

**Single-Pole DC Contactor, Normally Closed
Size 5, 300 A, Type MGO-3, Series A
Class 7004**

INTRODUCTION

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

This instruction bulletin illustrates and describes the Class 7004, MGO-3 single-pole DC contactor. The Class 7004, Type M contactor is a DC magnetic, mill-type clapper device designed to meet NEMA Standards. Table 1 lists the contactor ratings.

Contactor Ratings

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

Size	Ratings	DC Motor Horsepower @ 230 VDC	DC Amperes
Size 5, 300 A	Open 8-hour	75	300
	Enclosed	67	270
	Crane	110	400

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 available coil voltages, refer to Class 9998 Coil Data Catalog Sheet.

Table 2: Operating Coil Ratings

Coil Part Number	DC Voltage Rating	Nominal Resistance @ +20°C (Ω)	Coil Amperes @ 20°C
D51017-243-53	230/240	1220	.197
D51017-243-56	115/120	310	.380

Electrical Interlocks

Electrical interlocks consist of stationary contacts mounted on the contact-arm support (item 23) and moving contacts attached to the bottom of the contact-arm assembly (item 22). A set of electrical interlocks contains one normally-open and one normally-closed double break contact. Make and break ratings apply for double-throw contacts only when both the normally-open and normally-closed contacts are connected to the same polarity. The electrical interlock ratings, listed in Table 3 and Table 4, are in accordance with NEMA standard ICS-2-125 (A600 and N600 Table Ratings).

Table 3: Electrical Interlock AC Ratings (A600)

Volts	Maximum Current (A)		Maximum Continuous Current (A)
	Make	Break	
120	60	6.0	10
240	30	3.0	10
480	15	1.5	10
600	12	1.2	10

Table 4: Electrical Interlock DC Ratings (N600)

Volts	Maximum Current (A)		Maximum Continuous Current (A)
	Make	Break	
125	2.2	2.2	10
250	1.1	1.1	10
600	0.4	0.4	10

Contact Tips

The movable and stationary power contact tips are identical. Copper power contact tips are standard. Silver-faced power contact tips are available and are recommended for applications where the contactors remain 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 contactor before installation, adjustments, maintenance or troubleshooting. Metal parts of contactor may be at line voltage.
Failure to observe this precaution will result in death or serious injury

 **CAUTION**

IMPROPER CONNECTION HAZARD
Failure to connect operating coil to proper voltage may cause improper contactor operation or damage to coil.
Failure to observe this precaution can result in injury or product damage.

1. Unpack contactor carefully. Remove shipping tape, if used.
2. Inspect nameplate data for correct equipment. Visually verify that the contactor operating coil (item 36) is the correct voltage. The operating coil circuit voltage may be different than 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 on page 3 above the top of the contactor and in front of the arc chute for pivoting or removal of the arc chute and for electrical clearances.
5. With all power removed, mount auxiliary devices such as electrical interlocks, if used, on contactor. Install and adjust these auxiliary devices according to procedures in the instruction sheets provided with the devices.
6. With all power removed, pivot the arc chute upwards. The contact tips (item 10) should meet squarely. If they do not meet squarely, align them by the procedure in "Contact Tip Alignment" on page 4.

