

LINE-ARC® Single-Pole DC Contactor

NEMA Size 1 & 2, Normally Open

**Class 7004 Type MXCO-1 (25 A) & MXDO-1 (50 A),
Series A**

Contactora de (cd) de un polo LINE-ARC®

Tamaños NEMA 1 y 2, normalmente abierto

**Clase 7004, tipos MXCO-1 (25 A) y MXDO-1 (50 A),
serie A**

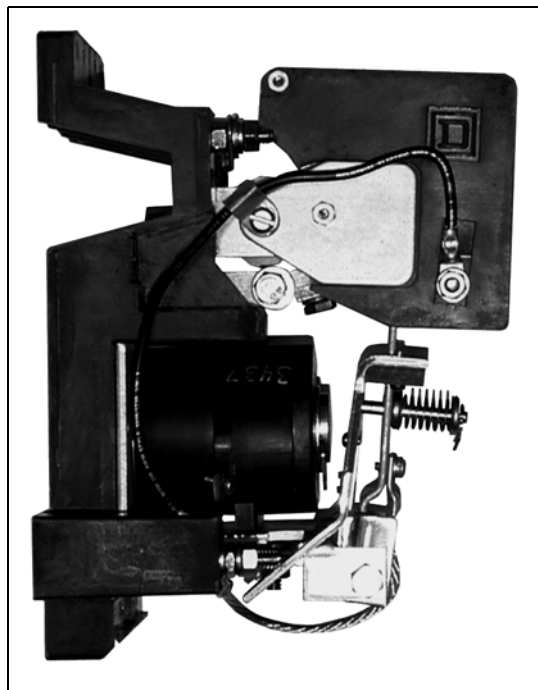
Contacteur cc unipolaire LINE-ARC®

NEMA tailles 1 et 2, normalement ouvert

**Classe 7004 types MXCO-1 (25 A) et
MXDO-1 (50 A), série A**



**Retain for future use. / Conservar para uso futuro. / À conserver pour
usage ultérieur.**



**The Electric Controller and
Manufacturing Company, LLC**

INTRODUCTION

⚠ DANGER
HAZARDOUS VOLTAGE
Disconnect all power before working on equipment.
Failure to follow this instruction will result in death or serious injury.

This single-pole contactor is a mill type clapper device, designed to meet NEMA standards. To identify contactor parts (denoted by parentheses), refer to the parts list on page 12 and to the assembly drawing on page 13.

Contactor Ratings

Table 1: Maximum Contactor Ratings @ 600 Vdc, +40 °C Ambient

Ratings	DC Motor HP @ 230 Vdc		DC Amperes	
	Size 1	Size 2	Size 1	Size 2
Open 8 hour	5.0	10	25	50
Enclosed	4.5	9	23	45
Crane	7.5	15	34	67

Operating Coils

The operating coils are designed in accordance with NEMA standards to withstand 110% of rated voltage continuously and to operate the contactor successfully at 80% of rated voltage. Standard coil voltages are 115/120 Vdc and 230/240 Vdc. Table 2 lists the ratings for standard coils. For other coil voltages, refer to the crane control catalog.

Table 2: Operating Coil Ratings

Coil Part No.	DC Voltage Rating	Nominal Resistance (Ω) @ +20 °C
51015-056-50	230/240	2114
51015-056-51	115/120	543

Electrical Interlocks

Electrical interlocks consist of stationary contacts mounted on the contactor base (36) and moving contacts attached to the bottom of the contact arm assembly (17). A set of electrical interlocks contains one N.O. (normally open) and one N.C. (normally closed) double-break contact. Make and break ratings apply to double-throw contacts only when both the N.O. and N.C. contacts are connected to the same polarity. The electrical interlock ratings (Table 3) comply with NEMA standard ICS-5, Part 1, Table 1-4-1 (AC) and Table 1-4-2 (DC).

