

## **LINE-ARC® Single-Pole DC Contactor**

**NEMA Size 5, Normally Open**

**Size 5A, Normally Open**

**Class 7004 Type MGO-1 (300 A) &**

**MGAO-1 (400 A), Series A**

**Contacteur de  $\equiv$  (cd) de un polo LINE-ARC®**

**Tamaños NEMA 5, normalmente abierto**

**Tamaños 5A, normalmente abierto**

**Clase 7004, tipos MGO-1 (300 Amperes) y**

**MGAO-1 (400 Amperes), serie A**

**Contacteur cc unipolaire LINE-ARC®**

**Tailles NEMA 5, normalement ouvert**

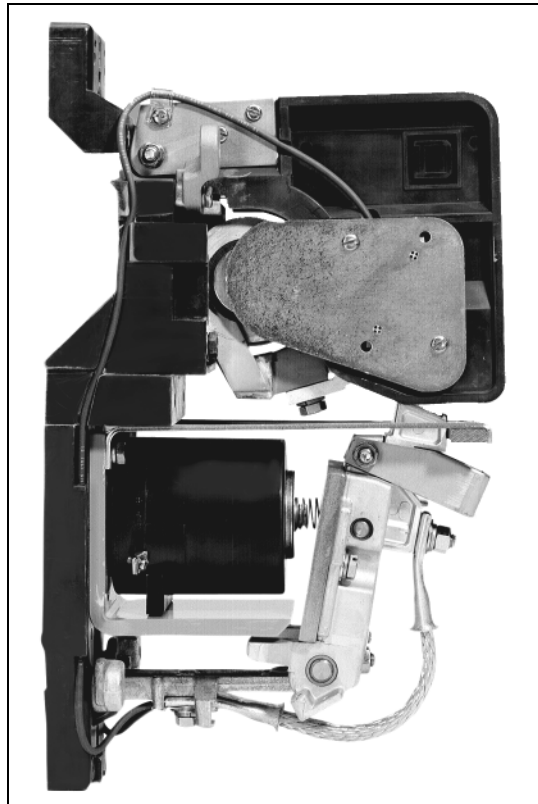
**Tailles 5A, normalement ouvert**

**Classe 7004 types MGO-1 (300 Ampères) et**

**MGAO-1 (400 Ampères), série A**



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



**SQUARE D**



**INTRODUCTION**

This size 5 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.

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

**ENGLISH**

**Contactor Ratings**

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

Ratings	DC Motor HP @ 230 Vdc		DC Amperes	
	Size 5	Size 5A	Size 5	Size 5A
Open 8 hour	75	110	300	400
Enclosed	67	100	270	360
Crane	110	150	400	533

**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 operating coils. For other coil voltages, refer to the crane control catalog, document 6100CT9702.

**Table 2: Operating Coil Ratings**

Coil Part No.	DC Voltage Rating	Nominal Resistance (Ω) @ +20 °C	Coil Amperes @ +20 °C
51019-243-53	230/240	1240	0.194
51019-243-56	115/120	315	0.381

**Electrical Interlocks**

Electrical interlocks consist of stationary contacts mounted on the contact arm support (23) and moving contacts attached to the bottom of the contact arm assembly (22). 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-2-125 (A600 and N600 Table Ratings).

**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	

Contact Tips

The movable and stationary power contact tips are identical. Copper power contact tips are standard. Optional silver-faced power contact tips are recommended for applications where the contactor remains closed for long periods of time. Silver-faced contact tips are standard on crane manual magnetic disconnect switches and 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.

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**ARC CHUTE POSITION HAZARD**

Do not operate the contactor with the arc chute up.

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**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 (39) 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 secure it 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.