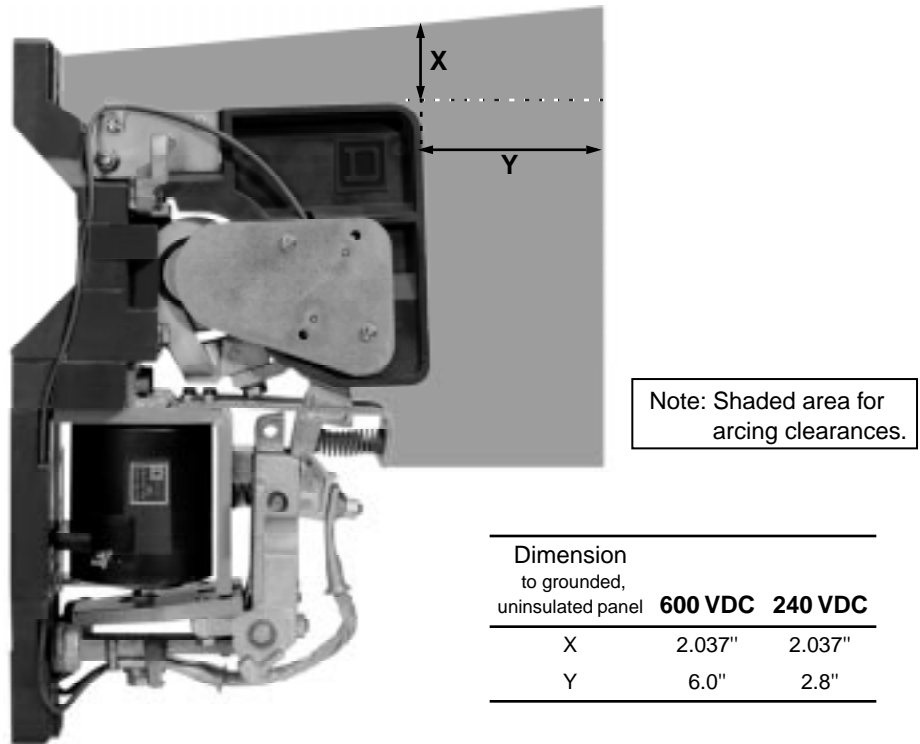



Figure 1: Electrical Clearances

- Pivot the arc chute down to its proper position.

 CAUTION
<p>ARC CHUTE POSITION HAZARD Do not operate contactor with arc chute up. Failure to observe this precaution can result in product damage and shortened product life.</p>

- Wire the contactor according to the control panel wiring diagram, making sure all connections are secure. The voltage of the operating coil circuit may be different than the power circuit voltage.

ADJUSTMENTS

Contactors may require contact alignment or adjustment of the electrical interlocks. This section describes the adjustment procedures. Refer to Figure 2 when aligning the contact tip.

DANGER

HAZARDOUS VOLTAGE

Contactors operated under load expel an arc. Stay away from contactor operated under load.

Disconnect power to contactor before aligning contact tips or adjusting electrical interlock. Metal parts of contactor may be at line voltage.

Failure to observe these precautions will result in death or serious injury.

Contact Tip Alignment

CAUTION

ARC CHUTE POSITION HAZARD

Do not operate contactor with arc chute up.

Failure to observe this precaution can result in product damage and shortened product life.

1. Remove all power. Pivot arc chute upward.
2. Visually verify that movable contact tip (item 10) is properly seated against the ridge located on the auxiliary arm (item 14). See Figure 2.
3. Visually verify that stationary contact tip (item 10) is seated against the stationary contact support located on the blowout coil assembly (item 2). See Figure 2.
4. Visually verify that contact tip surfaces are vertically and horizontally aligned.
5. Pivot arc chute down to its proper position.

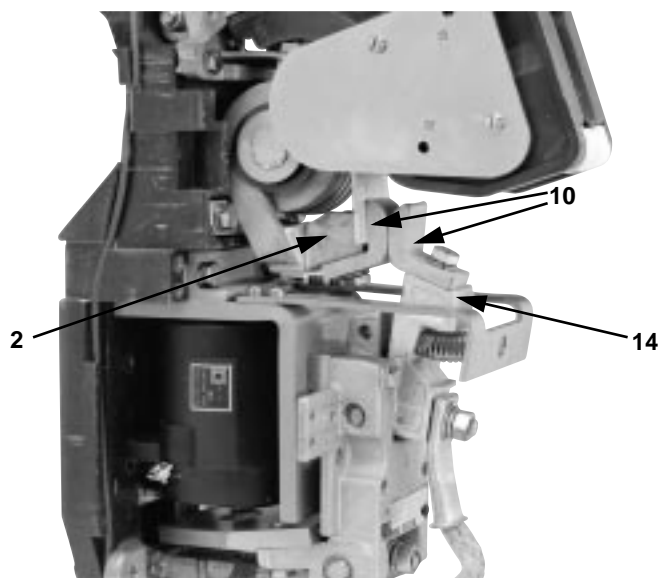


Figure 2: Contact Arm Assembly

Electrical Interlock Adjustment

Refer to Figure 3 when adjusting the electrical interlock.