Table 3: Electrical Interlock Ratings

Rating	Volts	Maximum Current (A)		Max. Continuous Current (A)
		Make	Break	
AC (A600)	120	60	6.0	10
	240	30	3.0	
	480	15	1.5	
	600	12	1.2	
DC (N600)	125	2.2	2.2	10
	250	1.1	1.1	
	600	0.4	0.4	

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Contact Tips

Copper power contact tips are standard. Optional silver-faced power contact tips are recommended for applications where the contactors remain closed for long periods of time. Silver-faced contact tips are optional on DC starters.

INSTALLATION

⚠ DANGER

HAZARDOUS VOLTAGE

Disconnect power to the contactor before installation, adjustments, maintenance, or troubleshooting. Metal parts of the contactor may be at line voltage.

Failure to follow this instruction will result in death or serious injury.

⚠ CAUTION

IMPROPER CONNECTION HAZARD

Failure to connect the operating coil to the proper voltage may cause improper contactor operation or damage to the coil.

ARC CHUTE POSITION HAZARD

Do not operate the contactor with the arc chute up.

Failure to follow these instructions can result in injury or equipment damage.

1. Unpack the contactor carefully. Remove the shipping tape, if used.
2. Inspect the nameplate data for correct equipment. Visually verify that the contactor operating coil (32) is the correct voltage. The operating coil circuit voltage may differ from the power circuit voltage.
3. Visually verify that all parts are undamaged and secure.
4. Mount the contactor vertically on a rigid support and fasten it down tightly using a plain washer against the contactor base. Provide the clearances shown in Figure 1 above the top of the contactor and in front of the arc chute.

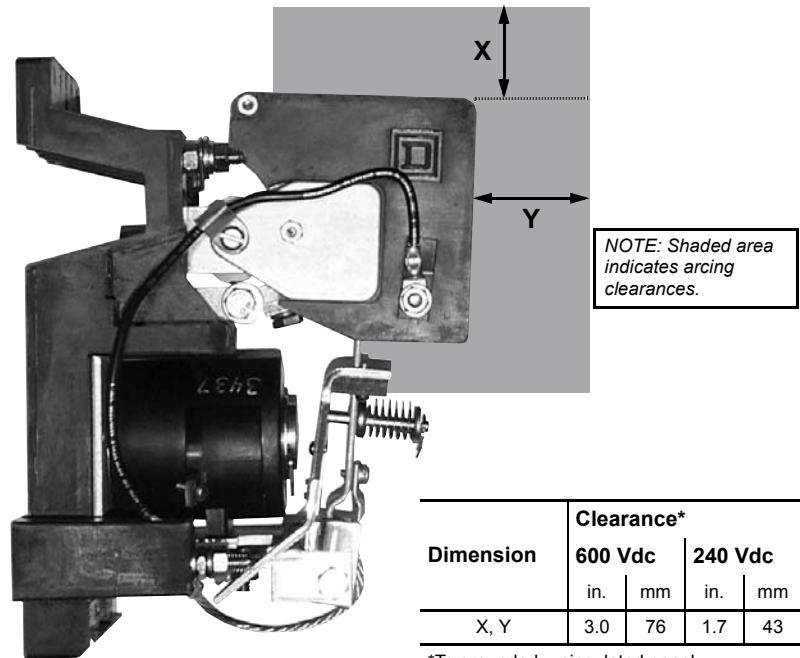


Figure 1: Electrical Clearances

5. With all power disconnected, mount auxiliary devices (such as mechanical or electrical interlocks) on the contactor. Install and adjust these auxiliary devices according to the instructions provided with the devices.
6. With all power disconnected, pivot the arc chute upward and operate the contactor by hand. The contact tips (14A and 14B) must meet squarely. If they do not, align them according to "Contact Tip Alignment" on page 5.
7. Pivot the arc chute downward to its proper position.
8. Wire the contactor according to the control panel wiring diagram, ensuring that all connections are secure. The operating coil circuit voltage may differ from the power circuit voltage.

ADJUSTMENTS

Contactors may require contact alignment or adjustment of the electrical or mechanical interlocks.

⚠ DANGER

HAZARDOUS VOLTAGE

- Contactors operated under load expel an arc. Stay away from a contactor operating under load.
- Disconnect power to the contactor before aligning contact tips or adjusting the electrical interlock. Metal parts of the contactor may be at line voltage.

