



DESCRIPTION • INSTALLATION • MAINTENANCE INSTRUCTIONS

TYPE M MAGNETIC CONTACTORS

Frames 310, 410, 510, 610 and 710

Single Pole

Direct Current

Magnet Closed

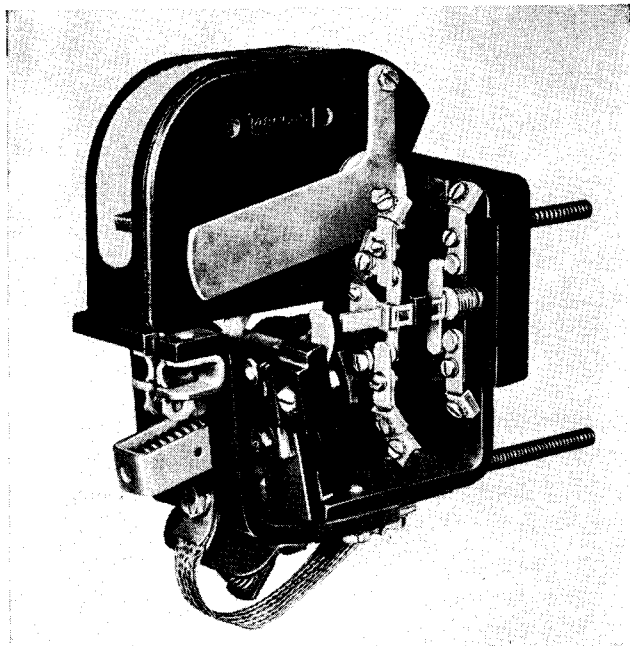


FIG. 1. Type M-410 Rear Connected Contactor
With Type L-61 Electrical Interlock

TYPE M CONTACTORS are heavy duty magnetic contactors designed primarily for steel mill and general purpose applications. The contactors have the ratings listed in Table No. 1.

Type M contactors are insulated for 600 volts maximum. The operating coils are rated for continuous duty and will operate the contactors at 80% to 110% of their rated voltage. Marine coils with maximum temperature rise of 55°C are available for frames 310, 410 and 510.

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.

Kickout springs hold the contacts open even when the contactor is tilted at an angle of 30 degrees with the vertical.

The arc shield, which is supported by the blow-out pole pieces, is capable of being swung upward for inspection of the contacts. It may be removed altogether by simply withdrawing the bolt at the top rear of the arc box.

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.

The latter is maintained at the potential of the moving contact by connection to the stop bracket through a blade which projects from the bottom of the arc shield. Electrical contact to the blade is maintained, when the arc shield occupies its lowered, operating position, by a pair of silver alloy faced jaws.

The moving contact support is hinged on the armature in a nitrided steel knife edge bearing so that the moving contact slides as the armature closes. The amount of slide is sufficient to keep the contacts free of oxides and scale, a provision essential to maintaining good contact with copper surfaces.

A pad of non-magnetic steel is brazed to the stop bracket to serve as a wearing pad and as an air gap to prevent magnetic "lockout" of the armature.

Table No. 1. RATINGS

CONTACTOR TYPE	M-310	M-410	M-510	M-610	M-710
Voltage Rating	600	600	600	600	600
8 Hour Ampere Rating	100	150	300	600	900
1 Hour Ampere Rating	133	200	400	800	1200

TYPE M CONTACTORS

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

Connections are normally made behind the panel. Should it be desired to make the connections in front of the panel, the contactor can be supplied with a pair of connecting straps and studs, the latter to be positioned on the insulating panel below the contactor.

The contactors are suitable for mounting only on insulating panels, up to 3 inches thick. As the frame is of 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-61 electrical interlocks either of which may be selected to have the following:

- a. One normally open contact.
- b. One normally closed contact.
- c. One normally open and one normally closed (independent) contact.
- d. Two normally open independent contacts.
- e. Two normally closed independent contacts.

The Type L-61 electrical interlock, shown in Fig. 1, comprises a contact assembly which is mounted as a unit on the molded base of the contactor, and an operating finger which is carried by an insulating block secured to the contactor armature.

For more complete information refer to instruction leaflet I.L. 15-829-1.

Mechanical Interlock. A Type M-27 mechanical interlock may be employed to safe-guard a pair of contactors against the closing of one if the other is already closed. Another version can be used to interlock three contactors against the closing

