



Bulletin 1370

DC Loop Contactors

Description

The Bulletin 1370 DC Contactors are electromagnetically held contactors specially designed to switch the armature current from the DC Drive module to a shunt wound DC motor. When used with the appropriate control logic design, these contactors can disconnect the motor armature from the DC Drive module when a stop is initiated or in the event of a power failure.

The contactors feature a top-wired design with all power connections at the top of the contactor.

This publication contains the information needed to install, connect and maintain the Bulletin 1370 DC Contactor.



WARNING: The National Electrical Code (NEC) and local codes outline provisions for safely installing electrical equipment. Installation must comply with specifications regarding wire types, conductor sizes, branch circuit protection and disconnect devices. Failure to do so may result in personal injury and/or equipment damage.



CAUTION: Incorrectly applied or installed DC contactors can result in component damage or a reduction in product life. Wiring or application errors, such as improper wire sizing or excessive ambient temperatures may result in a malfunction of these devices.

Bulletin 1370 DC Contactors have the following features:

Contacts - The double break silver cadmium oxide contacts are weld resistant for improved reliability. Movable contacts are wedge shaped, while the stationary contacts have a unique "fold back" design. On contact opening, this "fold back" design generates a strong magnetic field which quickly throws the arc off the contact surface. The arc is then cooled and extinguished by the surface of the arc chamber.

Coil - The contactor coils are hot pressure molded in thermoset epoxy to protect against mechanical damage and harmful environments.

The coil shunt plate is designed to retard the magnetic flux until the voltage applied reaches the "pick up" voltage.

Each coil is provided with an exclusive thermal cutout which is designed to open on excessive currents or misapplied voltages.

Magnet - The high efficiency magnet has a permanent air gap. Pole face wear cannot affect the air gap and cause magnetic sticking due to residual magnetism. Each magnet lamination is phosphate coated to provide ample resistance to corrosion.

Specifications Table A provides the electrical and environmental specifications for the DC Loop Contactors.

Table A
Contactor Specifications

Contact Rating - N.O.	
Voltage:	56A through 280A – 550V DC maximum, 360A – 500V DC maximum
Full Load Steady State Current:	56A contactor – 56A DC maximum 110A contactor – 110A DC maximum 180A contactor – 180A DC maximum 280A contactor – 280A DC maximum 360A contactor – 360A DC maximum
Contact Break Current (at 550V DC motor load):	56A contactor – 112A DC maximum 110A contactor – 220A DC maximum 180A contactor – 360A DC maximum 280A contactor – 560A DC maximum 360A contactor – 900A DC maximum
Contact Rating - N.C.	
Voltage:	550V DC maximum (500V DC maximum for 360A)
Contact Make Current (at 550V DC resistive load):	56A contactor – 112A DC 110A contactor – 220A DC 180A contactor – 360A DC 280A contactor – 560A DC 360A contactor – 900A DC
Auxiliary Contact Rating	
Voltage:	115V AC, 50/60 Hz
Continuous Current (all contactors):	10A AC maximum
Contact Break Current (all contactors):	6 A AC maximum
Coil Ratings	
Voltage (all contactors):	115V AC, 50/60 Hz
Operate:	Pickup: 75% of nominal (minimum) Dropout: 55% of nominal (maximum)
Breakdown Voltage	2,100V RMS (all electrical elements to ground)
Ambient Operating Temperature	0 to 65° C (32 to 149° F)
Mounting Orientation	Vertical
Contact Termination	
Line and Load Terminals for N.O. Contacts:	56A contactor – 10 - 32 x 25/64" screw, 35 lb-in torque 110A contactor – 1/4 - 28 x 3/8" bolt, 45 lb-in torque 180A contactor – 5/16 - 24 x 1/2" bolt, 150 lb-in torque 280A contactor – 1/2 - 13 stud with nut, 400 lb-in torque 360A contactor – 4 lugs - #4 AWG to 500 MCM
Dynamic Braking Terminals for N.C. Contact:	56A contactor – 10 - 32 x 25/64" screw, 35 lb-in torque 110A contactor – 1/4 - 28 x 3/8" bolt, 45 lb-in torque 180A contactor – 5/16 - 24 x 1/2" bolt, 150 lb-in torque 280A contactor – 3/8 - 24 x 5/8 bolt, 240 lb-in torque 360A contactor – 2 lugs - #4 AWG to 500 MCM
Coil Termination	Captive Pressure Plate for 2 – #12 AWG wires maximum
Contact Material	Silver Cadmium Oxide
Auxiliary Contact	with Captive Pressure Plate for 2 – #14 AWG wires maximum