1. Remove all power. Visually verify that electrical interlock assembly (item 46) has proper follow-up (amount of spring compression). With new electrical interlock contacts, the moving contacts (item 49) should provide at least 1/16" follow-up on each stationary contact when the contact arm reaches its limit of travel, either completely closed or completely opened (see Figure 3).

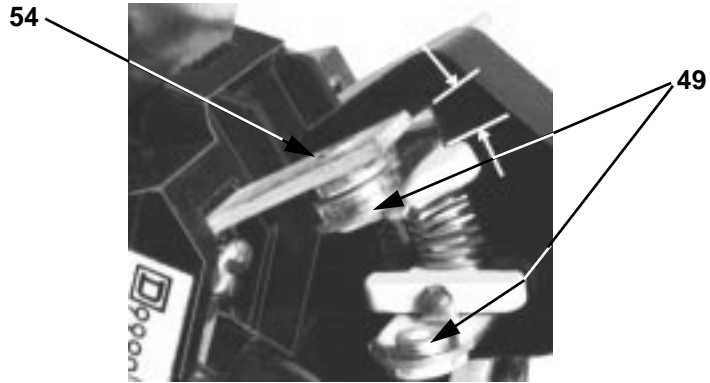


Figure 3: Electrical Interlock Contact Follow-Up

2. Visually verify that the power contact tips open before the normally-open electrical interlock contacts close.
3. Electrical interlock follow-up can be adjusted by bending stationary contacts (items 53 not shown and 54).

MAINTENANCE

This section describes some of the maintenance procedures that may be required for the Class 7004 Type MG0-3 contactor. No lubrication is required since these contactors have permanently-lubricated, oil-impregnated bearings.

DANGER

HAZARDOUS VOLTAGE

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

Failure to observe this precaution will result in death or serious injury.

Contact Tip Inspection

Replace contact tips when the contact follow-up is less than 1/16" (see Figure 4).

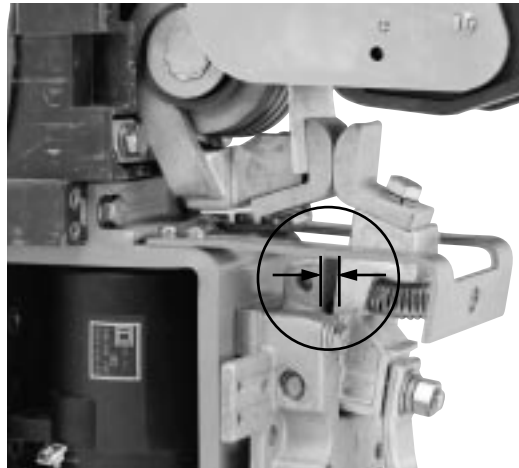



Figure 4: Contact Follow-Up

Contact Tip Replacement

 CAUTION
ARC CHUTE POSITION HAZARD Do not operate contactor with arc chute up. Failure to observe this precaution can result in product damage and shortened product life.

1. Remove all power. Pivot the arc chute upward.
2. Remove the movable contact tip by removing the silicon bronze hex head cap screw and lock washer located on the auxiliary arm (item 14).
3. Remove the stationary contact tip by removing the silicon bronze hex head cap screw and lock washer located on the blowout coil assembly (item 2).
4. Install the new stationary contact tip using the silicon bronze hex head cap screw and lock washer.
5. Install the new movable contact tip using the silicon bronze hex head cap screw and lock washer.
6. Manually operate the contactor and check the contact tips for alignment by the procedure described in "Contact Tip Alignment" on page 4.
7. Pivot the arc chute down to its proper position.