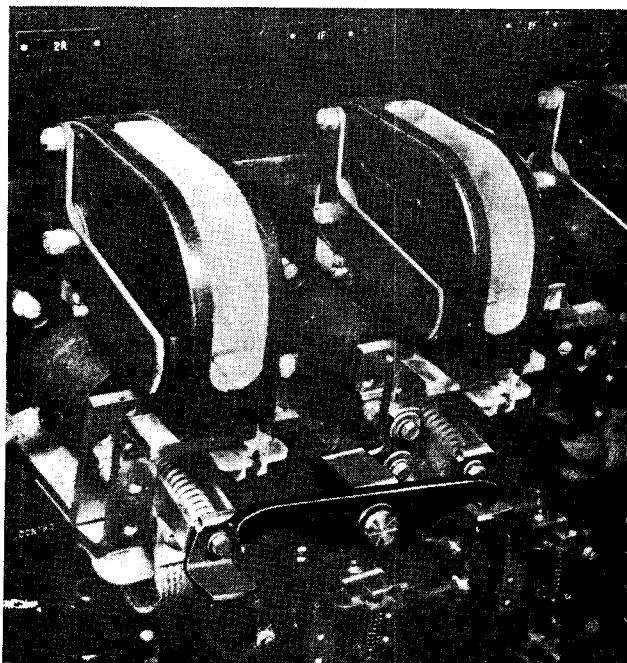


FIG. 2. Type M-27 Mechanical Interlock Assembled on Two Type M-410 Contactors

of either or both of two contactors if one is already closed.

Interlocks must be selected in accordance with the frame size of the contactor as tabulated in Table No. 2.

The mechanical interlock is mounted on the stop bracket of the contactor and requires no additional panel drilling. The interlock will operate satisfactorily at either of two contactor spacings as indicated in the table. Adjustment is obtained by moving the interlock mounting bracket. With one contactor energized and the other de-energized, all vertical play of the operating arm should be removed. Check the interlocking action to make sure that no binding occurs.

INSTALLATION AND MAINTENANCE

Arc Shield. The arc shield and its arc horn are essential to the performance of the contactor

Table No. 2. TYPE M-27 MECHANICAL INTERLOCK DATA

FRAME	FOR TWO CONTACTORS		FOR THREE CONTACTORS	
	STYLE NUMBER EITHER SPACING	C TO C CONTACTOR SPACING	STYLE NUMBER EITHER SPACING	C TO C CONTACTOR SPACING
M-310-410	1486 669	5¼ or 6 in.	1486 670	5¼ or 6 in.
M-510	1486 671	6 or 7 in.	1486 672	6 or 7 in.
M-610-710	1486 673	7½ or 9 in.	1486 674	7½ or 9 in.