Dimensions Figures 1 and 2 provide dimension information for the various contactors.

NOMINAL DIMENSIONS AND WEIGHTS – NON-REVERSING CONTACTOR
IN INCHES (MILLIMETERS) AND POUNDS (KILOGRAMS)

Current Rating (Continuous)	Power Poles	Catalog Number	A	B	C	D	E	J	Approximate Weight
56A	2 – N.O. 1 – N.C.	1370-DC56	3.56 (90.4)	6.00 (152.4)	4.47 (113.5)	1.38 (35.0)	5.50 (139.7)	#10 (0.5)	3.0 (1.4)
56A	2 – N.O.	1370-NC56	3.56 (90.4)	6.00 (152.4)	4.47 (113.5)	1.38 (35.0)	5.50 (139.7)	#10 (0.5)	3.0 (1.4)
110A	2 – N.O. 1 – N.C.	1370-DC110	3.94 (100.1)	6.81 (173.0)	4.63 (117.6)	1.58 (40.1)	6.31 (160.3)	#10 (0.5)	4.0 (1.8)
110A	2 – N.O.	1370-NC110	3.94 (100.1)	6.81 (173.0)	4.63 (117.6)	1.58 (40.1)	6.31 (160.3)	#10 (0.5)	4.0 (1.8)
180A	2 – N.O. 1 – N.C.	1370-DC180	6.13 (155.7)	10.04 (255.0)	6.09 (154.7)	2.75 (69.8)	8.66 (220.0)	3-1/4 (0.25)	12.0 (5.4)
180A	2 – N.O.	1370-NC180	6.13 (155.7)	10.04 (255.0)	6.09 (154.7)	2.75 (69.8)	8.66 (220.0)	3-1/4 (0.64)	12.0 (5.4)
280A	2 – N.O. 1 – N.C.	1370-DC280	7.00 (177.8)	11.40 (289.6)	7.66 (194.6)	3.16 (80.3)	9.84 (250.0)	3-5/16 (0.79)	22.0 (10.0)
280A	2 – N.O.	1370-NC280	7.00 (177.8)	11.40 (289.6)	7.66 (194.6)	3.16 (80.3)	9.84 (250.0)	3-5/16 (0.79)	22.0 (10.0)
360A	2 – N.O. 1 – N.C.	1379-DC360	9.50 (241.3)	15.40 (391.2)	7.50 (190.5)	3.50 (88.9)	13.50 (342.9)	3-0.406 (10.3)	45.0 (20.5)
360A	3 – N.O.	1379-NC360	9.00 (228.6)	15.40 (391.2)	7.50 (190.5)	3.50 (88.9)	13.50 (342.9)	3-0.406 (10.3)	45.0 (20.5)