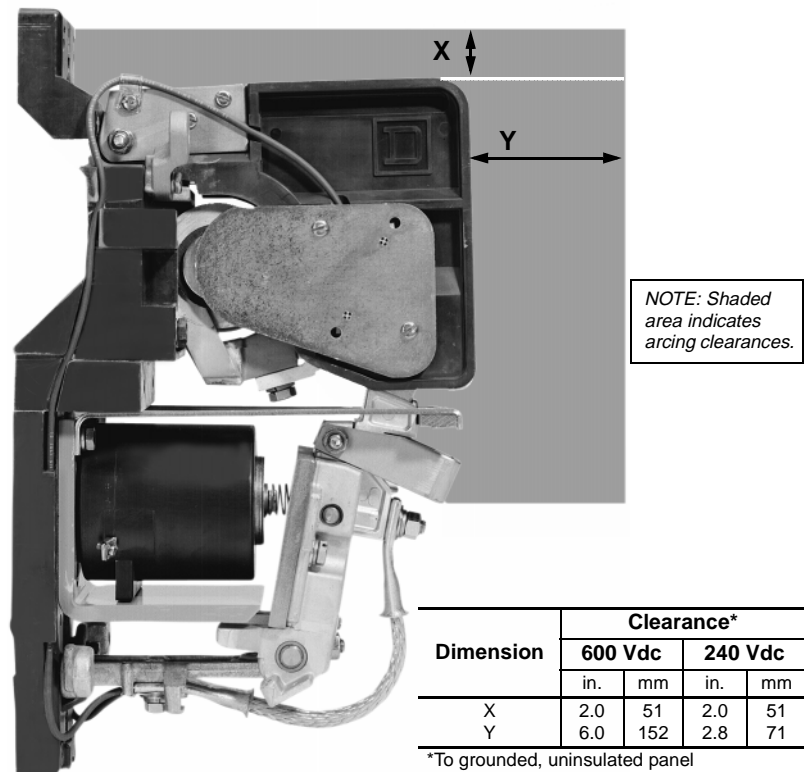


Figure 1: Electrical Clearances

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 (10) 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 mechanical or electrical 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

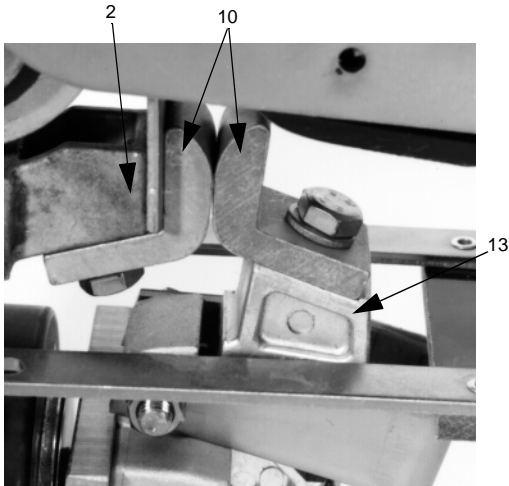


Figure 2: Contact Arm Assembly

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 (10) is properly seated against the ridge on the auxiliary arm (13).
  - The stationary contact tip (10) is seated against the stationary contact support on the blowout coil assembly (2).
  - The faces of the contact tips are flush.
  - 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

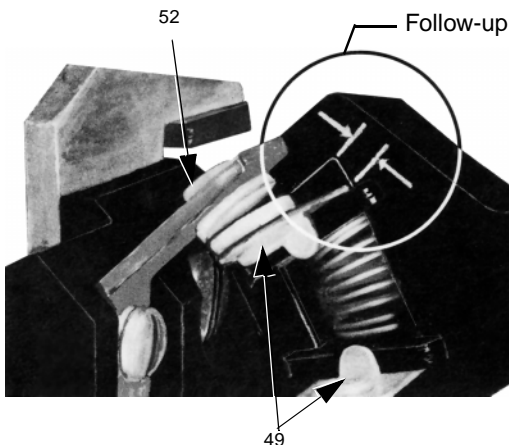


Figure 3: Electrical Interlock Contact Follow-Up

Refer to Figure 3 when adjusting the electrical interlock.