Failure to follow these instructions will result in death or serious injury.

Contact Tip Alignment

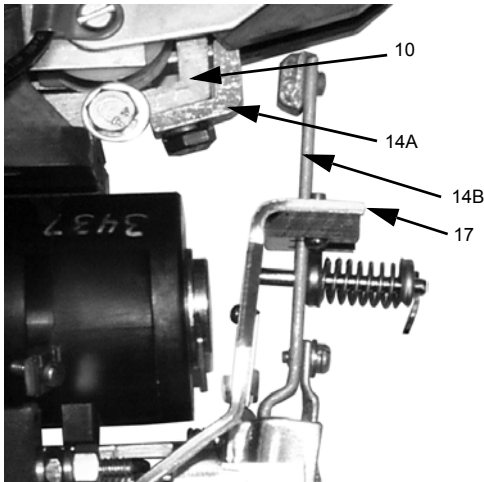


Figure 2: Contact Arm Assembly

Refer to Figure 2 when aligning the contact tips.

1. Disconnect all power.
2. Pivot the arc chute upward.
3. Visually verify that:
 - The movable contact tip (14B) is securely fastened to the contact arm assembly (17) with the contact arm spring, cup washers, and cotter pin.
 - The movable contact tip is positioned in the slot in the contact arm assembly (Figure 2).
 - The stationary contact tip (14A) is positioned against the stationary contact support (10).
 - The contact tip surfaces are vertically and horizontally aligned.
4. Pivot the arc chute downward to its proper position.

CAUTION

ARC CHUTE POSITION HAZARD

Do not operate the contactor with the arc chute up.

Failure to follow this instruction can result in product damage and shortened product life.

Electrical Interlock Adjustment

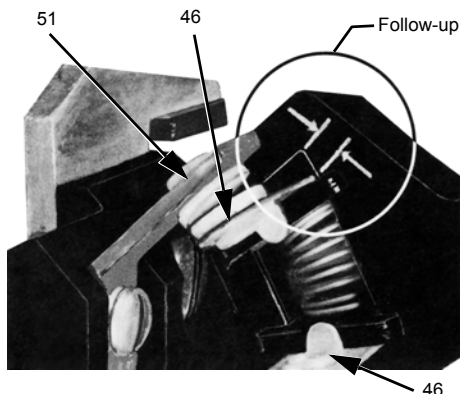


Figure 3: Electrical Interlock Contact Follow-Up

Refer to Figure 3 when adjusting the electrical interlock.

1. Disconnect all power.
2. Visually verify that:
 - The electrical interlock assembly (43) has proper follow-up (amount of spring compression). With new electrical interlock contacts, the moving contacts (46) must provide at least $1/16$ in. (1.6 mm) follow-up on each stationary contact when the contact arm reaches its limit of travel (either completely closed or completely open).
 - The N.C. electrical interlock contacts open before the power contact tips close.
3. To adjust the electrical interlock follow-up, bend the stationary contacts (50 and 51, see Figure 7).

Mechanical Interlock Adjustment

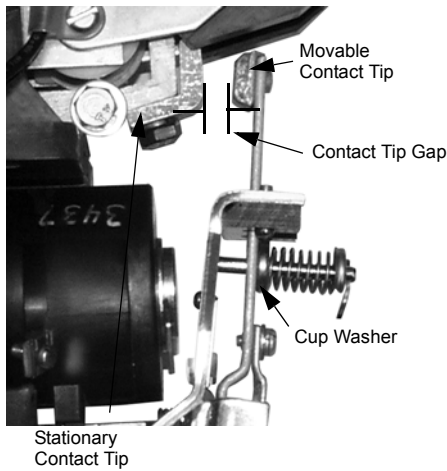


Figure 4: Contact Tip Gap

The mechanical interlock is a tie bar which, when attached to two adjacent contactors, ensures that only one of the two contactors can close at any one time. Refer to Figure 4 when adjusting the mechanical interlocks.