Coil Replacement

1. Remove all power. Disconnect coil leads.
2. Remove hex head cap screws and lock washer (items 41 and 8) from contact arm support (item 23).
3. Lower complete contact arm support and main contact arm assembly (support as required).
4. Loosen hex head cap screws and lock washer (items 43 and 8) on magnet frame.
5. Remove the silicon bronze hex head cap screw (item 11) on the front of the magnet core and remove the lock washer (item 13), core cap spacer (item 34), core cap (item 35) and coil (item 36).
6. Install the new coil using the core cap, core cap spacer and lock washer. Tighten the silicon bronze hex head screw. Note that the steel core cap, which is thicker than the non-magnetic phosphor bronze spacer, must be installed against the coil (see Figure 6 on page 11). Ensure the spring washer (item 37) is so positioned that the outside edge (concave side) is against the coil (item 36) and not against the magnet frame.
7. Tighten screws on magnet frame.

8. Replace the contact arm assembly.
9. Reconnect the coil leads.

 CAUTION

ARC CHUTE POSIITON HAZARD

Do not operate contactor with arc chute up.

Failure to observe this precaution can result in product damage and shortened product life.

Arc Chute Replacement

1. Remove all power. Disconnect the arc chute wires by removing the hex head cap screw (item 42), washer (item 19), lock washer (item 8), arc chute wires and shunt (item 21).
2. Disassemble the arc chute wires from the contactor base.
3. Remove the arc chute by removing the hex head nut (item 12), lock washer (item 8), hex head screw (item 40), and the arc chute.
4. Install the new arc chute using the hex head cap screw and lock washer and secure with the hex head nut.
5. Reposition the arc chute wires along the contactor base.
6. Reconnect the arc chute wires and shunt (see Figure 5) using the washer, lock washer, and hex head cap screw.

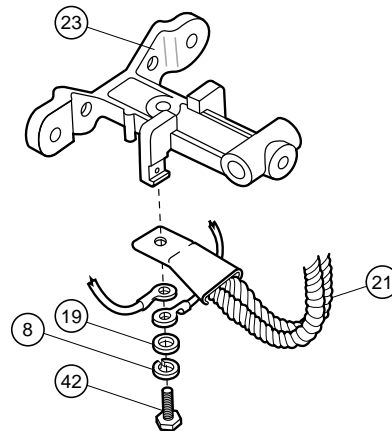


Figure 5: Assembling the Arc Chute Wire and Shunt

7. Rotate the arc chute back to its proper position.

Shunt Replacement

Replace the shunt (item 21) when the flexible braided wires are broken or burned or if wires are loose in the terminal connectors at either end of the shunt.

CAUTION

IMPROPER CONNECTION HAZARD

Shunt must be directly against the contact arm support to provide proper connection.

Failure to observe this precaution can result in product damage and shortened product life.

1. Remove all power. Disconnect bottom end of shunt (item 21) by removing the hex head cap screw, lock washer, washer, arc chute wires and the shunt.
2. Disconnect the top end of shunt (item 21) by removing the hex head nut, lock washer, washer and the shunt.
3. Ensure the auxiliary arm pin (item 27) is centered and the set screw (item 18) is tight.
4. Install the new shunt. Connect the top end of the shunt by replacing the washer, lock washer, and hex head nut.
5. Connect the bottom end of the shunt by replacing the shunt, arc chute wires, washer, lock washer and hex head cap screw (see Figure 5).

Electrical Interlock Replacement

The electrical interlock contact tips should be replaced when inspection shows that they are burned or badly pitted. It is recommended that the entire electrical interlock assembly be replaced from a kit. However, the contact tip assemblies only can also be replaced.

Electrical Interlock Assembly Replacement

1. Remove all power. Loosen terminal clamps and screws and remove terminal leads from the stationary contact assembly. Note the position of the leads so they can be properly replaced.
2. Remove the movable contact assembly by removing the slotted screws (item 47), lock washers (item 48) and washers (item 56).
3. Remove the stationary contact assembly by removing the slotted screw (item 55).
4. Install new stationary contact assembly by replacing the stationary contact assembly slotted screw. Ensure the stationary contact assembly is positioned as shown in Figure 6 on page 11.
5. Install new movable contact assembly by replacing the washers, lock washers and slotted screws. Ensure the movable contact assembly is positioned as shown in Figure 6 on page 11.
6. Manually operate the contactor and check the moving contacts for follow-up and sequencing according to "Electrical Interlock Adjustment" on page 5.
7. Replace the terminal leads.