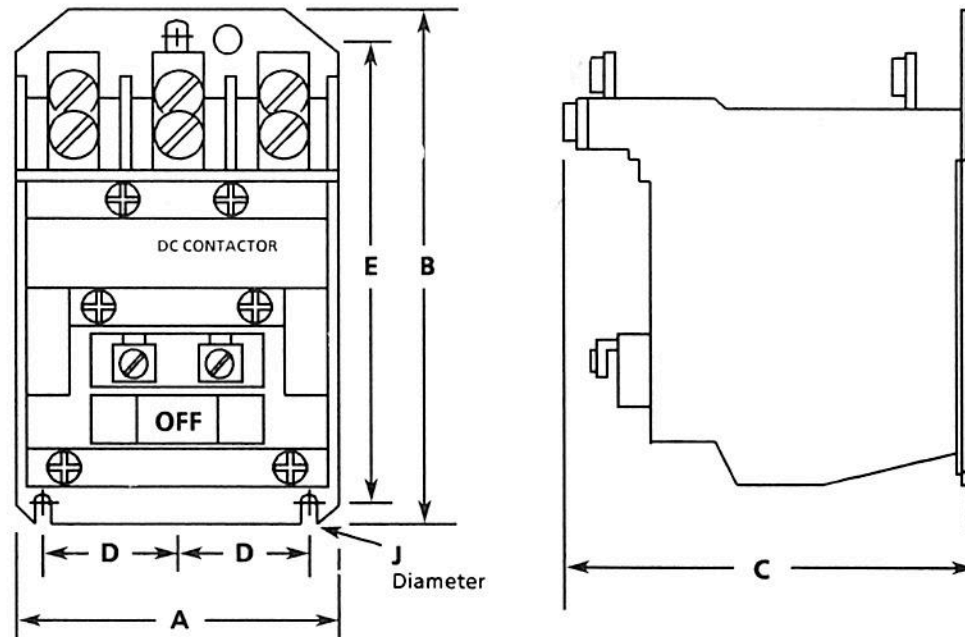


Figure 1 – Non-Reversing Contactor Dimensions

NOMINAL DIMENSIONS AND WEIGHTS – REVERSING CONTACTOR
IN INCHES (MILLIMETERS) AND POUNDS (KILOGRAMS)

Current Rating (Continuous)	Power Poles	Catalog Number	A	B	C	D	E	F	J	Approximate Weight
56A	4 – N.O. 2 – N.C.	1370-RC56	8.00 (203.2)	7.59 (192.8)	4.63 (117.6)	7.09 (180.1)	7.09 (180.1)	3.17 (80.5)	#10 (0.5)	8.75 (3.9)
110A	4 – N.O. 2 – N.C.	1370-RC110	9.06 (230.1)	8.38 (212.9)	4.88 (124.0)	7.88 (200.2)	7.88 (200.2)	4.34 (110.2)	#10 (0.5)	11.0 (5.0)
180A	4 – N.O. 2 – N.C.	1370-RC180	12.88 (327.2)	10.66 (270.8)	6.31 (160.3)	11.81 (300.0)	9.84 (250.0)	–	4-1/4 (0.25)	30.0 (13.6)
280A	4 – N.O. 2 – N.C.	1370-RC280	14.84 (376.9)	12.72 (323.1)	7.94 (201.7)	13.78 (350.0)	11.81 (300.0)	–	4-5/16 (0.79)	47.0 (21.3)
360A	4 – N.O. 2 – N.C.	1370-RC360	19.25 (488.9)	15.38 (390.6)	8.63 (219.2)	17.00 (431.8)	13.50 (342.9)	–	2-.406 ① (10.3)	90.0 (40.9)

① 360A Contactors Only – Key hole (2 plcs.) at top of contactor is 0.188R, 0.750 Dia.