1. Disconnect all power.
2. Visually verify that the mechanical interlock allows the contact arm of either contactor to reach its limit of travel (either completely closed or completely open) without binding.
3. Hold the contact arm of the left contactor fully closed and push the contact arm of the right contactor closed until it is stopped by the mechanical interlock. With new contact tips, verify that there is a gap of at least $\frac{3}{16}$ in. (4.8 mm) but not more than $\frac{1}{4}$ in. (6.3 mm) between the contact tips. If the gap is not within the limits, adjust the mechanical interlock as follows:
 - Loosen the two hex-head screws holding the mechanical interlock to the contactor.
 - Move the mechanical interlock until the desired gap is achieved.
4. Repeat step 3 above while holding the right contactor in the fully closed position.
5. Push one contactor to the kiss position (when contact tips first touch) and verify that the other contactor does not come to the kiss position at the same time.
6. If both contactors come to the kiss position at the same time, repeat steps 3–5, increasing the gap to no more than $\frac{1}{4}$ in. (6.3 mm).
7. Visually verify that the mechanical interlock allows the contact arm of either contactor to reach its limit of travel (either completely closed or completely open) without binding.

Contact Tip Gap

The contact tip gap is factory adjusted. Do not change the setting of the adjusting screw. If the setting is inadvertently changed:

1. Readjust the contact tip gap by turning the adjusting screw (27), located on the bottom of the contact arm, until the contact tip gap is $\frac{5}{16}$ in. (7.9 mm).
2. Retighten the hex nut (39) that holds the adjusting screw.

MAINTENANCE

This section describes maintenance procedures that may be required. These contactors require no lubrication because they have permanently lubricated, oil-impregnated bearings.

⚠ DANGER

HAZARDOUS VOLTAGE

Disconnect power to the contactor before installation, adjustments, maintenance, or troubleshooting. Metal parts of the contactor may be at line voltage.

Failure to follow this instruction will result in death or serious injury.

Contact Tip Inspection and Replacement

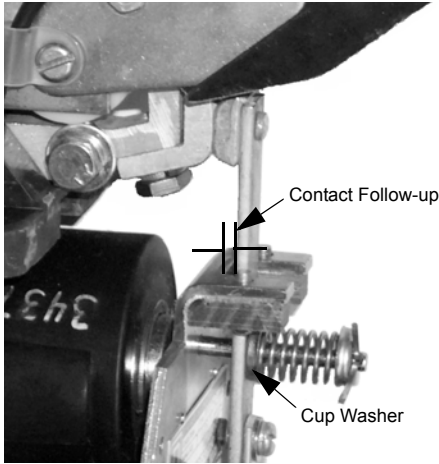


Figure 5: Contact Follow-Up

Replace the contact tips when the contact follow-up (Figure 5) is less than $\frac{1}{32}$ in. (0.8 mm). To replace the contact tips:

1. Disconnect all power.
2. Pivot the arc chute upward.
3. Remove the pan-head screw with captive lock washer (22), washer (24), and shunt (25) from the movable contact tip (14B).
4. Remove the cotter pin (20), cup washers (19), and spring (18) from the contact tip.
5. Remove the movable contact tip by lifting it over the clevis pin.
6. Remove the silicon bronze hex-head cap screw (15), lock washer (16), and stationary contact tip (14A).
7. Install the new stationary contact tip using the hex-head cap screw and lock washer.
8. Install the new movable contact tip over the clevis pin by inserting the lower end tang in the slot in the contact arm.
9. Replace the spring, cup washers, and cotter pin.
10. Replace the shunt, pan-head screw, and washer.
11. Manually operate the contactor and check the contact tips for alignment (see "Contact Tip Alignment" on page 5).
12. Check the adjustment of the mechanical interlock, if used.
13. Pivot the arc chute downward to its proper position.

CAUTION

ARC CHUTE POSITION HAZARD

Do not operate the contactor with the arc chute up.

Failure to follow this instruction can result in product damage and shortened product life.

