

# TYPE TA-2 THERMAL OVERLOAD RELAYS

## INSTRUCTIONS

### Construction

The Type TA-2 Thermal Overload Relay makes use of bimetallic elements to break a circuit when an overload occurs. It has been designed in two sizes to obtain different ranges of current ratings. The relay with bimetal strips .030" thick is used in connection with heaters rated from 1 to 40 amperes. The relay with bimetal strips .040" thick is used in connection with heaters rated from 41 to 95 amperes.

When used in circuits having normal currents above 95 amperes, transformers are used with the relay. These transformers are specially designed to allow for the longer time required to accelerate larger motors to full speed.

### Installation

**To Mount Heaters**—To mount heaters, (see Fig. 1), remove screws and washers from the heater supports. Place heater so that the U opening straddles the bimetal strip and heater lugs rest on heater supports. Replace washers and screws, and adjust heater to give  $\frac{1}{32}$ " to  $\frac{1}{16}$ " clearance between heater and bimetal. Do not bend or change position of bimetal in any way, as this will alter the rating.

**Important**—Large tinned washers furnished with relay on the heater mounting studs should always be used between the heater and the screw head.

Heater mounting screws must be tight. Periodic inspection is advised.

To install Heaters, remove screws and washers from binding posts; set Heater in place and replace washers and screws.

When tightening in place adjust Heater to obtain  $\frac{1}{32}$ " to  $\frac{1}{16}$ " clearance between Bimetal Strip and Heater.

RESET LATCH

To provide Relay for Automatic Reset, remove Latch and Spring

DO NOT TAMPER WITH CONTACT SNAP SPRING



CALIBRATION LEVER: MOVE this to vary Tripping Value of Current

FIG. 1—THERMAL RELAY, SHOWING HOW HEATERS ARE INSTALLED

### Rating

The relay will operate in both A-C. and D-C. circuits up to 600 volts with current ratings from 1 to 95 amperes. When used in air temperatures much different from 40°C., a slight adjustment of the calibration lever will be necessary.

The rating stamped on the heater is the current that will trip the relay in 15 to 20 minutes at 40°C. air temperature. The heater rating should be 115% to 130% of the motor rating. The relay rating may be varied from 90% to 120% of the value stamped on the heater by moving the calibration lever along the calibration scale.

The thermal relay will give protection against abnormal load conditions up to the locked current of the motor. To protect against short circuit, fuses having a rating equal to not more than four times the Motor rating must be used.

### Operation

It is preferable to choose heaters of such rating that the desired overload protection will be obtained when the relay calibration lever is at the 90% setting.

Heaters are located in the circuit leading to the motor and are in close proximity to bimetal strips. When heated, one side of the bimetal strip expands more than the other, causing the strip to curl or bend. The movement of the bimetal is transferred through a lever to one end of the contact snap spring. When free, the snap spring holds the contacts closed, but when the end of the spring is deflected the proper amount, the spring undergoes a toggle action causing the contacts to snap open. When the relay has cooled sufficiently, the end of the spring is allowed to return to its free position and the contacts snap closed. Normal motor current passing through the heater will not generate sufficient heat to trip the relay.

A definite period of time is required for the relay to trip, depending upon the magnitude of the overload. The greater

the overload, the shorter the time. This time delay is sufficient to allow the motor to be started with the relay in the circuit, but with sustained overload the relay will trip. The curve, (Fig. 2) shows these characteristics. A short time must elapse before the relay can be reset after an overload trip has occurred.

If relay trips too frequently, the calibrating lever should be set at a higher point on the scale. If the motor is overloaded too heavily without tripping, the lever should be set at a lower point.

### To Reset Relay After Overload Trips

#### Hand Reset

The relay is provided with a latch which will hold the contact spring in the open position when the relay trips.

To reset, pull string attached to latch, thus releasing snap spring and closing contacts.

#### Automatic Reset

Remove latch and latch spring from the relay, so that the contact spring will be free to close itself when the relay has cooled sufficiently.

No oiling or attention is necessary, except to reset when an overload trip occurs.

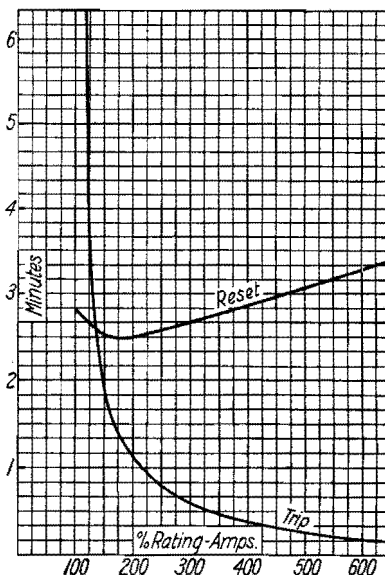
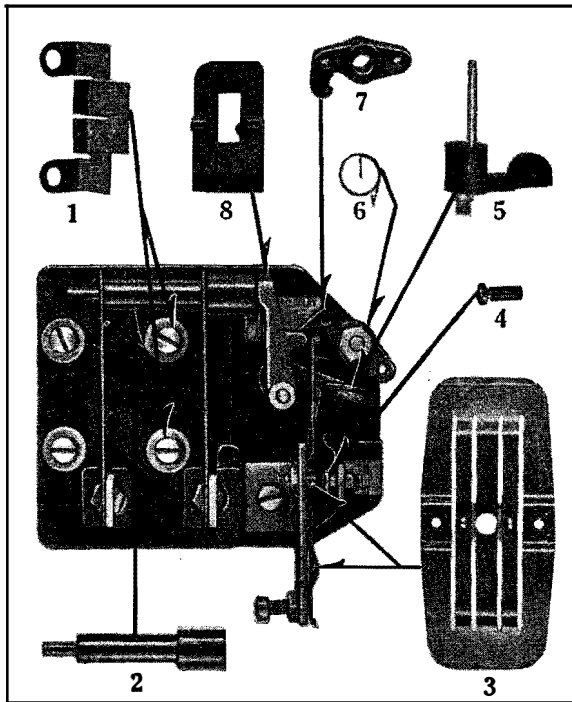