1. Disconnect all power.
2. Visually verify that:
  - The electrical interlock assembly (49) has proper follow-up (amount of spring compression). With new electrical interlock contacts, the moving contacts (52) 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 (56 and 57).

### Mechanical Interlock Adjustment

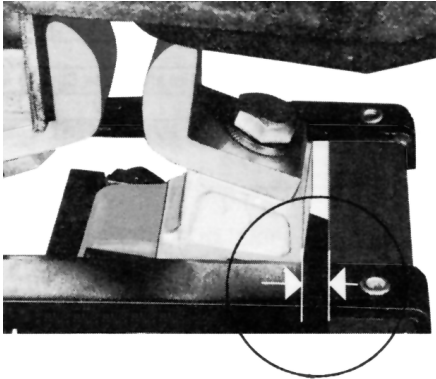


Figure 4: Mechanical Interlock Gap

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 interlock.

1. Disconnect all power.
2. Visually verify that the mechanical interlock allows the contact arm (22) 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. Verify that there is a gap of at least  $\frac{1}{32}$  in. (0.8 mm) but not more than  $\frac{1}{16}$  in. (1.5 mm) between the inside edge of the stop bracket (44) and the back surface of the auxiliary arm (13). If the gap is not within the limits, adjust the mechanical interlock as follows:
  - Loosen the two screws that hold the mechanical interlock to the stop bracket.
  - 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, decreasing the gap. The gap must be at least  $\frac{1}{32}$  in. (0.8 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.

### 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

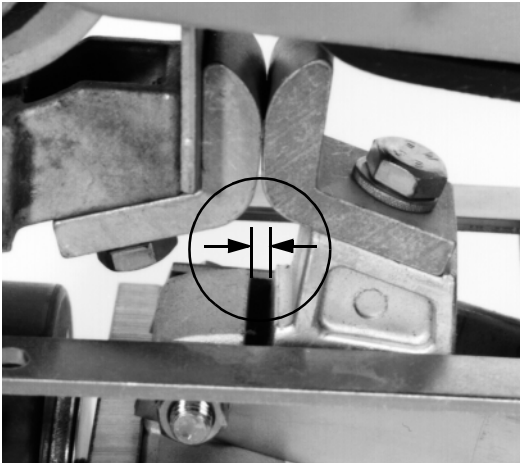


Figure 5: Contact Follow-Up

Replace the contact tips when the contact follow-up (Figure 5) is less than  $\frac{1}{16}$  in. (1.6 mm). To replace the contact tips:

1. Disconnect all power.
2. Pivot the arc chute upward.
3. Remove the silicon bronze hex-head cap screw (11), lock washer (12), and movable contact tip (10) from the auxiliary arm (13).
4. Remove the silicon bronze hex-head cap screw (11), lock washer (12), and stationary contact tip (10) from the blowout coil assembly (2).
5. Install the new stationary contact tip, securing it with the hex-head cap screw and lock washer.
6. Install the new movable contact tip, securing it with the hex-head cap screw and lock washer.
7. Manually operate the contactor and check the contact tips for alignment (see "Contact Tip Alignment" on page 5).
8. Check the adjustment of the mechanical interlock, if used.
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.**

### Coil Replacement

To replace the coil:

1. Disconnect all power.
2. Disconnect the coil leads.
3. Disconnect the top end of the shunt (21) by removing the hex-head nut (20), lock washer (48), and washer (19).
4. Remove the hex-head nut (20), lock washer (48), set screw (26), and contact arm pin (24).
5. Remove the contact arm assembly (22).
6. Remove the silicon bronze hex-head cap screw (35), lock washer (36), core cap spacer (37), core cap (38), and coil (39) from the magnet frame (41).
7. Install the new coil, securing it with the core cap, core cap spacer, and lock washer. Tighten the hex-head screw. *Note: the core cap, which is thicker than the spacer, must be installed against the coil (see Figure 7 on page 13).* Position the spring washer (40) so that the outside edge (concave side) is against the coil and not against the magnet frame.
8. Replace the contact arm. Verify that the opening spring (29) is seated properly over the hex-head cap screw (35).
9. Replace the contact arm pin (24). Tighten the set screw and hex-head nut.
10. Verify that the auxiliary arm pin (27) is centered and that the set screw (18) is tight.
11. Connect the top end of the shunt by replacing the washer, lock washer, and hex-head nut.
12. Reconnect the coil leads.
13. Check the contact tip alignment and the adjustment of the mechanical interlock, if used.