Coil Replacement

To replace the coil:

1. Disconnect all power.
2. Disconnect the coil leads.
3. Disconnect the top end of the shunt (25) by removing the pan-head screw with captive lock washer (22) and washer (24).
4. Remove the shoulder screw (21), washer, lock washer, and nut (7–9), which secure the contact arm assembly to the magnet frame.
5. Remove the contact arm assembly (17) and opening spring (26).
6. Remove the cotter pin (30), coil retainer (31), and coil (32).
7. Install the new coil, using the coil retainer and cotter pin.
8. Replace the contact arm assembly and opening spring, using the shoulder screw, washer, lock washer, and nut.
9. Replace the top end of the shunt, using the pan-head screw and washer.
10. Reconnect the coil leads.
11. Check the contact tip alignment and the adjustment of the mechanical interlock, if used.

Arc Chute Replacement

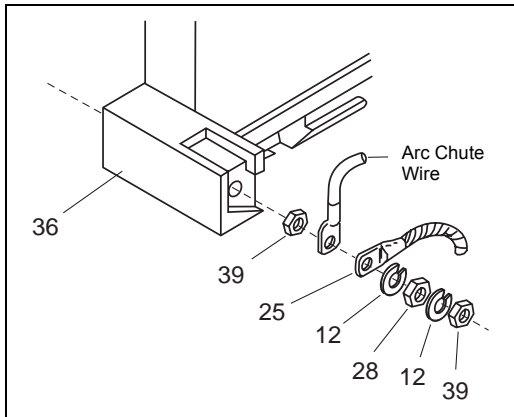


Figure 6: Assembling the Arc Chute Wire and Shunt

To replace the arc chute:

1. Disconnect all power.
2. Pivot the arc chute upward.
3. Remove the silicon bronze hex-head cap screw (15), lock washer (16), and stationary contact tip (14A).
4. Remove the bottom end of the shunt (25), lock washers (12), nuts (28 and 39), and arc chute wire.
5. Remove the pan-head screw (5), washer, lock washer, nut (7–9), and arc chute (1).
6. Install the new arc chute, using the pan-head screw, washer, lock washer, and nut.
7. Reconnect the arc chute wire and the bottom end of the shunt to the contactor base, using the lock washers and nuts (Figure 6).
8. Reinstall the stationary contact tip, using the silicon bronze hex-head cap screw and lock washer.
9. Pivot the arc chute downward to its proper position.

CAUTION

ARC CHUTE POSITION HAZARD

Do not operate the contactor with the arc chute up.

Failure to follow this instruction can result in product damage and shortened product life.

Shunt Replacement

Replace the shunt when the flexible braided wires are broken or burned, or if wires are loose in the terminal connectors on either end of the shunt.

1. Disconnect all power.
2. Disconnect the bottom end of the shunt (25) by removing the lock washers (12) and hex nuts (28 and 39).
3. Disconnect the top end of the shunt by removing the pan-head screw with captive lock washer (22) and washer (24).
4. Install the new shunt. Use the pan-head screw with captive lock washer and washer to attach the top end of the shunt.
5. Reconnect the arc chute wire and the bottom end of the shunt to the contactor base, using the lock washers and nuts (Figure 6).

Electrical Interlock Replacement

Replace the electrical interlock contact tips when inspection shows that they are burned or badly pitted. Replace the entire electrical interlock assembly when replacing the contact tips.

Electrical Interlock Assembly Replacement

To replace the electrical interlock assembly:

1. Disconnect all power.
2. Loosen the terminal clamps and screws and remove the terminal leads from the stationary contact assembly. Note the position of the leads to ensure proper replacement.
3. Remove the pan-head screw (44), lock washer (45), washer (53), and the movable contact assembly.
4. Remove the pan-head screw with captive lock washer (49) and the stationary contact assembly.
5. Install the new stationary contact assembly and pan-head screw with captive lock washer. Position the stationary contact assembly as shown in Figure 7 on page 13.
6. Install the new movable contact assembly and replace the washer, lock washer, and pan-head screw. Position the movable contact assembly as shown in Figure 7.
7. Manually operate the contactor and check the movable contacts for follow-up and sequencing (see “Electrical Interlock Adjustment” on page 5).
8. Replace the terminal leads.