Electrical Interlock Contact Tip
Replacement

1. After the electrical interlock assembly has been removed from the contactor, the contact tips can be replaced.
2. Remove both sets of movable contact tips (item 49) from the movable contact assembly by compressing the spring (item 51) and retainers (item 50) and sliding out the movable contact tips.
3. Install both sets of new movable contact tips by compressing the spring and retainers and sliding in the movable contact tips.
4. Remove both top stationary contact tips (item 54) from the stationary contact assembly by removing the screws and washers which hold them in place.
5. Remove the terminal clamps and screws from the top stationary contact tips (item 54).
6. Install both new top stationary contact tips by replacing the top stationary contact tips, screws, terminal clamps and their screws.
7. Remove both bottom stationary contact tips (item 53) from the stationary contact assembly by removing the screws and terminal clamps.
8. Install both new bottom stationary contact tips by replacing the bottom stationary contact tips, screws, terminal clamps and their screws.
9. Manually operate the contactor and check the moving contacts for follow-up and sequencing according to "Electrical Interlock Adjustment" on page 5.
10. Replace the terminal leads.

ORDERING
INSTRUCTIONS

When ordering parts, specify quantity, part number and description of part, giving complete nameplate data of the device. To identify parts, see Figure 6 on page 11.

Table 5: Parts List

Item	Description	Part Number	Qty
1	Arc chute.....	51019-217-50	1
2	Blowout coil assembly.....	51019-205-50	1
3	Blowout coil guard.....	51019-237-01	1
4	1/4" - 20 x 1/2" pan head screw with captive lock washer.....	■	1
5	1/4" - 20 x 7/8" slotted hex head cap screw.....	■	2
6	1/4" lock washer.....	■	2
7	5/16" - 18 x 1" hex head cap screw.....	■	2
8	5/16" lock washer.....	■	8
9	1/4" - 20 x 3/8" flat head brass screw.....	21203-20120	1
†10	Contact tip kit (copper) consisting of 2 - sets of tips and hardware.....	Class 9998, Type MG-1 or	1
	Contact tip kit (silver) consisting of 2 - sets of tips and hardware.....	Class 9998, Type MG-2	1
11	3/8" - 16 x 7/8" silicon bronze hex head cap screw.....	■	2
12	1/4" -20 hex nut.....	■	1
13	3/8" silicon bronze lock washer.....	■	3
14	Auxiliary arm.....	51019-255-50	1
15	Auxiliary arm spring.....	50502-602-33	1
16	Auxiliary arm spring retainer.....	51019-270-01	1
17	1/4" - 20 x 3/8" slotted hex head cap screw.....	■	2
18	3/8" - 16 x 2" headless slotted half dog point set screw.....	21802-20480	1
19	3/8" plain washer.....	■	4
21	Shunt.....	51019-204-50	1
22	Contact arm.....	51019-214-51	1
23	Contact arm support.....	51019-229-50	1
24	Contact arm pin.....	51019-251-07	1
25	Bearing.....	29005-32220	2
26	1/4" - 20 x 3/4" headless slotted half dog point set screw.....	21802-24320	1
27	Auxiliary arm pin.....	51019-251-05	1
28	Bearing.....	29005-24161	2
29	Magnetic latch.....	51019-284-01	1
	Magnetic latch plate.....	51019-285-01	1
	1/4" - 20 x 1 5/8" bronze hex head cap screw.....	■	1
	1/4" bronze plain washer.....	■	1
	1/4" bronze lock washer.....	■	1
30	Armature plate.....	51019-233-01	1
31	5/16" - 18 x 3/4" hex head cap screw.....	■	2
32	Nameplate.....	51139-242-01	1
33	#6 - 32 x 1/4" pan head screw.....	■	2
34	Core cap spacer (phosphor bronze).....	50502-006-11	1
35	Core cap (steel).....	51019-292-01	1
†36	Operating coil 230/240V.....	51019-243-53 or	1
	Operating coil 115/120V.....	51019-243-56	1
37	Spring washer.....	51019-041-01	1
38	Magnet frame.....	51019-248-50	1
39	Contact base.....	51019-238-50	1
40	5/16" - 18 x 2-1/2" hex head cap screw.....	■	1
41	5/16" - 18 x 3/4" slotted hex head cap screw.....	■	2
42	3/8" - 16 x 7/8" hex head cap screw.....	21401-20240	1
43	5/16" - 18 x 5/8" hex head cap screw.....	■	1
†46	Electrical interlock kit.....	Class 9999, Type MX-11 or 1	
	Bulk pack of 5 - sets of replacement interlock contacts consisting of:.....	51075-038-54	1
	10 - Movable contact tip (item 49)		
	10 - Bottom stationary contact tip (item 53)		
	10 - Top stationary contact tip (item 54)		
	4 - Spring retainer (item 50)		
	2 - Spring (item 51)		
47	#10 - 24 x 1" pan head screw.....	■	2
48	#10 Lock washer.....	■	2
49	Movable contact tip.....	■	2
50	Spring retainer.....	■	2
51	Spring.....	■	1
52	#10 - 24 x 1/2" pan head screw with captive lock washer.....	■	1
53	Bottom stationary contact tip.....	■	2
54	Top stationary contact tip.....	■	2
55	#10 - 24 x 3/4" pan head screw with captive lock washer.....	■	1
56	#10 plain washer.....	■	3
57	Core cap base.....	51019-311-01	1

