

Instructions for Type MR and Type MD, DC Contactors Sizes 5, 6, 7, 8 and 9, 600V Maximum

The Contactors

Type MR contactors are rear connected and Type MD contactors are front connected. Both types are single-pole devices, available in five sizes, in normally-open or normally-closed contact configurations, for DC applications up to 600 volts. Continuous current ratings are shown in **Table 1**.

Interrupting ratings of normally-open (NO) contactors are ten times their eight-hour continuous current ratings except as noted below. Spring-closed, normally-closed (NC) contactors have interrupting ratings equal to their one-hour continuous current ratings.

The contactors are of unit construction with all parts assembled on a common frame. The armature hinges on a knife edge bearing which requires little maintenance. Size 5 contactors, as well as Size 6 and Size 7 contactors, with normally-open (NO) poles have a single coil. All other contactors covered by this instruction leaflet have two coils, see **Table 5**.

For contactors with normally-open poles, kickout springs hold the contacts open even when the contactor is tilted at an angle of 30 degrees with the vertical. For contactors with normally-closed poles the operating springs close the contacts when their coil is de-energized. The force exerted by the springs can be varied by means of an adjusting screw.

The arc shield on all contactors is supported by the blow-out pole pieces. It is capable of being swung upward for inspection of the contacts. It may be removed altogether by 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 for all types except 910 which have a bolted connection.

Table 1. Continuous Current Ratings

Size	Contactor Type	Pole and Contact Config. ^①	Open 1-Hr. Ampere Rating	Open 8-Hr. Ampere Rating
Rear Connected				
5	MR501	1NC	400	300
5	MR510	1NO	400	300
6	MR601	1NC	800	600
6	MR610	1NO	800	600
7	MR701	1NC	1200	900
7	MR710	1NO	1200	900
8	MR810	1NO	1800	1350
9	MR910	1NO	3333	2500
Front Connected				
5	MD501	1NC	400	300
5	MD510	1NO	400	300
6	MD601	1NC	800	600
6	MD610	1NO	800	600
7	MD701	1NC	1200	900
7	MD710	1NO	1200	900
8	MD810	1NO	1800	1350
9	MD910	1NO	3333	2500

^① NO = Normally Open, NC = Normally Closed

Installation

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. Mounting provisions are shown in **Table 2**.

Table 2. Mounting Provisions

Contactor Size	Type Prefix	Panel Material	Non-conducting Mounting Means	Thru-Panel Conducting Studs
5, 6, 7	MR	Insul. ^②	1 Stud	2
8, 9	MR	Insul. ^②	2 Studs	2
5, 6, 7	MD	Steel	4 Bolts	None
8, 9	MD	Steel	4 Bolts	None

^② Insulating material up to 3 inches (76 mm) thick.

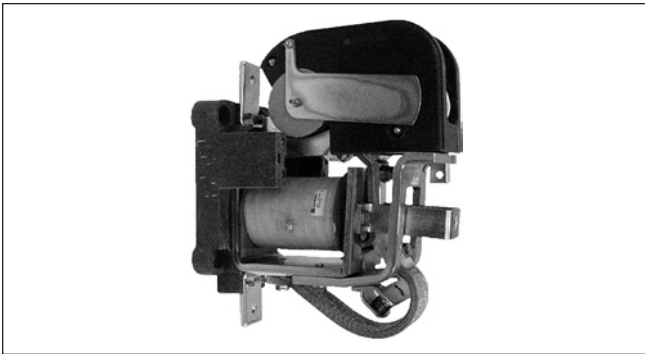


Figure 1. Type MD710 Front-Connected Contactor

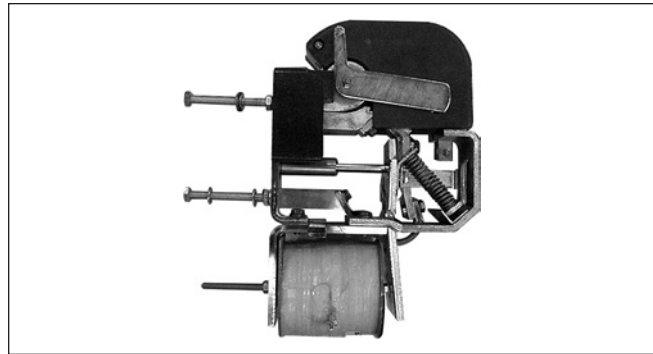


Figure 2. Type MR501 Rear-Connected Contactor

Auxiliary Contacts

Two auxiliary contact assemblies can be mounted on each of the contactors listed in **Table 1**. For additions to existing contactors, each auxiliary contact must be ordered as two components (contact assembly plus mounting and operating hardware). When replacing an auxiliary contact, only the contact assembly need be ordered. See **Table 3**.

