (2/pole)	18 - 20

⚠IMPORTANT

DO NOT TAMPER WITH THIS TRIP INDICATOR AS IT IS AN INTEGRAL PART IN THE CALIBRATION AND TAMPERING THEREWITH MAY CAUSES CHANGES IN TRIP CHARACTERISTICS.

Heaters

Heaters are not included with the overload relay and must be ordered separately per the heater selection table and the Information listed below. When installing heaters be sure that connecting surfaces are clean and heaters are attached securely to the relay in the proper location with the screws provided. The trip rating of a heater in a 40ºC Ambient is 125% of the minimum full load current shown in **Table 5 or 6**. When tested at 600 percent of its trip rating, the relay will trip in 20 seconds or less (class 20).

The heaters should be selected on the basis of the actual full load current and service factor as shown on the motor nameplate or in the manufacturer's published literature. When the service factor of the motor is 1.15 to 1.25, select heaters from the heater application table. If the service factor of the motor is 1.0, or there is no service factor shown, or a maximum of 115% protection is desired, select one size smaller heater than indicated. When motor and overload relay are in different ambient and when using non-compensated overload relays, select heaters from the table using adjusted motor currents as follows: decrease rated motor current 1% for each ºC motor ambient exceeds controller ambient. Increase rated motor current 1 % for each ºC controller ambient exceeds motor ambient. For ambient compensated overload relays no adjustment in heater selection is necessary for normal variations in ambient temperatures.

Short Circuit Protection

The relay will provide protection against abnormal load conditions to current values exceeding normal locked rotor current; however, to protect the relay from short circuit currents, branch circuit protection must be provided per the National Electric Code. Protective device ratings should not exceed the maximum values listed in the heater application table. The relays, as protected are suitable for use on a circuit capable of delivering not more than 5000 rms symmetrical amperes.

Maintenance

Other than the normal tightening of all wire and heater connections, no maintenance should be attempted on the unit. Complete replacement of the unit must be made in the event of damage.

Medium-Voltage applications

The Type A OLR is used with current transformers and the "G" family of heaters for coordination with mediumvoltage fuses. Since the current transformers have a limited current output under short-circuit conditions, no shortcircuit protection is required in their secondary circuits supplying current to the Type "G" heaters. Wire the secondary circuits of the current transformers with #12 or #14 conductors. Divide the motor full-load current by the transformer turns ratio to determine the equivalent motor fullload current and select the appropriate heater from **Table 5** for a service factor 1.15 medium-voltage motor.

Table 5. Type G heaters

Code Marking	Heater Rating	Equivalent Full-Load Current
G22	2.03A	1.63-1.78 Amperes
G23	2.23A	1.79-1.95 Amperes
G24	2.44A	1.96-2.15 Amperes
G25	2.69A	2.16-2.35 Amperes
G26	2.95A	2.36-2.58 Amperes
G27	3.23A	2.59-2.83 Amperes
G28	3.55A	2.84-3.11 Amperes
G29	3.90A	3.12-3.42 Amperes
G30	4.28A	3.43-3.73 Amperes
G31	4.67A	3.74-4.07 Amperes
G32	5.10A	4.08-4.39 Amperes
G33	5.50A	4.40-4.87 Amperes
G34	6.10A	4.88-5.30 Amperes

Table 6. F series heater selection

For compensated OLR's in any size enclosure, and non-compensated OLR's in enclosures with volume not less than 5500 cu. in. Wire with 75°C wire.