FIG. 2—28°C. AMBIENT TEMPERATURE READINGS TAKEN AT 5-MINUTE INTERVALS FROM RESET

## TYPE TA-2 THERMAL OVERLOAD RELAYS RENEWAL PARTS DATA



Below is a list of the Renewal Parts and the quantities of each that we recommend should be stocked by the user of this apparatus to minimize interrupted operation caused by breakdowns. The parts recommended are those most subject to wear in normal operation or those subject to damage or breakage due to possible abnormal conditions.

This list of Renewal Parts is given only as a guide. When continuous operation is a primary consideration, additional insurance against shut-downs is desirable. Under such conditions more Renewal Parts should be carried, the amount depending upon the severity of the service and the time required to secure renewals.

### ORDERING INSTRUCTIONS

Name the part and give its style number. Give the complete name plate reading. State whether shipment is desired by express, freight or by parcel post. Send all orders or correspondence to nearest Sales Office of the Company. Small orders should be combined so as to amount to a value of at least \$1.00 net. Where the total of the sale is less than this, the material will be invoiced at \$1.00.

### RECOMMENDED STOCK OF RENEWAL PARTS

Style Numbers of Relays, Without Heaters.....		576184, A, B, 599174, A, 653840, A, 653841, A, B			
(Automatic or Hand Reset Without Cover)					
For Relays in use up to and including.....					
Ref. No.	Name of Part	No. Per Relay	1	5	Style No. of Part
1†	Heater.....	2	2	4	
2	Latch Push Rod.....	1	0	0	597587
3†	Moving Contact—See Note Below.....	1	0	0	
4†	Stationary Contact and Holder—See Note Below.....	1	0	0	
5	Calibrating Lever.....	1	0	0	597584
6	Latch Spring.....	1	0	0	597590
7	Latch.....	1	0	0	597585
8	Operating Lever.....	1	0	0	597586

†When ordering Heaters, specify style number obtained from table of Heater ratings.

‡When Moving Contact, Stationary Contact and Holder or Thermal Strips must be renewed, the complete Relay should be sent to our works or nearest service shop, as accurate recalibration is necessary when any change in contacts is made. These contacts and thermal strips may be renewed by the customer, but at the risk of a possible change in relay calibration.

### RELAY HEATER RATINGS AND STYLE NUMBERS

Heater Rating	Relay Style No.	Heater Rating	Relay Style No.
1 to 40 Amperes	576184-B (Without Studs)	41 to 95 Amperes	599174-A (Without Studs)
1 to 40 Amperes	653840-A (With Studs)	41 to 95 Amperes	653841-B (With Studs)

### Recommended Heater Ratings for Type TA-2 Relay (Based on Terminal Current Marked on Motor Name Plate).

Motor Amps. per Terminal	Heater Rating Amps.	Heater Style No. 2 Req'd.	Motor Amps. per Terminal	Heater Rating Amps.	Heater Style No 2 Req'd.
.70 to .90	1.0	511342	9.6 to 11.0	13	474420
.91 to 1.20	1.4	511341	11.1 to 13.0	15	474421
1.21 to 1.45	1.7	511263	13.1 to 14.5	17	474422
1.46 to 1.65	1.9	511264	14.6 to 17.5	20	502915
1.66 to 1.80	2.1	511265	17.6 to 20.0	23	474425
1.81 to 2.00	2.3	511261	20.1 to 22	26	474426
2.01 to 2.25	2.6	511262	22.1 to 25	29	474427
2.26 to 2.70	3.1	551944	25.1 to 27	32	501695
2.71 to 3.10	3.6	551941	27.1 to 31	36	474429
3.15 to 3.65	4.2	551942	31.1 to 35	40	474431
3.70 to 4.10	4.7	551943	32.0 to 35	41	501694
4.20 to 4.90	5.7	551937	35.1 to 42	48	760593
5.00 to 5.80	6.7	551938	42.1 to 50	58	474432
5.90 to 6.70	7.7	551939	50.1 to 58	68	474433
6.80 to 7.30	8.4	551940	58.1 to 62	71	474434
7.40 to 7.80	9.0	511343	62.1 to 70	81	474436
7.90 to 9.50	11.0	474419	70.1 to 83	95	539018