### Arc Chute Replacement

#### ⚠ CAUTION

##### IMPROPER CONNECTION HAZARD

The shunt must be positioned directly against the contact arm support to provide proper connection.

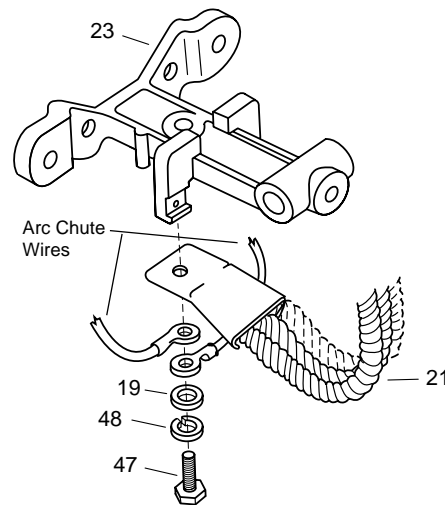
##### ARC CHUTE POSITION HAZARD

Do not operate the contactor with the arc chute up.

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

To replace the arc chute:

1. Disconnect all power.
2. Pivot the arc chute upward.
3. Remove the hex-head cap screw (47), lock washer (48), washer (19), arc chute wires, and shunt (21) from the contact arm support (23).
4. Remove the arc chute wires from the contactor base.
5. Remove the hex-head nut (17), lock washer (8), hex-head cap screw (45), and arc chute.
6. Install the new arc chute, securing it with the hex-head cap screw, lock washer, and hex-head nut.
7. Reposition the arc chute wires on the contactor base.
8. Reconnect the arc chute wires and shunt (Figure 6), securing them with the washer, lock washer, and hex-head cap screw.
9. Pivot the arc chute downward to its proper position.



**Figure 6: Assembling the Arc Chute Wires and Shunt**

### Shunt Replacement

#### ⚠ CAUTION

##### IMPROPER CONNECTION HAZARD

The shunt must be positioned directly against the contact arm support to provide proper connection.

##### 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.**

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

1. Disconnect all power.
2. Pivot the arc chute upward.
3. Disconnect the bottom end of the shunt (21) by removing the hex-head cap screw (47), lock washer (48), washer (19), and arc chute wires.
4. Disconnect the top end of the shunt by removing the hex-head nut (20), lock washer (48), and washer (19).
5. Ensure that the auxiliary arm pin (27) is centered and the set screw (18) is tight.
6. Install the new shunt. Secure the top end of the shunt with the hex-head nut, lock washer, and washer.
7. Secure the bottom end of the shunt and the arc chute wires with the washer, lock washer, and hex-head cap screw (Figure 6).
8. Pivot the arc chute downward to its proper position.



### Electrical Interlock Replacement

Replace the electrical interlock contact tips when inspection shows that they are burned or badly pitted. It is recommended that the entire electrical interlock assembly be replaced. However, the contact tips only can also be replaced.