Code Marking	Full Load Current of Motor (Amperes) (40°C Ambient)	Max. Protect. Device (Amp)	Load Wire Size
For use on one pole OLR's			
FH03	.25 - .27	1A	#14
FH04	.28 - .31	1A	#14
FH05	.32 - .34	1A	#14
FH06	.35 - .38	1A	#14
FH07	.39 - .42	1A	#14
FH08	.43 - .46	2A	#14
FH09	.47 - .50	2A	#14
FH10	.51 - .55	2A	#14
FH11	.56 - .62	3A	#14
FH12	.63 - .68	3A	#14
FH13	.69 - .75	3A	#14
FH14	.76 - .83	3A	#14
FH15	.84 - .91	3A	#14
FH16	.92 - 1.00	3A	#14
FH17	1.01 - 1.11	3A	#14
FH18	1.12 - 1.22	3A	#14
FH19	1.23 - 1.34	5A	#14
FH20	1.35 - 1.47	6A	#14
FH21	1.48 - 1.62	6A	#14
FH22	1.63 - 1.78	6A	#14
FH23	1.79 - 1.95	6A	#14
FH24	1.96 - 2.15	6A	#14
FH25	2.16 - 2.35	10A	#14
FH26	2.36 - 2.58	10A	#14
FH27	2.59 - 2.83	10A	#14
FH28	2.84 - 3.11	15A	#14
FH29	3.12 - 3.42	15A	#14
FH30	3.43 - 3.73	15A	#14
FH31	3.74 - 4.07	15A	#14
FH32	4.08 - 4.39	15A	#14
FH33	4.40 - 4.87	15A	#14
FH34	4.88 - 5.3	20A	#14
FH35	5.4 - 5.9	20A	#14
FH36	6.0 - 6.4	20A	#14
FH37	6.5 - 7.1	25A	#14
FH38	7.2 - 7.8	25A	#14
FH39	7.9 - 8.5	30A	#14
FH40	8.6 - 9.4	30A	#14
FH41	9.5 - 10.3	35A	#14
FH42	10.4 - 11.3	35A	#14
FH43	11.4 - 12.4	40A	#14
FH44	12.5 - 13.5	45A	#14
FH45	13.6 - 14.9	45A	#14
FH46	15.0 - 16.3	50A	#12
FH47	16.4 - 18.0	60A	#12
FH48	18.1 - 19.8	60A	#12
FH49	19.9 - 21.7	70A	#10
FH50	21.8 - 23.9	80A	#10
FH51	24.0 - 26.2	80A	#10
Above heaters for use on size 1			
FH52	26.3 - 28.7	90	#8
FH53	28.8 - 31.4	100	#8
FH54	31.5 - 34.5	125	#8
FHSS	34.6 - 37.9	125	#8
FH56	38.0 - 41.5	125	#6
FH57	41.6 - 45.0	150	#6
Above heaters for use on size 2			

⚠WARNING:

TO PROVIDE CONTINUED PROTECTION AGAINST FIRE AND SHOCK HAZARD, THE COMPLETE OVERLOAD RELAY MUST BE REPLACED IF BURNOUT OF A CURRENT ELEMENT OCCURS. SEE TABLE I.