Electrical Interlock Contact Tip Replacement

After the electrical interlock assembly has been removed from the contactor, the contact tips can be replaced. To replace the electrical interlock contact tips:

1. Remove the electrical interlock assembly from the contactor.
2. Remove both sets of movable contact tips (46) from the movable contact assembly by compressing the spring (48) and retainers (47), then sliding out the movable contact tips.
3. Install both sets of new movable contact tips by compressing the spring and retainers, then sliding in the movable contact tips.
4. Remove both top stationary contact tips (51) from the stationary contact assembly along with the screws and washers that hold them in place.
5. Remove the terminal clamps and screws from the top stationary contact tips (51).
6. Install both new top stationary contact tips, replacing the contact tip screws, the terminal clamps, and their screws.
7. Remove the screws and terminal clamps that hold both bottom stationary contact tips (50) on the stationary contact assembly.
8. Install both new bottom stationary contact tips, replacing the screws, the terminal clamps, and their screws.
9. Manually operate the contactor and check the movable contacts for follow-up according to “Electrical Interlock Adjustment” on page 5.
10. Replace the terminal leads.

Opening Spring Replacement

To replace the opening spring:

1. Disconnect all power.
2. Pivot the arc chute upward.
3. Disconnect the top end of the shunt (25) by removing the pan-head screw with captive lock washer (22) and washer (24).

4. Remove the shoulder screw (21), washer, lock washer, and nut (7–9), which secure the contact arm assembly to the magnet frame.
5. Remove the contact arm assembly (17) and opening spring (26).
6. Install the new opening spring in the slot at the bottom of the contact arm assembly.
7. Replace the contact arm assembly and new opening spring, using the shoulder screw, washer, lock washer, and nut.
8. Replace the top end of the shunt, using the pan-head screw with captive lock washer and washer.
9. Check the contact tip alignment and the adjustment of the mechanical interlock, if used.
10. Pivot the arc chute downward to its proper position.

CAUTION

ARC CHUTE POSITION HAZARD

Do not operate the contactor with the arc chute up.

Failure to follow this instruction can result in product damage and shortened product life.

TROUBLESHOOTING

When troubleshooting, refer to page 3 for contactor ratings (Table 1) and coil ratings (Table 2).

⚠ DANGER
<p>HAZARDOUS VOLTAGE</p> <ul style="list-style-type: none"> Troubleshooting procedures marked with an asterisk (*) require the application of power. Do not touch the contactor with power applied. Disconnect power to the contactor before performing any other troubleshooting corrective action. <p>Failure to follow these instructions will result in death or serious injury.</p>

ENGLISH

Table 4: Troubleshooting Procedure

Problem	Possible Causes	Corrective Action
The contacts do not close or operation is sluggish.	Improper or inoperative operating coil	Visually verify the coil part number. Measure the resistance to determine if the coil is inoperative.
	Low control circuit voltage	* Measure the control circuit voltage. It must be at least 80% of the rated coil voltage. If it is 0, the problem is elsewhere in the circuit.
	Loose connection in the control circuit	Inspect the connections. Tighten if loose.
	Mechanical interference or binding	Inspect the mechanical interlock for interference by disconnecting it from the contactor that is binding. See "Mechanical Interlock Adjustment" on page 6. Ensure that the tie bar is not causing the binding.
The contact tips overheat, short tip life.	Loose connections	Inspect the contact tips and shunt connections. Tighten if loose.
	The movable or stationary contact tip is not properly aligned.	Align the contact tips. See page 5.
	There is foreign matter on the contact surfaces.	Remove all foreign matter.
	The contact tips are worn beyond the recommended limits.	Replace the contact tips. See page 7.
	The contact surfaces are severely scored or burned.	Ensure that the arc chute wires are connected to the contact arm support and are not broken.
	The arc chute is improperly installed.	Visually verify that the arc chute is pivoted to the full downward position.
	The opening spring is inoperative.	Replace the spring.
	Normal load currents are below 5% of rated contactor current.	Use a smaller size contactor.
The operating coil overheats.	Improper or inoperative coil	Visually verify the coil part number. Measure the resistance to determine if the coil is inoperative.
	High voltage condition on the coil	* Measure the control circuit voltage. It must not exceed 110% of the rated coil voltage.
	Loose connection at the coil terminals	Check the connections. Tighten if loose.