### Electrical Interlock Assembly Replacement

To replace the electrical interlock assembly:

1. Disconnect all power.
2. Loosen the terminal clamps and screws (57) 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 screws (50), lock washers (51) and washers (59), and the movable contact assembly.
4. Remove the pan-head screw (58) and the stationary contact assembly.
5. Install the new stationary contact assembly and replace the pan-head screw (58). Position the assembly as shown in Figure 7 on page 13.
6. Install the new movable contact assembly and replace the washers, lock washers, and pan-head screws. Position the assembly as shown in Figure 7.
7. Manually operate the contactor and check the moving 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. Compress the spring (54) and retainers (53), and slide out the movable contact tips (52) from the movable contact assembly.
2. Compress the spring and retainers, and slide in the new movable contact tips.
3. Remove the screws (55), washers (59), and top stationary contact tips (57) from the stationary contact assembly.
4. Remove the screws and terminal clamps from the top stationary contact tips.
5. Replace the terminal clamps and screws onto the top stationary contact tips. Replace the top stationary contact tips onto the stationary contact assembly, securing them with the screws and washers.
6. Remove the screws and terminal clamps from the bottom stationary contact tips (56).
7. Replace the terminal clamps and screws onto the bottom stationary contact tips. Replace the bottom stationary contact tips onto the stationary contact assembly, securing them with the screws and washers.
8. Manually operate the contactor and check the movable contacts for follow-up (see “Electrical Interlock Adjustment” on page 5).
9. 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 (21) by removing the hex-head nut (20), lock washer (48), and washer (19).
4. Remove the hex-head nut (20), lock washer (48), and set screws (26), and slide out the contact arm pin (24).
5. Remove the contact arm (22).
6. Remove the hex-head cap screws (31), lock washer (8), washers (9), armature plate (30), and opening spring (29).
7. Install the new opening spring by inserting the narrow end of the spring through the hole in the armature plate. Ensure that the wide end of the spring is between the armature plate and the contact arm.
8. Secure the armature plate to the contact arm with the washers, lock washers, and hex-head cap screws.
9. Verify that there is no gap between the armature plate and the contact arm. This indicates that the opening spring is properly seated between the armature plate and the contact arm.
10. Replace the contact arm assembly. Verify that the opening spring is seated properly over the hex-head screw (35).
11. Replace the contact arm pin, set screw, lock washer, and hex-head nut. Tighten the set screw and hex-head nut.
12. Secure the top end of the shunt with the washer, lock washer, and hex-head nut.
13. Check the contact tip alignment and the adjustment of the mechanical interlock, if used.
14. 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**

**HAZARDOUS VOLTAGE**

- 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.

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

**ENGLISH**

**Table 4: Troubleshooting Procedure**

<b>Problem</b>	<b>Possible Causes</b>	<b>Corrective Action</b>
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 for mechanical interference or binding: <ul style="list-style-type: none"> <li>— Disconnect the mechanical interlock from the contactor that is binding (see “Mechanical Interlock Adjustment” on page 6).</li> <li>— Ensure that the tie bar is not causing the binding.</li> <li>— Manually close the contact arm and verify that the cap screw head (35) on the core of the magnet frame assembly clears the hole in the armature plate.</li> <li>— Manually close the contact arm and verify that the auxiliary arm bearings are not binding.</li> </ul>
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. Inspect the contact surfaces and file as required.
	The arc chute is improperly installed.	Verify that the arc chute is pivoted to the full downward position.
	The auxiliary arm spring is inoperative.	Replace the spring.
The operating coil overheats.	Normal load currents are below 5% of rated contactor current.	Use a smaller size contactor.
	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 MM3 mechanical interlock kit for two single-pole normally-open or two double-pole normally-open contactors
- Class 9999 Type MT3 tie bar kit for two single-pole normally-open contactors
- Class 9999 Type MK2 pneumatic timer kit
- Class 9999 Type ML2 power lug kit, consisting of 4 clam shell lugs