■ Obtain standard hardware, listed without Square D part number, from a local hardware supplier.
† Parts recommended for general maintenance.

NOTE: The following user modification kits are also available for this contactor:
Class 9999 Type MK-2 pneumatic timer kit
Class 9999 Type ML-2 power lug kit consisting of 4 - clam shell lugs

EXPLODED
ASSEMBLY DRAWING

Figure 6 identifies items in the parts list and in the maintenance and adjustment procedures.

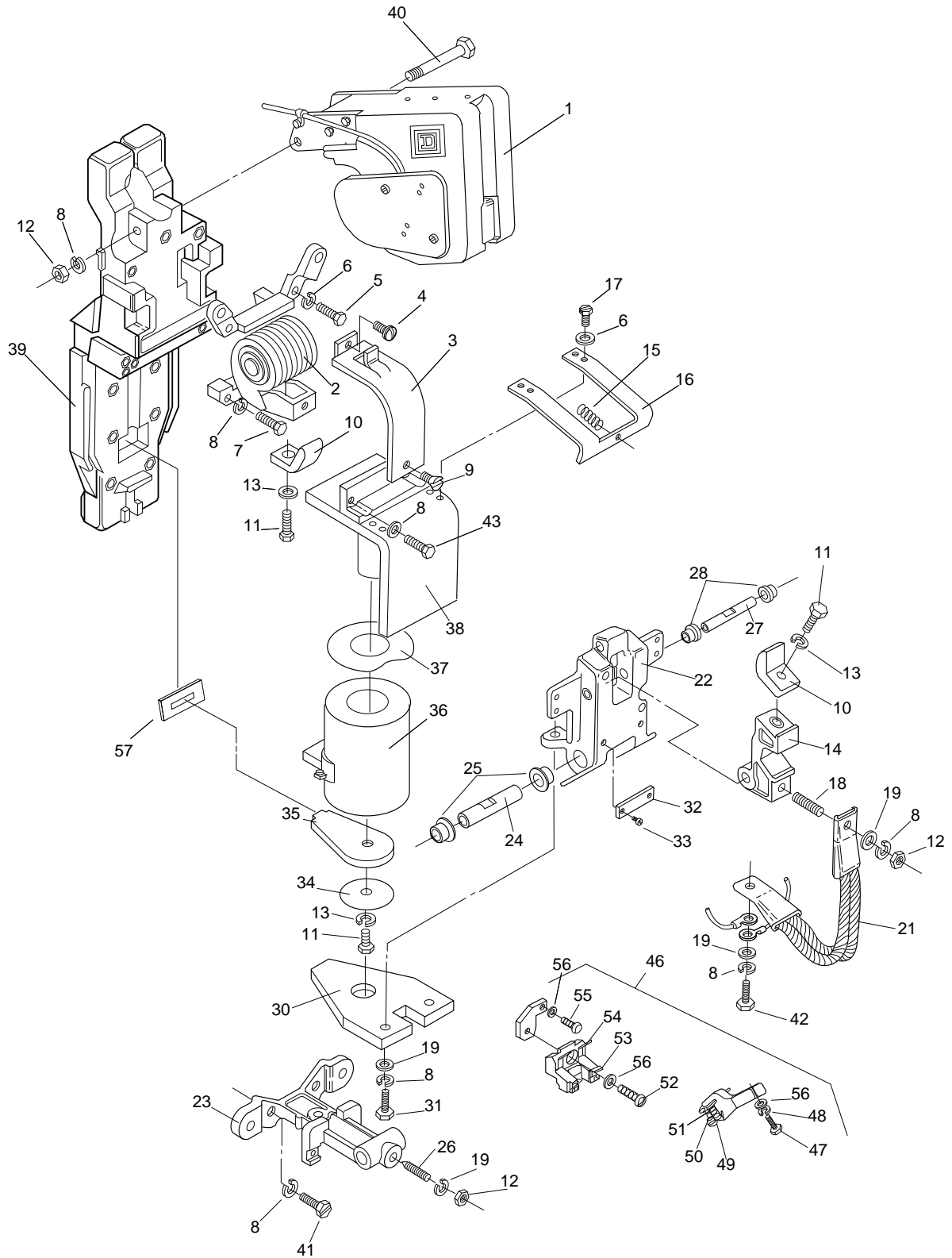



Figure 6: Contactor Assembly Drawing

TROUBLESHOOTING

When troubleshooting, refer to Table 1 on page 1 for contactor ratings and Table 2 on page 1 for coil ratings.



DANGER

HAZARDOUS VOLTAGE

Troubleshooting procedures marked with an asterisk (*) require application of power. Do not touch contactor with power applied. Disconnect power to contactor before performing any other troubleshooting corrective action.


Failure to observe this precaution will result in death or serious injury.

Table 6: Troubleshooting Procedure

Problem	Possible Causes	Corrective Action
Contacts will not open or operation is sluggish.	Improper or inoperative operating coil.	Visually verify coil part number. Measure resistance to determine if coil is inoperative.
	Low control circuit voltage.	Measure control circuit voltage. It must be at least 80% of rated coil voltage. If it is zero, the problem is elsewhere in the circuit. *
	Loose connection in control circuit.	Inspect connections and tighten if loose.