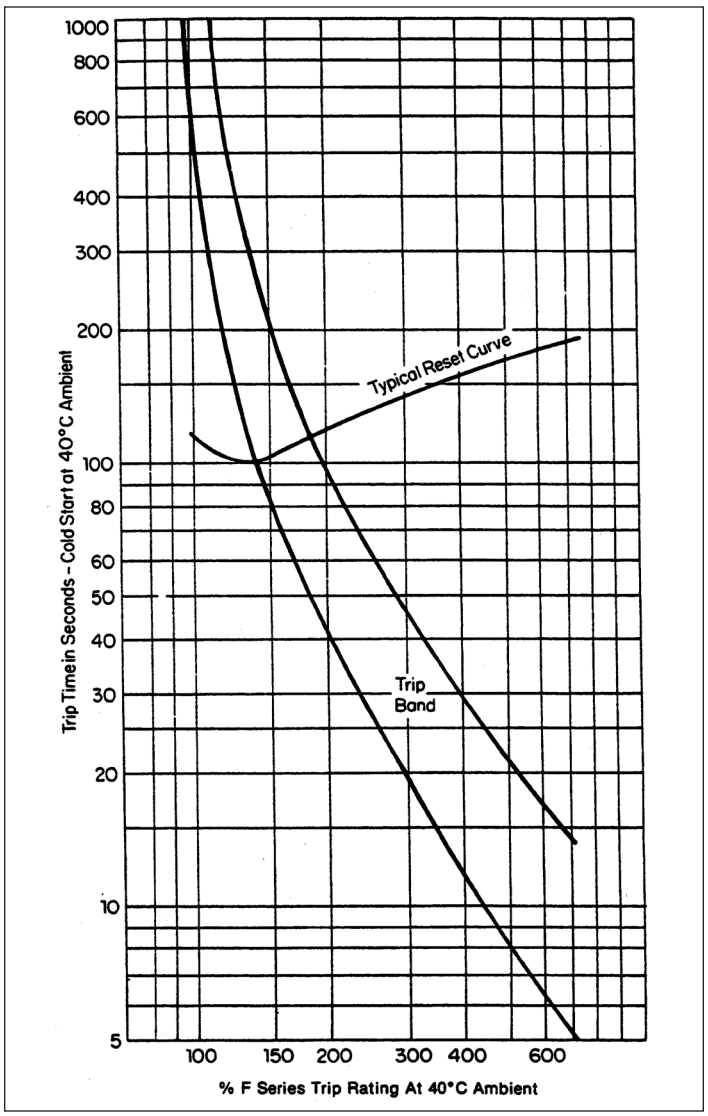
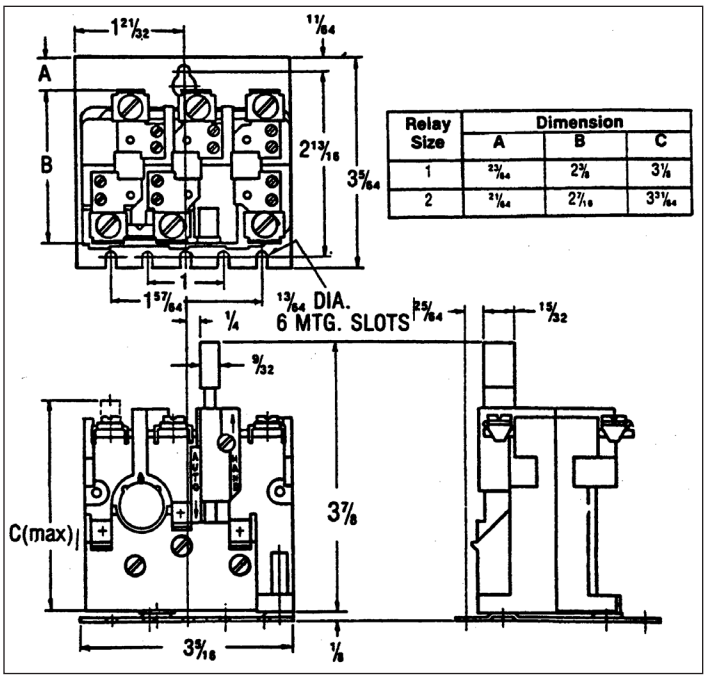


Figure 4. Time/current trip and reset curves

The trip rating of a heater in a 40ºC ambient is 1.25 times the minimum value of full load current listed for each heater.



Relay Size	Dimension A	B	C
1	2 3/64	2 3/8	3 1/8
2	2 1/64	2 7/16	3 31/64

Figure 5. Dimension drawing (Dim. in inches)

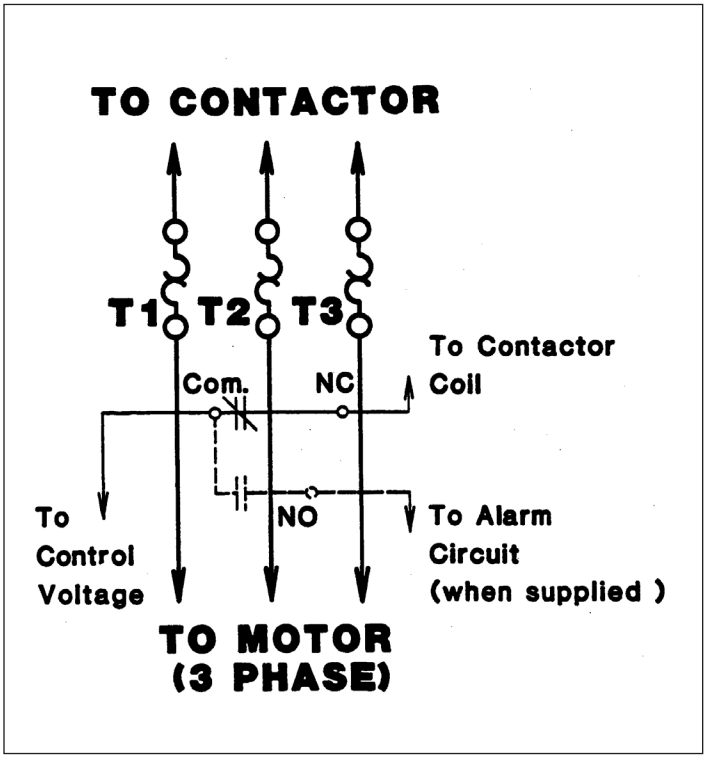


Figure 6. Connection diagram

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