**Table 5: Parts List**

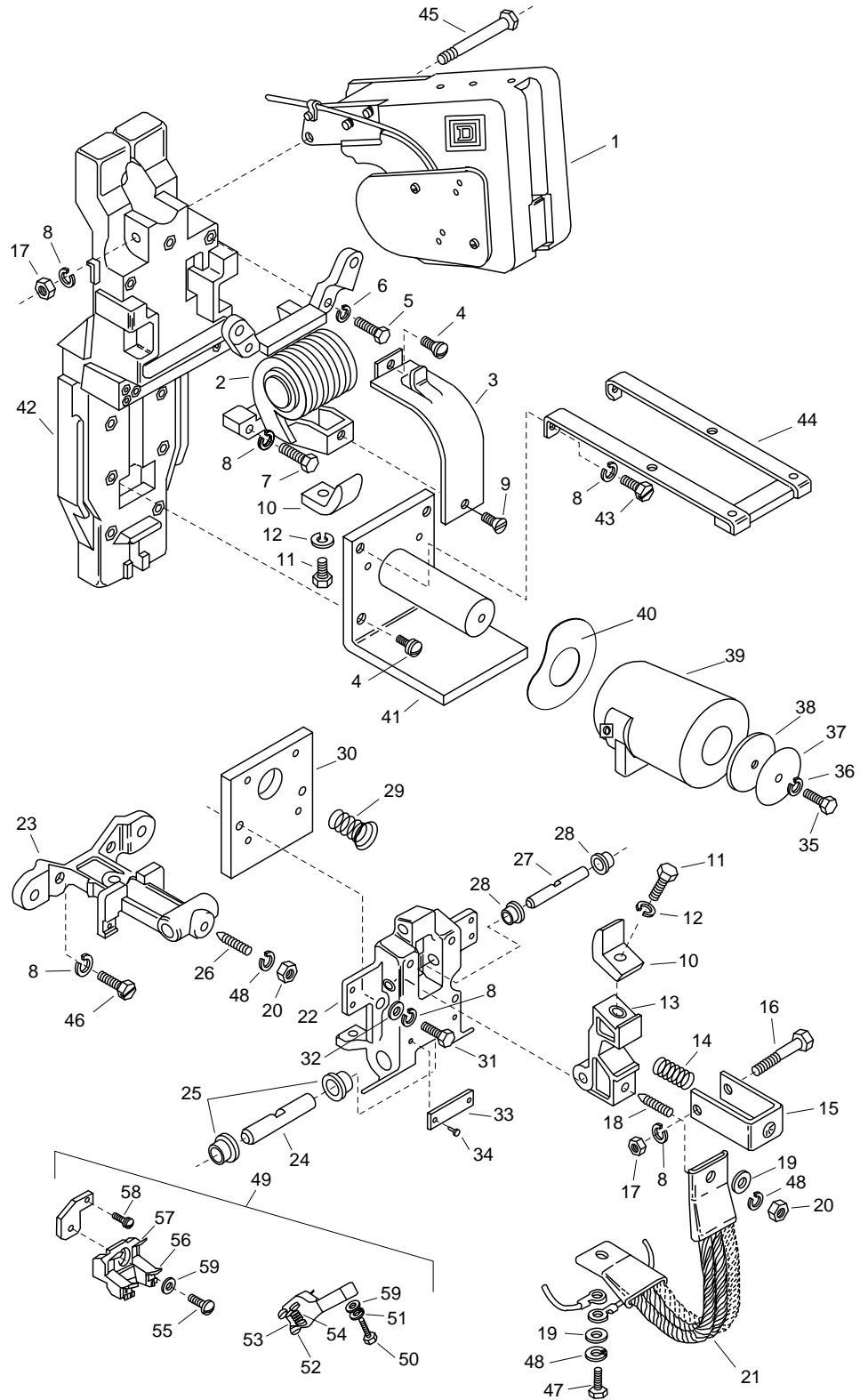
Item	Description	Part Number	Qty	Item	Description	Part Number	Qty
1	Arc chute	51019-217-50	1	30	Armature plate	51019-234-01	1
2	Blowout coil assembly Size 5 Size 5A	51019-205-50 51019-157-50	1	31	5/16" -18 x 5/8" hex-head cap screw	■	2
				32	5/16" plain washer	■	2
3	Blowout coil guard	51019-237-01	1	33	Nameplate	■	1
4	1/4" -20 x 1/2" pan-head screw with captive lock washer	■	5	34	#6-32 x 1/4" pan-head screw	■	2
5	1/4" -20 x 7/8" slotted hex-head cap screw	■	2	35	5/16" -18 x 3/4" silicon bronze hex-head cap screw	21407-22240	1
6	1/4" lock washer	■	2	36	5/16" silicon bronze lock washer	23711-22200	1
7	5/16" -18 x 1" slotted hex-head cap screw	■	2	37	Core cap spacer, phosphor bronze	50502-006-11	1
8	5/16" lock washer	■	10	38	Core cap, steel	50502-006-10	1
9	1/4" -20 x 3/8" flat head brass screw	21203-20120	1	+39	Operating coil, 230/240 Vdc Operating coil, 115/120 Vdc	51019-243-53 51019-243-56	1 1
+10	Contact tip kit (2 sets of tips & hardware) Copper Silver	Class 9998 Type MG1 Class 9998 Type MG2	1 1	40	Spring washer	51019-041-01	1
				41	Magnet frame	51019-223-50	1
11	3/8" -16 x 7/8" silicon bronze hex-head cap screw	21407-24280	2	42	Contact base	51019-238-50	1
12	3/8" silicon bronze lock washer	23711-22400	2	43	5/16" -18 x 1/2" hex-head cap screw	■	2
13	Auxiliary arm	51019-255-50	1	44	Stop bracket	51019-256-50	1
14	Auxiliary arm spring	50502-602-44	1	45	5/16" -18 x 2-1/2" hex-head cap screw	■	1
15	Auxiliary arm spring retainer	51019-239-01	1	46	5/16" -18 x 3/4" slotted hex-head cap screw	■	2
16	5/16" -18 x 2" hex-head cap screw	■	1	47	3/8" -16 x 7/8" hex-head cap screw	21401-24280	1
