



SQUARE D Instruction Bulletin

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2- and 3-Pole AC Magnetic Contactors and Starters Type SE, Series A Class 8502 and 8536 – Size 3

INTRODUCTION

This instruction bulletin illustrates and describes Class 8502 and 8536 two- and three-pole magnetic contactors and starters. It also contains assembly, modification and parts ordering instructions. To identify parts, refer to Figure 1.

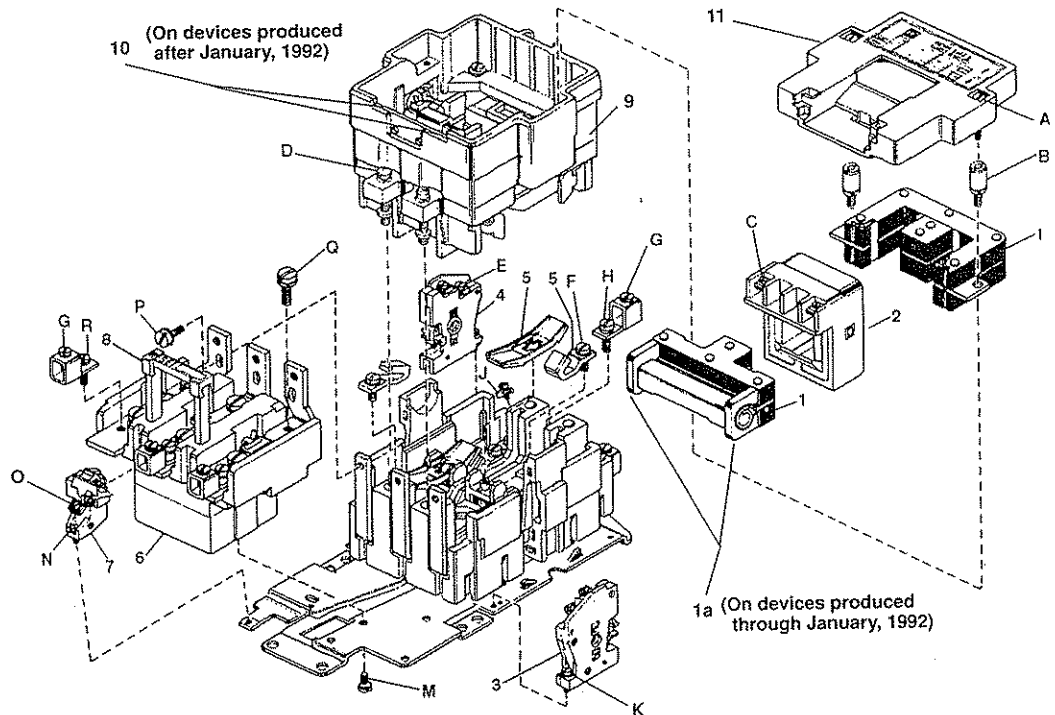


Figure 1 Contactor and Starter Assembly Drawing

⚠ DANGER

HAZARDOUS VOLTAGE.

Disconnect all power before working on equipment.

Electrical shock will cause severe injury or death.

AUXILIARY CONTACTS

All contactors are supplied with a normally-open holding circuit contact as standard. Additional normally-open or normally-closed auxiliary contacts can be installed in the field. Refer to Table 5 on page 4 for class and type. For application information, refer to Bulletin 9999-287 or the Square D Digest.

COVER MOUNTED CONTROL UNITS

NEMA Type 1 general purpose enclosures with slip-on or hinged covers are supplied with knockouts for field addition of the kits listed in Table 1 on page 2.