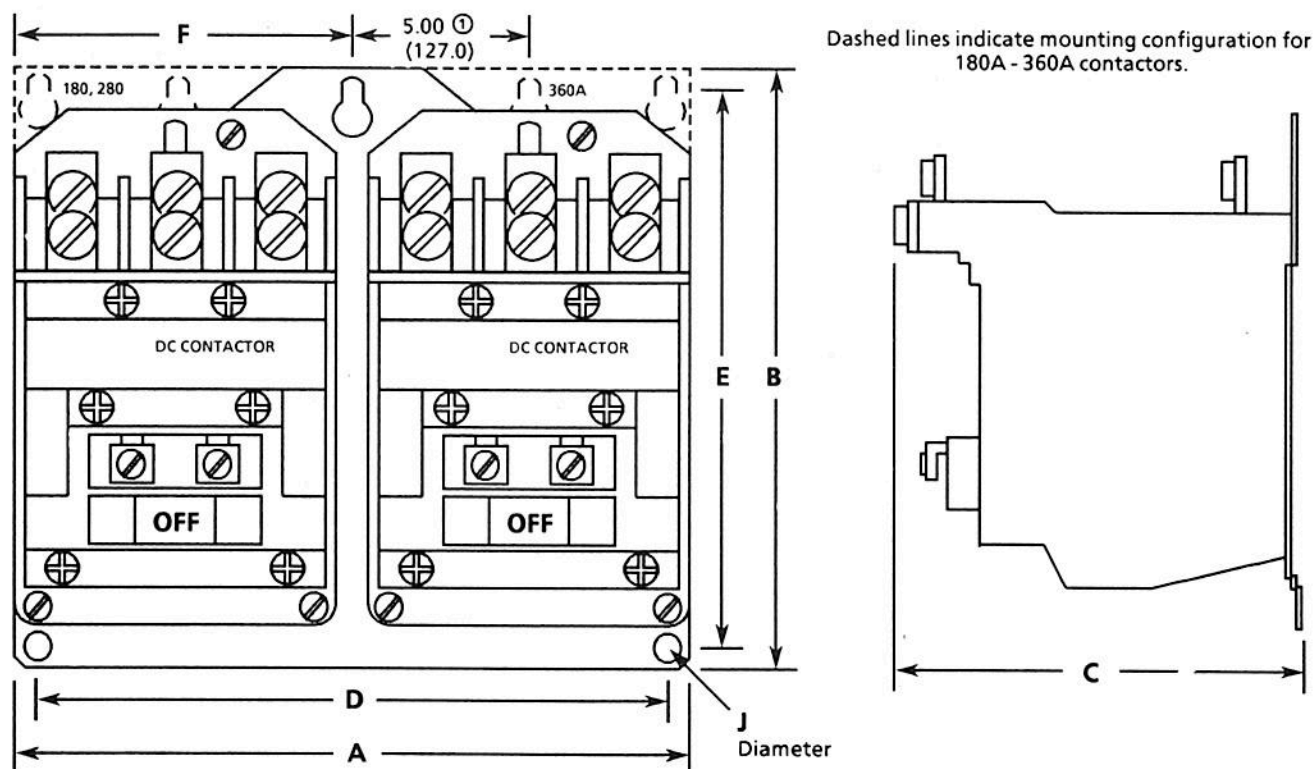


Figure 2 – Reversing Contactor Dimensions

Unpacking and Inspection

Remove all packing material, wedges, or braces from within the contactor. If any part of the equipment will **not** be installed when it is unpacked, it must be stored in a clean, dry place. The storage temperature **must** be between -30°C and $+65^{\circ}\text{C}$ (-22°F and $+149^{\circ}\text{F}$) and a humidity range of 5% to 95%, non-condensing, to guard against damage to components.

After unpacking, check the material received against the Bill of Lading to assure that the nameplate description of each item agrees with the material ordered. When checking the items received, refer to the Catalog Number Explanations provided in Figures 3 and 4. Inspect the items for physical damage such as cracks in moldings or insulators.

Unpacking and Inspection
(Continued)

1370	–	N	C	56
First Position		Second Position	Third Position	Fourth Position
Bulletin No.		Type	Contactor	Current Rating
		Letter Description		Number Amperes
		N Non-Reversing		56 56
		D Non-Reversing w/DB		110 110
		R Reversing w/DB		180 180
				280 280
				360 360

Figure 3 – Contactor Catalog Number Explanation

1370	–	LG	40
First Position		Second Position	Third Position
Bulletin No.		Lug Kit	Lug Current Rating
			Number Amperes
			40 40
			52 52
			56 56
			68 68
			92 92
			104 104
			110 110
			120 120
			140 140
			160 160
			180 180
			204 204
			228 228
			248 248
			268 268
			280 280

Figure 4 – Lug Kit Catalog Number Explanation

Operation

When the coil is energized, the magnet closes. The contact carrier moves upward into place and closes the power contacts. Movable contact springs are used to provide proper contact seating. Shock absorbing pads are provided in the cover and base assemblies to reduce the impact of pickup and drop-out.