17	5/16" -18 hex-head nut	■	2	48	3/8" lock washer	23701-00240	1
18	3/8" -16 x 2" headless slotted half dog point set screw	21802-24640	1	+49	Electrical interlock kit Bulk pack of 5 sets of replacement interlock contacts, includes: 10 movable contact tips (item 52), 10 bottom stationary contact tips (item 56), 10 top stationary contact tips (item 57), 4 spring retainers (item 53) & 2 springs (item 54)	Class 9999, Type MX1 51075-038-54	1 1
19	3/8" plain washer	■	2				
20	3/8" -16 hex-head nut	■	2				
21	Shunt Size 5 Size 5A	51019-204-50 51019-204-51	1	50	#10-24 x 1" pan-head screw	■	2
				51	#10 lock washer	■	2
22	Contact arm	51019-214-50	1	52	Movable contact tip	■	2
23	Contact arm support	51019-230-01	1	53	Spring retainer	■	2
24	Contact arm pin	51019-251-07	1	54	Spring	■	1
25	Bearing	29005-32220	2	55	#10-24 x 1/2" pan-head screw with captive lock washer	■	1
26	3/8" -16 x 1" headless slotted half dog point set screw	21802-24320	1	56	Bottom stationary contact tip	■	2
27	Auxiliary arm pin	51019-251-05	1	57	Top stationary contact tip	■	2
28	Bearing	29005-24161	2	58	#10-24 x 1/2" captive screw assembly with long shank & captive lock washer	■	1
29	Opening spring	50502-602-13	1	59	#10 plain washer	■	3

■ Obtain standard hardware, listed without Square D part number, from a 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**

**LINE-ARC® DC Contactor, NEMA Size 5, N.O. / Size 5A, N.O. /  
Contactor de cd LINE-ARC®, tamaños NEMA 5 y tamaños 5A, N.A. /  
Contacteur cc unipolaire LINE-ARC®, NEMA tailles 5 et tailles 5A, N.O.**

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