Spring-Closed (NC) Contactors

Each spring-closed contactor is designed to operate with a positive snap action. In the un-energized state, the armature is at rest against a post situated about the main magnet, and below the stationary contact assembly. When the operating coil is first energized, a heavy copper ring encircling the path of the main flux provides sufficient leakage flux through the stop post to momentarily freeze the armature against it. As the current in the operating coil approaches its steady state condition, its rate of change decreases and blocking action of the short-circuiting ring diminishes, and finally the armature is attracted toward the main core in a fast positive movement.

Table 3. Auxiliary Contacts

Auxiliary Contact Arrangement	Auxiliary Contact Assembly Part Number	Plus:	Mounting and Operating Hardware Part Number				
			For Contactor Type — MR or MD:				
			501 / 510	601 / 610	701 / 710	810	910
1NO-1NC 2NO 2NC	843D943G04 843D943G05 843D943G06	}	2087A63G01 2087A63G04	2087A63G02 2087A63G17	2087A63G02 2087A63G17	2087A63G05	2087A63G06

NOTE: Order each set of auxiliary contacts as two components, the auxiliary contact assembly plus the mounting and operating hardware.

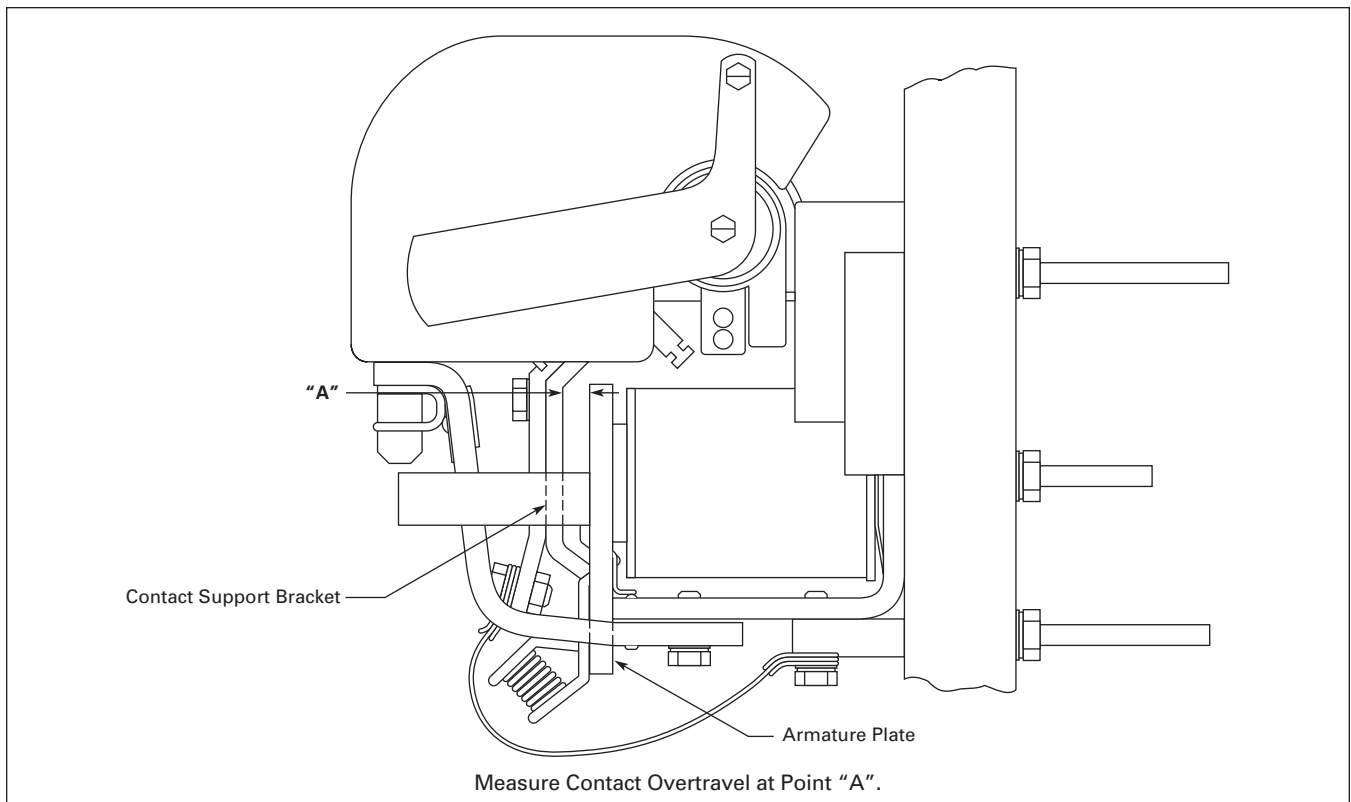


Figure 3. Type MR810 Contactor with Armature Closed

Maintenance

Arc Shield

This industrial type controller 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, checkout, safe operations or maintenance. Care must be exercised to comply with local, state and national regulations, as well as safety practices, for this class of equipment.

The arc shield and its arc horn are essential to the performance of these contactors and the arc shield parts should always be in place. On the Sizes 5, 6 and 7 and Type 810 contactors, 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. This engagement is a bolted connection on the Type 910 contactors.

An arc shield may be removed by first removing the arc shield retaining bolt (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, insure 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 blowout 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 minimize the dust and dirt collecting between the armature and frame. Oil should not be used at any point on these contactors.

Contacts

Order replacement contact kits by the part number shown in **Table 4**. When contacts are new and the armature is seated either electrically or mechanically, the gap between the contact support bracket and the top of the armature plate, Dimension "A" in **Figure 3**, should be as shown in **Table 4**. Change contacts when this dimension is reduced to 1/32 inch.