Table 1 Field Modification Kits, Class 9999

Kit	Type	Form (Factory Mod.)
Push button, Start-Stop	SA2	A
Push button, On-Off	SA10	A3
Selector switch, Hand-Off-Auto	SC2	C
Selector Switch, On-Off	SC22	C6
Red pilot light (slip-on enclosure)	SP4R	P1
Red pilot light (hinged door enclosure)	SP14R	P1

OVERLOAD RELAYS

A melting alloy overload relay is supplied as standard with provisions for one or three thermal units. The contact unit (item 7) of the melting alloy overload relay is available with a normally-open or normally-closed isolated alarm contact in addition to the standard normally-closed contact. The contact unit with alarm circuit contacts can be installed in the field (refer to Table 5 on page 4).

Non-temperature compensated bimetallic overload relays are available as an optional feature (Form B5). Ambient-temperature compensated bimetallic overload relays are also available as an optional feature (Form Y59). Bimetallic overload relays have provisions for three thermal units.

These overload relays are not designed for field repair and should not be disassembled.

TERMINALS

Use **copper wire only** on standard device power and control terminals. Box lugs are suitable for wire sizes #14-1/0 AWG. Pressure wire control terminals are suitable for wire sizes #16-12 AWG, solid or stranded.

INSPECTING AND REPLACING CONTACTS

Contacts are not harmed by discoloration and slight pitting. **Do not file contacts**, as it wastes contact material. Replacement is only necessary when the contact has worn thin. Replacement contacts for starters or contactors are available as kits. Order from Table 5.

It is unnecessary to remove any wiring to visually inspect the contacts. To inspect, loosen the four screws (item D) holding the contact actuator to the contact block. Lift the contact actuator to expose the contacts.

MANUAL OPERATION

! WARNING
HAZARDOUS VOLTAGE.
Disconnect all power before manually operating equipment.
Manual operation with power on can cause contact arcing and unexpected energization of load, resulting in personal injury or equipment damage.

Manual operation of contactors and starters may be accomplished by pushing the contact carrier down with a screwdriver. There is a step on the outside of the contact carrier suitable for this use.

COIL REPLACEMENT

To remove the coil, loosen the two captive cover screws (item A). Disconnect wires from the coil terminals and remove the cover. Loosen the two screws (item B) holding the magnet in place. Remove the coil and magnet. Manually operate the contact carrier and remove the armature. Separate the coil from the magnet.

To replace the coil, first assemble the magnet, coil and armature and insert the complete unit. Approximately 3/8" space should exist between the top outside surface of the coil and inside surface of the magnet. If this space does not exist and magnet tends to be loose and not quite in place, grasp the coil firmly and slide it down toward the armature. Magnet will then fall in place.

Before installing the cover, manually operate the device as described in "Manual Operation" to ensure all parts are functioning properly.

ASSEMBLY INSTRUCTIONS

Figure 1 on page 1 shows how contactors and starters are assembled. Factory recommended torque for mechanical, electrical and pressure wire connections are listed in Table 2 and the device instruction sheet. These torques must be followed to ensure proper device operation.

Table 2 Factory Recommended Tightening Torques

Item	Description	Tightening Torque (in-lb)
A	Cover screws (2 per cover)	24-28
B	Screw post (2 per magnet)	65-75
C	Coil terminal pressure wire connector (2 per coil)	[1]
D	Power plant screws (4 per device)	40-45
E	Auxiliary contact pressure wire connector (2 per contact)	[1]
F	Stationary contact fasteners (2 per pole)	44-50
G	Lug screw (2 per pole)	[1]
H	Lug retaining screw (2 per pole)	44-50
J	Control circuit pressure wire connector (1 per pole)	[1]
K	Auxiliary contact fastening screw (1 per contact)	13-16
M	Overload relay fastening screws (3 per overload block)	24-28
N	Overload switch module fastening screw (1 per module)	9-12
O	Switch module pressure wire connectors (2 per module standard; 4 per module w/ alarm circuit contact)	[1]
P	Overload-to-contact fasteners (3 per device)	44-50
Q	Thermal unit fastening screw (2 per pole)	90-100
R	Lug retaining screw	44-50

[1] See device instruction sheet.