Installation

The contactor must be vertically mounted in a clean, dry location. Oils, coolants and other debris must be kept from settling on the contactor. The choice of an appropriate NEMA enclosure type for the application is important. Special considerations should also be given to the wire bend radius and wire clearances.



WARNING: The contactor must be mounted in a vertical position. Failure to observe this mounting practice will result in improper operation of the contactor and possible personal injury.

Refer to the National Electrical Code and Local Codes for specific installation guidelines.

The supplied surge suppressor will reduce noise interference that could adversely affect Drive performance. Install the suppressor on the contactor coil using the instructions provided below. Reversing contactors are supplied with factory installed suppressors on each coil.



CAUTION: Component damage may occur if more than 132V AC is applied to the suppressor.

Suppressor Installation

1. Loosen coil terminal clamps.
2. Slide surge suppressor onto coil terminals.
3. Place coil circuit conductors between suppressor terminals and coil terminal clamps.
4. Tighten coil terminal clamps securely.

Wiring

Figure 5 shows the typical wiring diagrams for the DC contactors. Refer to Figures 6 and 7 for specific terminal identification.

When wiring Dynamic Braking Resistors, use wire with a current capacity at least 1/2 that of the full load current rating of the motor.

IMPORTANT: Consult the National Electrical Code and local codes for specific guidelines on wire size and type for dynamic braking resistor application.

All DC Drive module power connections (Keps-nuts) are to be installed to the following torque settings:

- 1/4 inch bolt – 35 in-lbs
- 3/8 inch bolt – 75 in-lbs
- 1/2 inch bolt – 150 in-lbs
- 3/4 inch bolt – 300 in-lbs