The moving and stationary contacts may be replaced by removing the bolts holding the contacts to their respective supports.

Table 4 shows the proper contact gap, contact overtravel, and contact forces with new contacts. To measure the final contact force, close the contacts and, by means of a spring scale hooked to a loop of thin tape or wire, measure the force necessary to separate the contacts. Give consideration to the thickness of the tape or wire used when comparing values read on the spring scale 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.

Table 4. Contact Measurements and Kits

Contactor Type	Contact Force in Pounds		"A" Contact Overtravel (Inches) ^①	Contact Gap (Inches)	Replacement Contact Kit (Part Number)
	Initial	Final			
MR501, MD501	7-1/4 to 8-3/4	8-1/2 to 10-1/2	13/64	5/16 ± 1/16	26D2610G22
MR601, MD601	14-1/2 to 17-1/2	22-1/2 to 27-1/2	11/32	1/2 ± 1/16	26D2610G24
MR701, MD701	14-1/2 to 17-1/2	22-1/2 to 27-1/2	11/32	1/2 ± 1/16	26D2610G24
MR510, MD510	6 to 7	13-1/2 to 16-1/2	13/64	25/32 ± 1/16	26D2610G15
MR610, MD610	13-1/2 to 15-1/2	36 to 44	11/32	7/8 ± 1/16	26D2610G16
MR710, MD710	13-1/2 to 15-1/2	36 to 44	11/32	7/8 ± 1/16	26D2610G16
MR810, MD810	12 to 14	38 to 44	13/32	7/8 ± 1/16	26D2610G18
MR910, MD910	18 to 22	54 to 66	13/32	7/8 ± 1/16	26D2610G20

^① Dimension "A" in Figure 3.

Magnet Operation

Failure of the magnet to operate the contactor may result from an open-circuited operating coil, from a circuit condition in which the voltage is low, from excessive spring forces, or from friction between parts. Failure of the contactor to release may be caused by friction or by defective kickout springs. Readjustment of the operating spring forces on spring-closed (NC) contactors may be necessary after the contacts have worn considerably. See **Table 4**.

Operating Springs

Adjust the operating springs of spring-closed contactors to obtain a reading of 24 ounces on Size 5 contactors and 28 ounces on Size 6 and Size 7 contactors with a push scale. This push spring scale is applied 1/8" up from the bottom of the armature. Readings are made when the armature starts to move.

Operating Coils

When replacing an operating coil, verify the voltage rating of the coil as being correct for the application, particularly where two coils are connected in series. Expect the surface temperature of the coils to be high after a period of continuous energization. The coils are designed to make maximum use of the magnet wire insulation class. Replacement coils are shown in **Table 5**.