SHORT CIRCUIT PROTECTION

Provide branch-circuit overcurrent protection for starters, referring to instructions supplied with the thermal unit selection table. Provide branch-circuit overcurrent protection for contactors (Class 8502 or 8702) in accordance with the National Electrical Code. Do not exceed the maximum protective device ratings listed in Table 3.

Table 3 Maximum Ampere Ratings

Maximum Voltage (V)	Class K5 or RK5 Fuse ^[1] (A)	Class J or RK1 Fuse (A)	Inverse-Time Circuit Breaker (A)
600	100	200	125
250	125	200	150

[1] Time delay fuse may be required.

DISTANT CONTROL

Series impedance and shunt capacitance of the control circuit must be considered to assure proper operation of contactors and starters when controlled from remote operator stations. Depending upon the voltage, wire size and number of control wires used, series impedance or shunt capacitance may limit the maximum distance of the wire run. If distances to start or stop stations are longer than those listed in Table 4 on page 4, the wire-run configuration and materials must be analyzed. For further information, contact your local Square D field office for Product Data Bulletin M379.

Table 4 Maximum Control Distance

Coil Voltage (60 Hz)	Maximum Control Distance (feet)	
	#14 AWG Copper Wire	#10 AWG Copper Wire
120 (2/3-wire)	360	845
240 (2-wire)	1400	1300
240 (3-wire)	990	655
480 (2-wire)	495	325
480 (3-wire)	245	160

ORDERING INSTRUCTIONS

Specify quantity, part number or class and type and description of part, giving complete nameplate data of the device. For example, one armature and magnet kit 31074-931-50 for a Class 8536 Type SEO1 Series A starter.

Table 5 Parts List

Item	Description	Part Number	Quantity	
			2-Pole	3-Pole
[1] 1	Armature and magnet kit	31074-931-50	1	1
2	Coil	See Table 6 below	1	1
3	Auxiliary contact, 1 normally-open Auxiliary contact, 1 normally-closed	Class 9999 Type SX6 Class 9999 Type SX7	...	...
4	Holding circuit contact, 1 normally-open	Class 9999 Type SX6	1	1
5	Contact kit	Class 9998: Type SL6 Type SL7	1 N/A	N/A 1
6	Melting alloy overload relay assembly (includes item 7) 1 thermal unit 3 thermal units	Class 9065: Type SDO11 Type SDO12	1 1	... 1
[2] 6	Bimetallic overload relay Form B5 (Series B) Form Y59	26005-31000 26005-11000	N/A N/A	3 3
7	Melting alloy overload contact unit	Class 9998 Type SO1	1	1
[2] 7	Melting alloy overload contact unit w/alarm circuit Normally-open alarm contact Normally-closed alarm contact	Class 9999: Type SO4 Type SO5	......	......
8	Reset bar for melting alloy overload relay	31075-008-01	1	1
9	Housing-barrier assembly (includes item 10)	31074-112-51	1	1
10	Drop-out pad	31091-157-01	2	2
11	Cover	31074-054-01	1	1
A	Cover screw	21916-16281	2	2
B	Screw post	31074-048-50	2	2
C	Coil terminal pressure wire connector	31051-007-50	2	2
G	Lug assembly	25050-94000	4	6
[3] H	Lug retaining screw (5/16-18 x 5/8)	21915-20200	4	6
K	Auxiliary contact fastening screw	21918-14161	...	...
M	Overload relay fastening screw	21911-16120	3	3
O	Switch module pressure wire connector	21910-12095	...	...
P	Overload-to-contactor fastening screw (5/16-18 x 1/2)	21911-20160	2	3
Q	Thermal unit fastening screw (5/16-18 x 7/8)	21943-22281	4	6
R	Lug retaining screw (1/4-20 x 7/16)	21915-20140	2	3

[1] When ordering armature and magnet kit (31074-931-50) for a contactor or starter containing an armature assembly (item 1) incorporating two rubber bumpers (item 1a), a housing-barrier assembly (item 9) must also be ordered and installed on the contactor or starter.