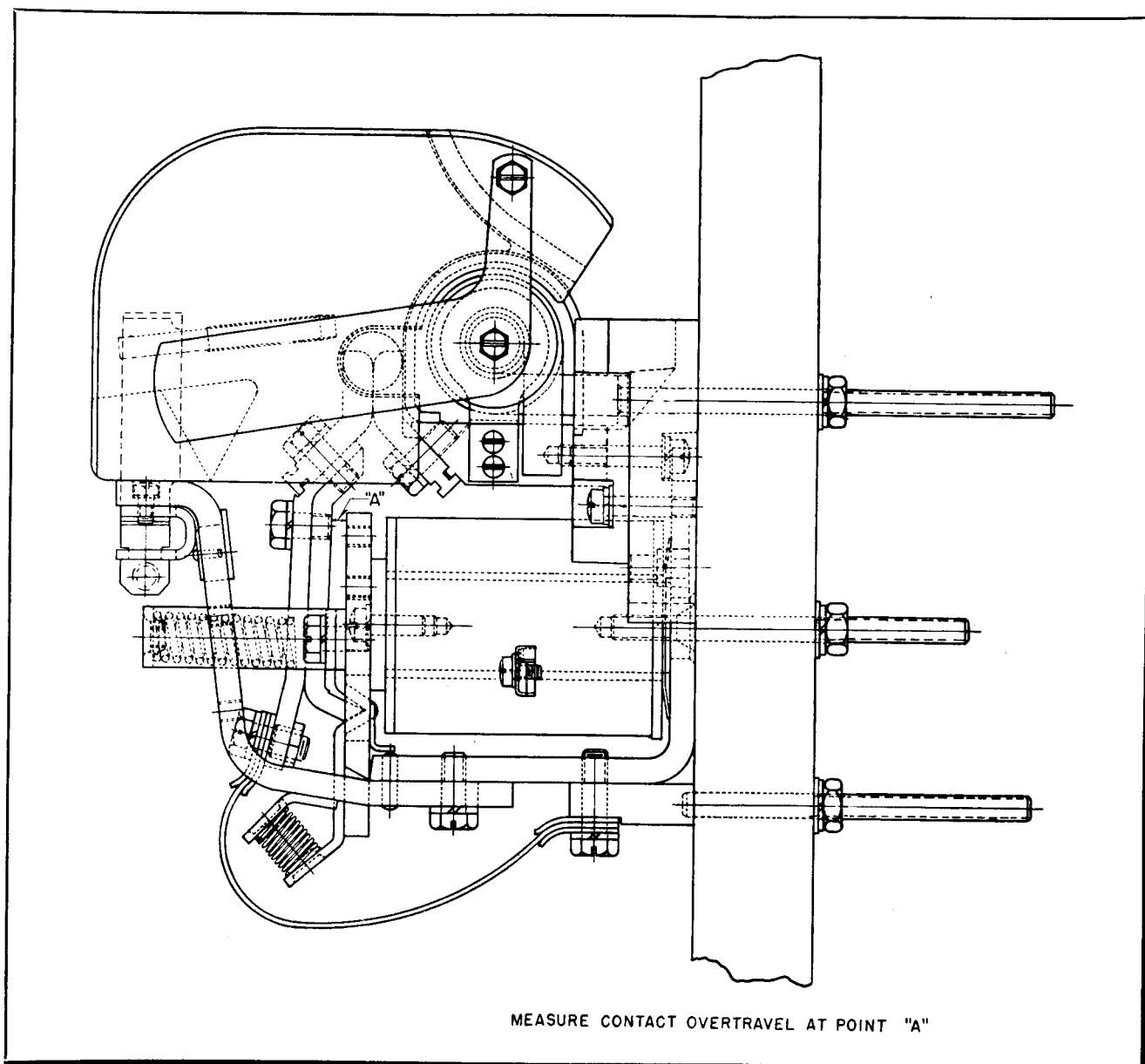


FIG. 3. Sectional View of Type M-410 Contactor with Armature Closed

and these parts should always be in place. The arc shield should always be pushed down so that it rests on the stop bracket. This insures proper engaging of the knife blade with the connector switch jaws.

The arc shield may be removed by first removing the arc shield retaining bolt, which is located at the top of the L shaped side plates, then raising the arc shield until the knife blade clears the stop bracket. Pull the arc shield forward, clear of the contactor.

In replacing the arc shield care must be taken that the pole piece plugs are aligned with the

recesses in the arc shield walls to permit proper reassembly. The arc box retaining bolt is made of non-magnetic material. A steel bolt used in this location will short circuit the magnetic blow-out field and impair interruption of the arc.

Armature and Bearing. The knife-edge bearing requires no maintenance. A shelf is provided on the armature plate to prevent falling dust and dirt collecting between the armature and frame. Oil should not be used at any point on this contactor.

On Types M-310, 410 and 510 the magnet pole face is secured to the core by means of a non-magnetic bolt having a head that projects forward

TYPE M CONTACTORS

Table No. 3. OPERATING COILS

COIL VOLTS	M-310/M-410	M-510	M-610/M-710
	COIL STYLE NO.	COIL STYLE NO.	COIL STYLE NO.
115	1419 539	1419 547	1419 561
230	1419 540	1419 548	1419 562
250	1626 833	1754 322	1754 338
550	1419 541	1419 549	1419 563

into a hole in the armature. When properly assembled this bolt head is centered in the hole.

Operating Coil. When a new operating coil is installed the identification label should be examined to make certain that the voltage rating and coil style number are correct for the application. The more commonly used coils are listed in Table No. 3. Marine coils are available for the frames M-310, M-410 and M-510 contactors.

The M-310, M-410 and M-510 contactors have class A coils. The M-610 and M-710 contactors have class H coils which operate at a temperature rise of approximately 150°C. The surface temperature of the latter coils will be higher than that of the class A coils.

Steps to follow in removing operating coil are:

1. Raise arc shield.
2. Remove the two bolts securing the stop bracket to the underside of the contactor frame and allow the assembly to hang by the shunt.
3. Remove the bolt holding the pole face to the core of the magnet.
4. Disconnect the coil leads and slide the coil forward until it is clear of the contactor.

Contacts. Oil or other lubricants should not be used on the copper contacts. Filing and dressing the contacts is unnecessary and harmful.

When the contacts are new and the armature is

closed either electrically or mechanically the gap between the contact support bracket and the top of the armature plate, Dimension "A", Fig. 3 should be as shown in Table No. 4. Change contacts when this dimension is reduced to 1/32 inch.

The moving and stationary contacts may be removed by removing the bolts holding the contacts to their respective supports. The bolt heads are slotted to permit use of a screwdriver.

Table No. 4 shows the proper contact gap, contact overtravel, and contact forces with new contacts.

To measure the final contact force, close the contactor and by means of a spring scale hooked to a loop of wire measure the force necessary to separate the contacts. Consideration must be given the thickness of the wire used in comparing values read with the tabulated values in this leaflet.

If after new contacts are installed, the forces are not correct, it may be necessary to replace the contact spring, or adjust the number of spring shims in the spring seat.

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, from excessive contact spring forces, or from friction between parts. Failure of the contactor to open may be caused by friction or by defective kickout springs.

Table No. 4. CONTACT FORCE, GAP AND OVERTRAVEL DATA

CONTACTOR TYPE	CONTACT FORCE IN POUNDS		*CONTACT OVERTRAVEL	CONTACT GAP
	INITIAL	FINAL		
M-310 M-410	2¾ to 3¼	4½ to 6	3/16	5/8" ± 1/16
M-510	6 to 7	13½ to 16½	13/64	25/32 ± 1/16"
M-610 M-710	13½ to 15½	36 to 44	1 1/32	7/8 ± 1/16

* Dimension "A" of Fig. 3.



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(11-63) Printed in U.S.A.