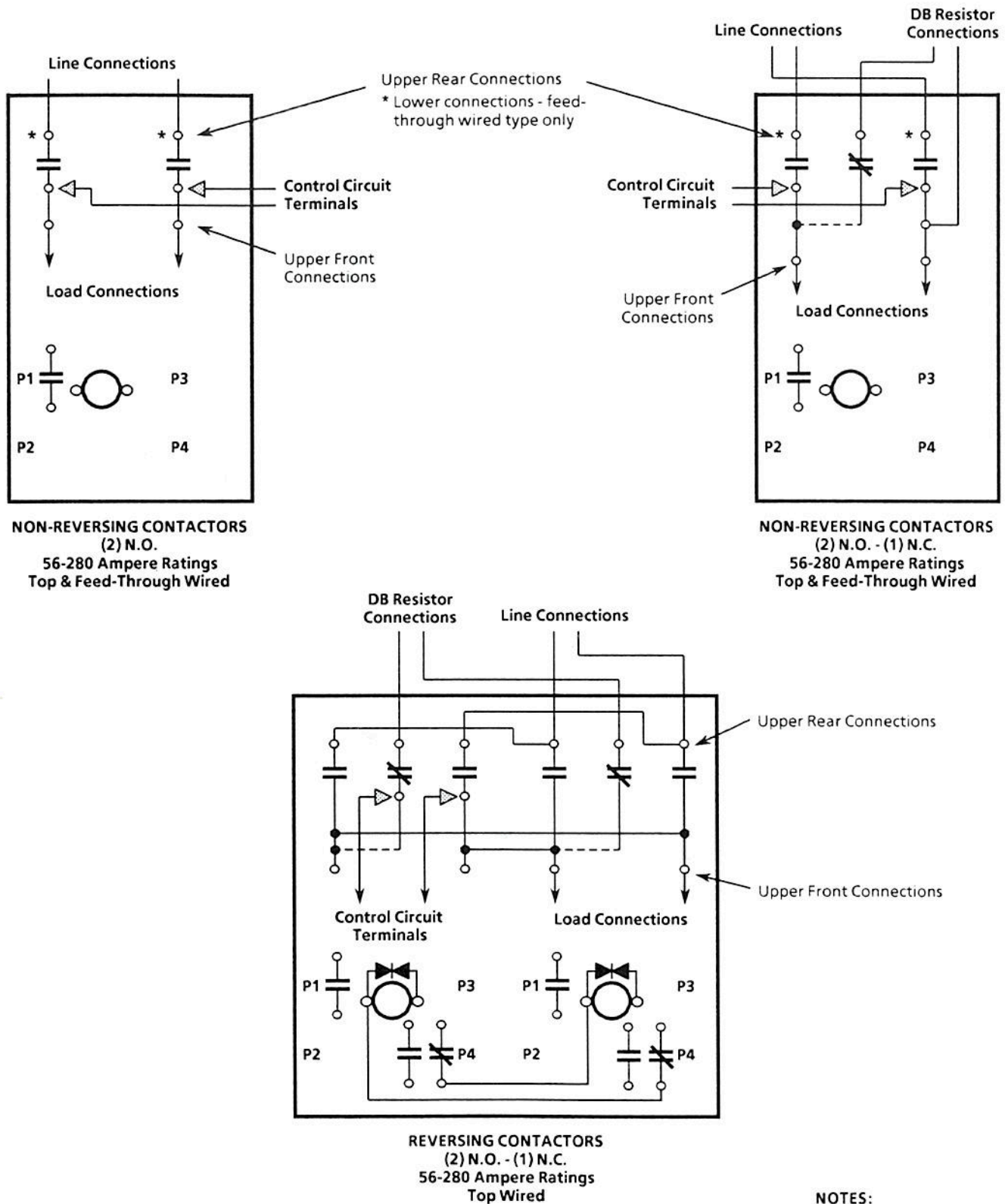


Figure 5 – Typical DC Power Wiring Diagrams