* See the danger statement above.

ORDERING INSTRUCTIONS

Specify the quantity, part number, and description of the part, giving the complete nameplate data of the contactor. To identify parts, see Figure 7 on page 13.

NOTE: The following modification kits are also available for this contactor:

- Class 9999 Type MM1 mechanical interlock kit for two single-pole normally-open.
- Class 9999 Type MT1 tie bar kit for two single-pole normally-open contactors
- Class 9999 Type MK1 pneumatic timer kit

Table 5: Parts List

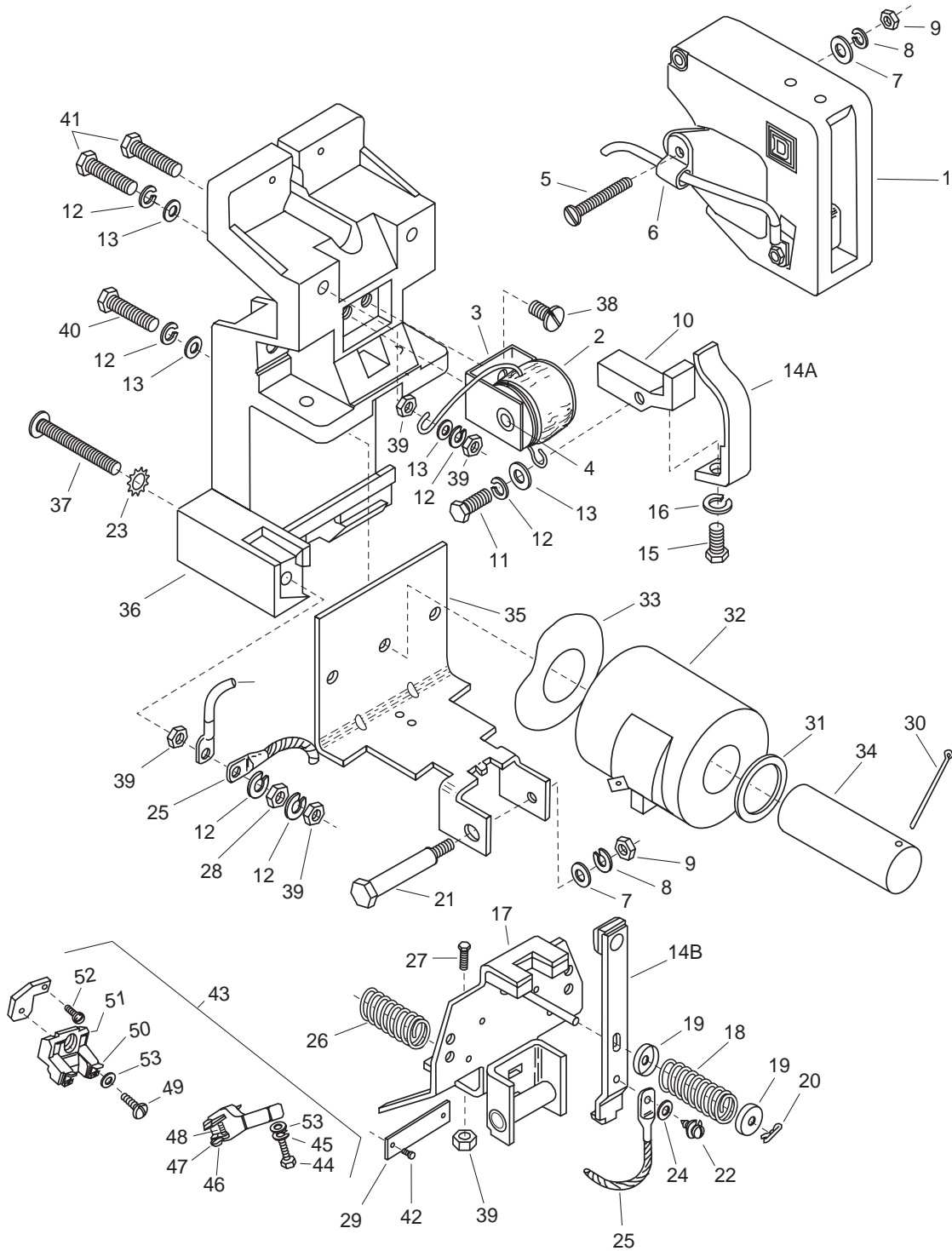
Item	Description	Part Number	Qty	Item	Description	Part Number	Qty
1	Arc chute	51016-221-50	1	27	Adjusting screw	51016-232-01	1
2	Blowout coil assembly: Size 1 Size 2	51015-205-50	1	28	1/4"-20 hex jam nut, 0.156 in. (4 mm) thick	■	1
		51016-213-50	1	29	Nameplate		
3	Blowout coil mounting bracket	51016-217-01	1	30	5/64" x 1-1/2" cotter pin	■	1
4	Blowout core	51016-231-01	1	31	Coil retainer	50502-006-28	1
5	#10-24 x 1-3/4" pan-head screw	■	1	32	Operating coil, 230/240 Vdc Operating coil, 115/120 Vdc	51015-056-50 51015-056-51	1
6	Cable clamp	25901-11082	1	33	Spring washer	51017-041-01	1
7	#10 plain washer	■	2	34	Coil core	51016-210-01	1
8	#10 lock washer	■	2	35	Magnet frame	51016-211-01	1
9	#10-24 hex-head nut	■	2	36	Contactorm base	51016-215-50	1
10	Stationary contact support	51016-209-02	1	37	1/4"-20 x 2-1/2" round head machine screw	■	1
11	1/4"-20 x 5/8" hex-head machine screw	■	1	38	#10-24 x 1/2" pan-head screw & captive lock washer	■	2
12	1/4" lock washer	■	6	39	1/4"-20 hex nut	■	5
13	1/4" plain washer	■	4	40	1/4"-20 x 3/4" hex-head machine screw	■	1
