



DESCRIPTION • INSTALLATION • MAINTENANCE INSTRUCTIONS

MAGNETIC CONTACTORS, TYPE MM Frames 310, 410 Direct Current Single Pole Magnet Closed

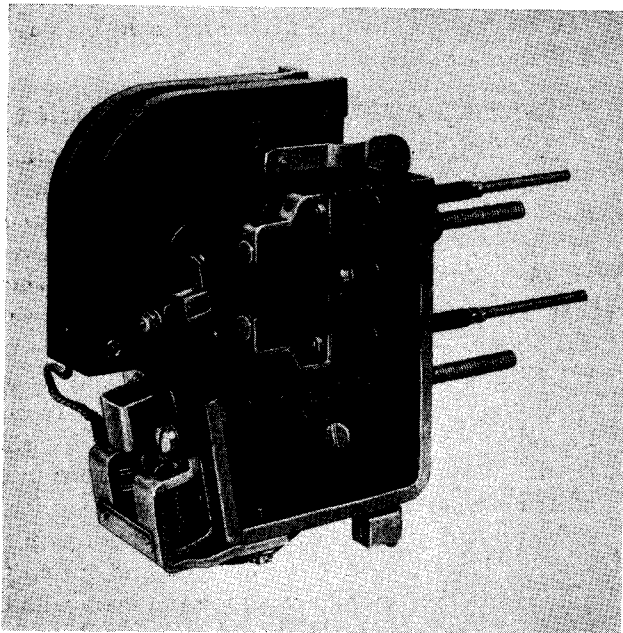


FIG. 1. Types MM-310, 410 Rear-Connected Contactors

TYPE MM CONTACTORS are general purpose magnetically-operated contactors suitable for motor starting and switching applications.

Rating

TYPE	8 HR	1 HR.	INTERRUPTING CAPACITY AT 600 V.
MM-301	100A	133A	1000A
MM-410	150A	200A	1000A

The operating coils are rated for continuous duty and will operate the contactors at 80 to 110 percent of their rated voltage. The contactors are insulated for a maximum potential difference of 600 volts among parts.

DESCRIPTION

The contactors are of unit construction with all parts assembled on a common frame. The armature hinges on a knife-edge bearing which has an extremely long life and requires little maintenance.

Strong kickout springs minimize the risk of accidental closing of the contactor under conditions of shock or tilt.

The contactor is supplied with magnetic blow-out. The arc shield, which is held in place by the blowout pole pieces and a pair of spring clips, may be removed by pulling it directly forward. An arc horn in the arc shield relieves the moving contact of excessive burning. The arc, which is drawn between the contacts when the contactor opens, moves outward under the influence of the magnetic blowout field and transfers from the moving contact to the arc horn. A flexible connection which is provided to maintain the arc horn at the same potential as the moving contact, serves also to prevent loss or misplacement of the arc shield when the latter is removed for inspection of the contacts.

The moving and stationary contacts are faced with solid silver. The moving contact is hinged on the armature in such a way that sliding or rubbing of the surfaces when the contacts meet is practically non-existent, a provision essential to the long life of silver contacts.

A plate of nonmagnetic steel is secured to the underside of the armature to prevent the armature from sticking closed due to residual magnetism following the interruption of voltage to the operating coil.

Rear-connected contactors are held to the panel by three mounting studs, the upper and lower of which make provision for the electrical connections.

Front-connected contactors are provided with pressure type solderless terminals and are held to the panel by two mounting studs.

The contactors are suitable for mounting only on insulating panels up to 2 inches thick. As the frame is at the same potential as the moving contact, special insulating precautions must be taken if a contactor is to be mounted on a conducting surface.

Electrical Interlocks. The contactors will accommodate a total of two Type L-46 or L-47 electrical interlocks, which may be selected in any combination that does not exceed the maximum allowable quantities listed in Table No. 1.

Table No. 1
ELECTRICAL INTERLOCK APPLICATIONS

ELECTRICAL INTERLOCK TYPE	MAXIMUM ALLOWABLE NUMBER OF INTERLOCKS TO BE APPLIED TO A CONTACTOR
L-46 Normally Open	2
L-46 Normally Closed	2
L-47 Normally Closed (delayed break)	2
Total number of interlocks of all the above types that can be applied to one contactor.	2

The Type L-46 electrical interlock is obtainable as a normally-open or a normally-closed interlock, and either combination can be furnished as a front-connected or a rear-connected assembly. For more complete information refer to Instruction Leaflet 15-829-L46-1B.

The Type L-47 electrical interlock is a normally-closed, delayed-break interlock available in both front-connected and rear-connected assemblies. It differs from the Type L-46 normally-closed interlock in that its contacts separate late, rather than early, in the closing cycle of the magnet; and it should be applied only where such a delayed-break action is required. For all ordinary applications, the Type L-46 interlock should be used. For more complete information refer to Instruction Leaflet 15-829-L47-1A.

The stationary contact assembly of either type of interlock is mounted on the moulded base of the contactor beside the arc shield. A molded insulating detail occupies this location when the contactor is assembled without interlocks at the factory, and this must be discarded at the time an interlock is mounted. The moving contact assembly is secured to the contactor armature by means of a single screw. Care should be taken when installing an interlock to make certain that its moving parts function freely, and that the contact gaps and overtravels conform to the information given in its instruction leaflet.

The sequence in which the various switching operations occur as the contactor magnet closes is as follows:

1. The Type L-46 normally-closed interlock opens.
2. The main contacts close.
3. The Type L-46 normally-open interlock closes.

4. The Type L-47 normally-closed interlock opens.

A single contactor can accommodate only two of the three varieties of interlocks at one time.