Steps to follow in removing an operating coil are:

1. Raise arc shield.
2. Remove the two bolts securing the stop bracket or spring bracket to the frame.
3. Allow the assembly to hang by the shunt, or in the case of spring-closed contactors disconnect shunt from lower stud. This permits removal of the armature and spring bracket assembly.
4. Remove the pole face bolt or bolts.
5. Disconnect leads and slide the coil forward until it clears the magnet core.

To install a new operating coil, reverse the above procedure. On devices with two coils, connect the coils in series or in parallel, depending upon the control voltage to be applied and the coil rating.

Table 5. Operating Coils

Contactor Type	Coils per Device	Operating Coil Part Number for Control Voltage of:				
		115V DC	125V DC	230V DC	250V DC	550V DC
MR & MD501	1	30B4375G04	30B4375G24	30B4375G05	30B4375G12	30B4375G06
MR & MD510	1	45A5515G01	45A5515G07	45A5515G04	45A5515G12	45A5515G05
MR & MD601	2	30B4377G23 ^①	30B4377G24 ^①	30B4377G01 ^①	30B4377G13 ^①	30B4377G25 ^①
MR & MD610	1	30B4377G01	30B4377G10	30B4377G05	43B4377G07	30B4377G06
MR & MD701	2	30B4377G23 ^①	30B4377G24 ^①	30B4377G01 ^①	30B4377G13 ^①	30B4377G25 ^①
MR & MD710	1	30B4377G01	30B4377G10	30B4377G05	30B4377G07	30B4377G06
MR & MD810	2	435A929G01 ^①	435A966G01 ^①	L482211G01 ^①	334P064G02 ^①	L482213G01 ^②
MR & MD910	2	435A931G01 ^①	435A967G01 ^①	L483507G01 ^①	L549720G01 ^①	L483508G01 ^②

^① This coil is rated for one half of the control voltage. Two coils connected in series are required.

^② This coil is rated for the control voltage. Two coils connected in parallel are required.

Mechanical Interlock

A Type M-27 mechanical interlock (see **Figure 4**) may be employed to safeguard a pair of normally-open contactors against the closing of one if the other is already closed. Another version can be used to interlock three contactors against the closing of either or both of two contactors if the center one is already closed.

Mechanical interlocks must be selected in accordance with the frame size of the contactor as tabulated in **Table 6**.

The mechanical interlock is mounted on the stop bracket of the contactor and requires no additional panel drilling. 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.

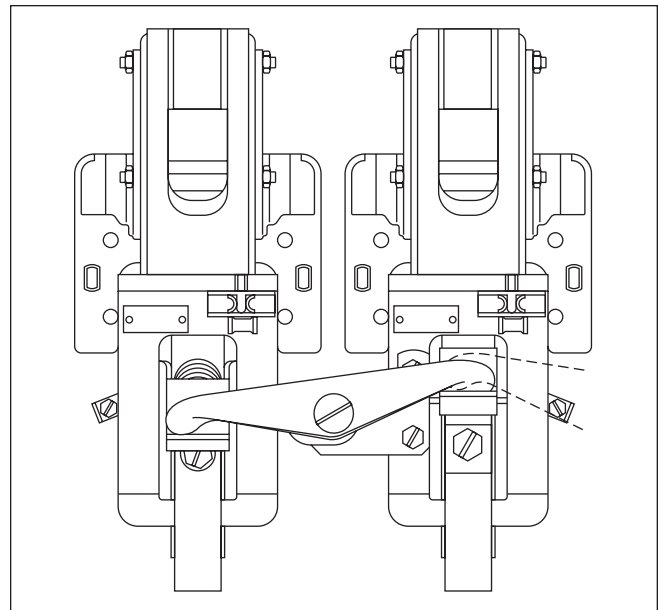


Figure 4. Type M-27 Mechanical Interlock

Table 6. Mechanical Interlocks

Contactor Type	For Two Contactors of Same Type		For Three Contactors of Same Type	
	Part Number for Either Spacing	Center-to-Center Spacing	Part Number for Either Spacing	Center-to-Center Spacing
MR510, MD510	25A1669G01	6 or 7 inches	25A1669G02	6 or 7 inches
MR610, MD610	25A1669G01	7-1/2 or 9 inches	25A1669G02	7-1/2 or 9 inches
MR710, MD710	25A1669G01	7-1/2 or 9 inches	25A1669G02	7-1/2 or 9 inches
MR810, MD810	25A1669G01	11 inches	25A1669G02	11 inches
MR910, MD910	25A1669G01	11 inches	25A1669G02	11 inches

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