†14	Contact tip kit (2 sets of tips & hardware) Copper Silver	Class 9998 Type MX1 Class 9998 Type MX2 50005-072-02 51016-225-50	1	41	1/4"-20 x 1" hex-head machine screw	■	2
				42	#6-32 x 1/4" tapping screw	■	2
14A 14B	Stationary contact tip, copper Movable contact tip, copper			†43	Electrical interlock kit Bulk pack of 5 sets of replacement interlock contacts, includes: 10 movable contact tips (item 46), 10 bottom stationary contact tips (item 50), 10 top stationary contact tips (item 51), 10 spring retainers (item 47) & 5 springs (item 48)	Class 9999 Type MX11 C51075-038-54	
15	1/4"-20 x 1/2" silicon bronze hex-head cap screw	21407-20160	1				
16	1/4" silicon bronze lock washer	23711-22000	1				
17	Contact arm assembly	51016-224-50	1	44	#10-24 x 1" pan-head screw	■	2
18	Contact arm spring	50502-602-39	1	45	#10 lock washer	■	2
19	Cup washers	306-D1-X1	2	46	Movable contact tip	51075-023-50	
20	1/16" x 1/2" cotter pin	■	1	47	Spring retainer	51075-040-01	
21	Shoulder screw	51016-218-01	1	48	Spring	50502-602-38	
22	#8-32 x 3/8" pan-head screw & captive lock washer	■	1	49	#10-24 x 1/2" pan-head screw with captive lock washer	■	1
23	1/4" external tooth lock washer	■	1	50	Bottom stationary contact tip	51075-017-50	
24	#8 plain washer	■	1	51	Top stationary contact tip	51075-016-50	
25	Shunt	51016-220-50	1	52	#10-24 x 1/2" captive screw with long shank & captive lock washer	■	1
26	Opening spring	50502-602-40	1	53	#10 plain washer	■	3

■ Obtain standard hardware, listed without a part number, from your local hardware supplier.

† Parts recommended for general maintenance.

**EXPLODED ASSEMBLY
DRAWING**

Figure 7 identifies items in the parts list and in the maintenance and adjustment procedures.



ENGLISH

Figure 7: Contactor Assembly Drawing