Mechanical Interlock. A Type M-25 mechanical interlock may be employed to safeguard a pair of contactors against the closing of one if the other is already closed. For mechanically interlocking a pair of contactors, use interlock Style No. 1597 073. The contactors are to be mounted side by side on 4³/₁₆ inch centers.

INSTALLATION AND MAINTENANCE

Arc Shield. The arc shield and its arc horn are essential to the performance of the contactor and these parts should always be in place. The flexible connection leading from the arc horn should always be securely fastened to the frame. The arc shield may be removed by pulling it directly forward, allowing the magnetic blowout pole pieces (which act as its fixed supports) to guide it in its sliding movement. In replacing the arc shield, care must be taken that the guiding recesses in its sides locate themselves properly on and be gripped firmly by the supporting guides. If the guides are found to be spread apart so that they no longer grip the arc box firmly, remove the arc box and spring the guides together slightly by squeezing them with the fingers. The arc shield should be pushed back as far as it will go, until it is held securely against the molded base by the spring clip.

Armature and Bearing. The knife-edge bearing requires no maintenance other than the removal of accumulated dirt. Oil should not be used, as it hastens the collection of dust.

The magnet pole face is secured to the core by means of a bolt having a head that projects forward into a hole in the armature. Care should be taken that the parts maintain their proper alignment, and particularly that the bolt head be accurately centered in the armature hole. Dirt should not be allowed to accumulate.

Operating Coil. When a new operating coil is installed, the identification label should be examined to make certain that the voltage rating and the coil style number are correct for the application.

This contactor has Class H coils which operate at a temperature of 150 degrees C. The surface temperature of the latter coils will be higher than that of Class A coils.

The more commonly used operating coils are listed in Table No. 2.

Table No. 2. OPERATING COILS

COIL VOLTS	TYPES MM-310, 410 CONTACTOR COILS
	Coil Style No.
115	1490 640
230	1490 641
550	1622 924

The steps to be followed in removing the operating coil are:

1. Remove the arc shield by sliding it forward.
2. Loosen the two bolts securing the armature stop to the underside of the contactor frame until the armature stop can be lowered clear of the two dowel pins which locate it in position.
3. Allow the self-contained assembly comprising the armature, armature stop, moving contact and springs to hang by the shunt.
4. Remove the bolt holding the pole face to the core of the magnet.
5. Disconnect the leads and slide the coil forward until it is clear of the contactor.

Contacts. Oil or other lubricant should not be used on the silver contacts. The discoloration which results from arcing and from exposure to the atmosphere usually is not harmful to their performance, and consequently no filing or dressing is necessary.

When the contacts are new they should meet sufficiently in advance of the final sealing of the armature against the magnet pole face, that a gap of approximately $\frac{5}{32}$ inch appears between the underside of the contact and the upper edge of the fully-sealed armature, as indicated in Fig. 2. As the contacts wear, the amount of this overtravel diminishes, and when at length it decreases to $\frac{1}{32}$ inch, the contacts should be replaced.

The moving contact can be removed for replacement by first disconnecting the shunt and then re-

moving the contact spring. The stationary contact is slotted to facilitate removal, and it is necessary only to loosen the screw until the dowel projecting from the back of the contact is free of the locating hole in the stationary arc horn which serves as the contact support.

The contact gap when the contacts are new should be $\frac{9}{32}$ to $\frac{11}{32}$ inch, as shown in Fig. 2.

If, after new contacts are installed, it is found that the overtravel and contact gap do not conform to the dimensions given: first, bend the moving contact strap to secure the proper overtravel; then measure the contact gap and, if necessary, bend the armature stop to secure the proper gap.

The contact pressures when the contacts are new should be as indicated in Table No. 3.

To measure the final contact pressure, close the contactor mechanically and by means of a spring scale hooked to a loop of fine wire, measure the force necessary to separate the contacts.

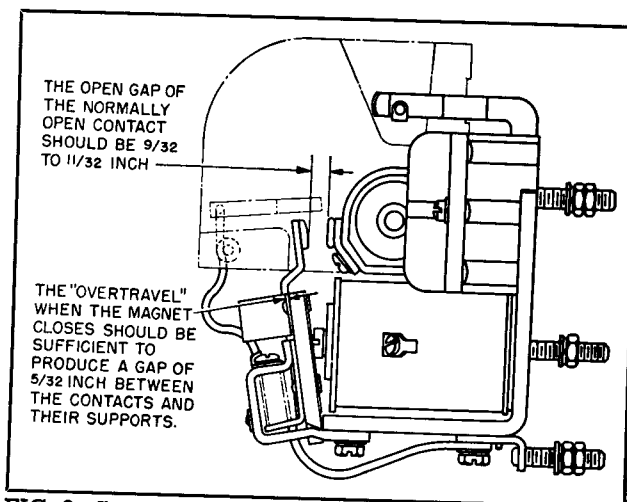


FIG. 2. Sectional View of Types MM-310, 410 Contactors with Armature in Closed Position

If, after new contacts are installed, the pressures are not correct, it may be necessary to replace the contact spring or to adjust the contact overtravel in the manner described previously.

Failure of the magnet to close the contactor may result from an open-circuited operating coil, from a circuit condition in which the voltage is excessively low, or from the presence of friction between the parts. Failure of the contactor to open may be caused by friction or by defective knockout springs.

Renewal Parts. Renewal parts may be ordered from the nearest Westinghouse Sales Office. Be sure to describe the part or parts required and give complete nameplate reading on the contactor for positive identification.

Table No. 3. CONTACT PRESSURES

CONTACTOR TYPE	CONTACT PRESSURE IN OUNCES	
	Initial	Final
MM-310 MM-410	9 to 12	22 to 26