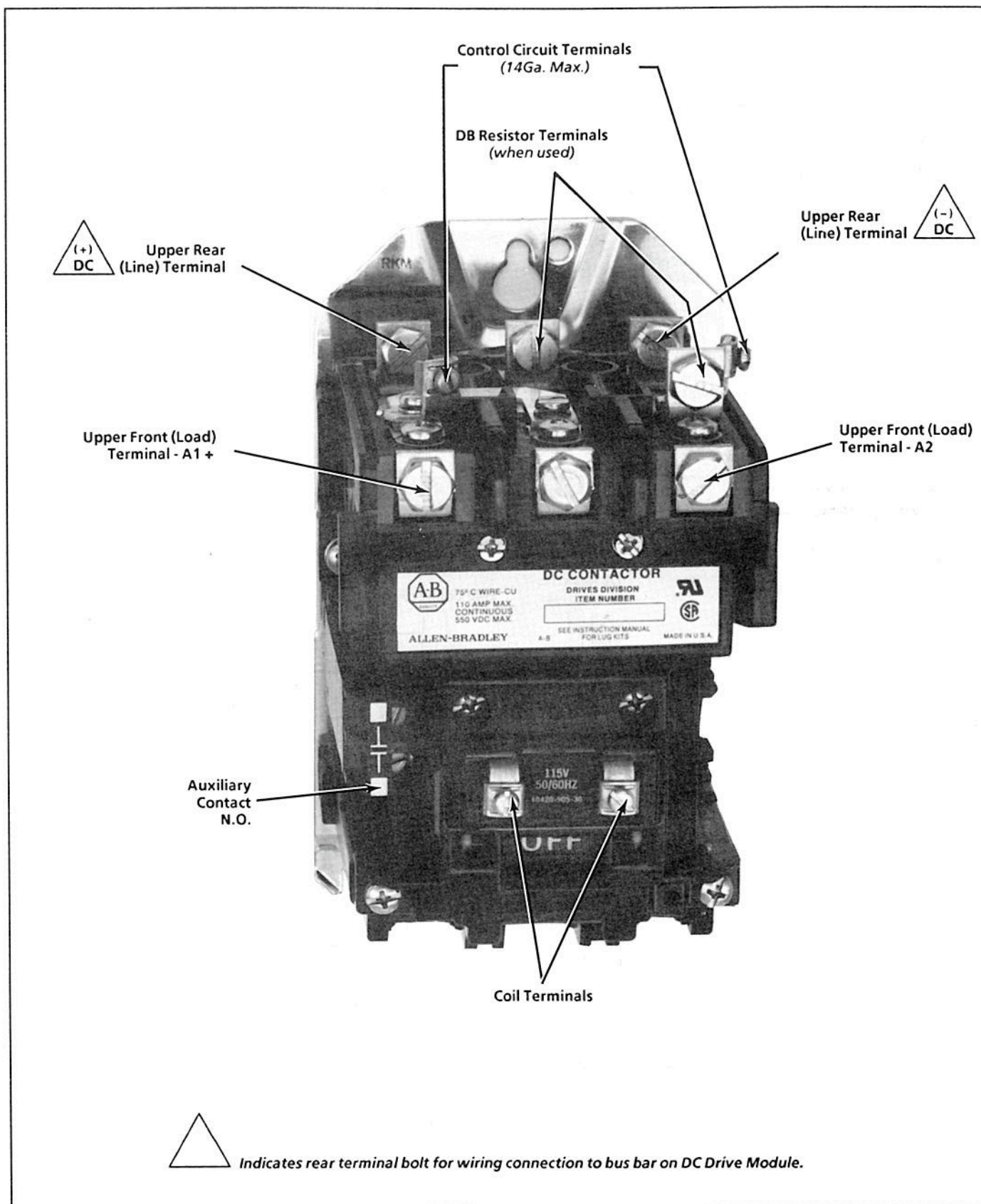
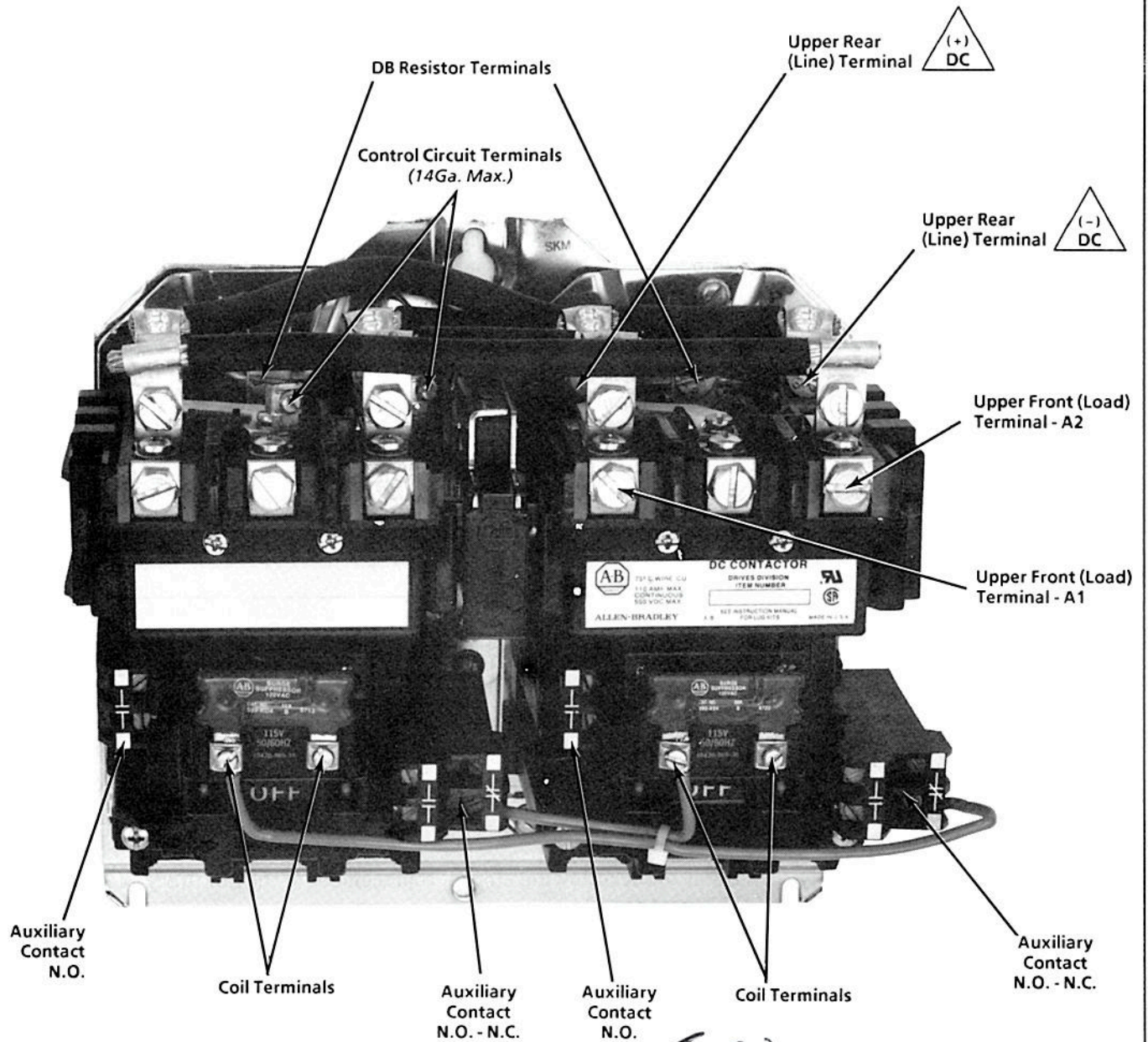