	Mechanical interference or binding.	Inspect for mechanical interference or binding: - Manually close the armature plate and check the cap screw head on the core of the magnet frame assembly clears the hole in the armature plate. - Manually close the armature plate, check that the auxiliary arm bearings are not binding.
Contact tips overheat, short contact tip life.	Loose connections.	Inspect contact tips and shunt connections and tighten if loose.
	Movable or stationary contact tip not properly aligned.	Align contact tips according to "Contact Tip Alignment" on page 4.
	Foreign matter on contact surfaces.	Remove foreign matter.
	Contact tips worn beyond recommended limits.	Replace contact tips according to "Contact Tip Replacement" on page 6.
	Contact surfaces severely scored or burned.	Inspect contact surfaces and dress with a file, as required.
	Arc chute not properly installed.	Visually verify that arc chute is pivoted to the fully down position.
	Inoperative closing spring.	Replace the spring.
	Normal load currents below 5% of rated contactor current.	Use smaller size contactor. *
Operating coil overheats.	Improper or inoperative coil.	Visually verify coil part number. Measure resistance to determine if coil is inoperative.
	High voltage condition on coil.	Measure control circuit voltage. It must not exceed 110% of rated coil voltage. *
	Loose connection at coil terminals.	Check connection and tighten if loose.

*See danger statement above.

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