Figure 6 – Non-Reversing DC Contactor Terminals (Top Wired)



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
 Indicates rear terminal bolt for wiring connection to bus bar on DC Drive Module.

Figure 7 – Reversing DC Contactor Terminals (Top Wired)

Auxiliary Contact Installation

Auxiliary contact assemblies can be used on all contactor ratings, 56 through 280 amperes. The N.O. auxiliary contact is designed to be open when the contactor is de-energized. The N.C. auxiliary contact is designed to be closed when the contactor is de-energized.

A (1) N.O. auxiliary contact assembly is supplied on the contactor in position P1 for use with the DC Drive module enable function.

Reversing contactors have an additional N.O. and N.C. auxiliary contact in position P4. The N.C. contact is used to electrically interlock the forward and reverse contactor coil circuits. The N.O. contact is used with the control circuit forward and reverse selection function to prevent changing the direction once the Drive is in operation.

Additional auxiliary contact assemblies may be installed in positions P2, P3 and P4 on non-reversing contactors. On reversing 180 and 280 ampere contactors, additional contact assemblies may be installed in all P2 and P3 positions. Placement on 56 and 110 ampere contactors will depend on the type of contact assembly that can be installed in the vacant P2 and P3 positions between the forward and reverse contactors.

Installation



WARNING: Open and lock-out main supply disconnect and all other power source disconnects to avoid hazard of electrical shock or injury from unintended actuation of controlled equipment.

1. Turn the Drive circuit breaker OFF and remove cabinet power.
2. Align arrows on the reverse side of the contact and locate the tabs.
3. Insert the auxiliary contact, tabs first, into the appropriate position on the side of the contactor. Push, to lock the contact in place.
4. Select the desired terminals and connect the corresponding wires.

Replacement

Refer to the following steps if replacement of the auxiliary contact becomes necessary.

1. Turn the Drive circuit breaker OFF and remove cabinet power.
2. Loosen the Coil Cover and pull the auxiliary contact straight out.

Maintenance

The Bulletin 1370 DC Contactors are constructed such that a minimum amount of maintenance is needed. As a result of normal use, the contacts will eventually begin to deteriorate. Periodic inspection of these contacts should be part of any Drive system preventative maintenance program.

If contact inspection reveals severe erosion on the power pole contacts, it is recommended that the power poles (if possible) or contactor be replaced. Replacing the contactor will help reduce the effects of uneven and unequal contact closings.

If the contactor has not been used for an extended period of time, a brief inspection for mechanical integrity and contact corrosion should be made before use.



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