[2] Not shown.

[3] Used on line and load side of contactor. Used on line side only on starter.

Table 6 Magnet Coil Part Numbers [1]

Coil Prefix	Hz	Coil Suffix													
		24 V	110 V	120 V	120/240 V	208 V	220 V	240 V	240/480 V	277 V	380 V	440 V	480 V	550 V	600 V
31074-400	60	16	Use 120 V	38	[2]	44	Use 240 V	47	[2]	49	53	Use 480 V	57	Use 600 V	60
	50	17	38	39	[3]	N/A	47	48	[3]	N/A	54	57	58	60	61

[1] Complete part number of coil consists of the prefix followed by the suffix (i.e.: 120 V 60 Hz coil = 31074-400-38). When ordering replacement coils, give part number, voltage and frequency of coil being replaced.

[2] Dual voltage coil. Order 120/240 V 60 Hz as 31074-402-02. Order 240/480 V 60 Hz as 31074-402-04.

[3] Consult local Square D field office.

PLEASE NOTE:

Electrical equipment should be serviced only by qualified electrical maintenance personnel, and this document should not be viewed as sufficient instruction for those who are not otherwise qualified to operate, service or maintain the equipment discussed. Although reasonable care has been taken to provide accurate and authoritative information in this document, no responsibility is assumed by Square D for any consequences arising out of the use of this material.



SQUARE D

Instruction Bulletin

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 Bulletin No. 30072-013-09B
 Raleigh, NC, U.S.A., February, 1994
 Supersedes 30072-013-09A dated 9/93

2- and 3-Pole AC Magnetic Contactors and Starters Type SB, Series A or B Class 8502 and 8536 – Size 0

INTRODUCTION

This instruction bulletin illustrates and describes Class 8502 and 8536 two- and three-pole magnetic contactors and starters. It also contains assembly, modification and parts ordering instructions. To identify parts, refer to Figure 1.

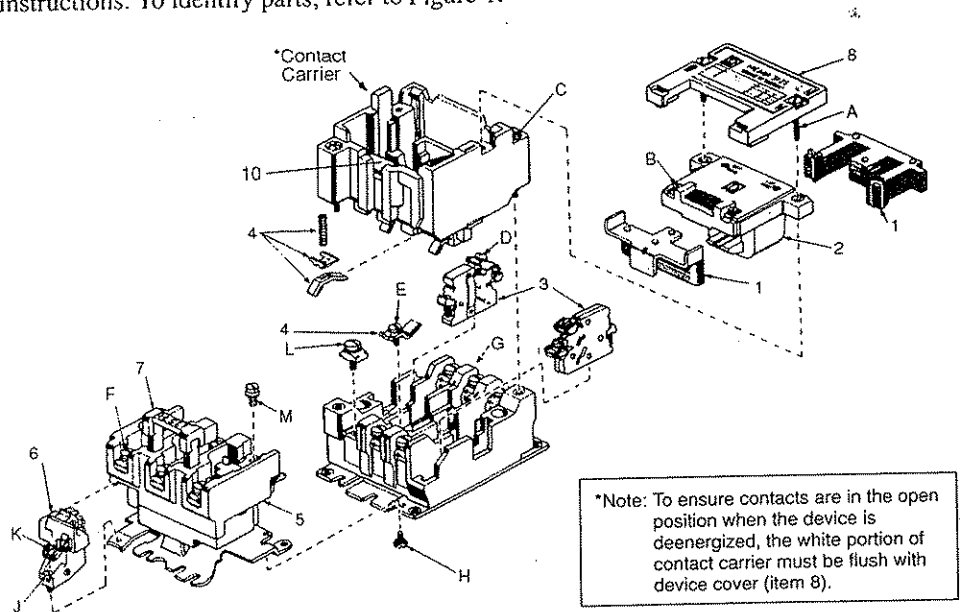


Figure 1 Contactor and Starter Assembly Drawing

⚠ DANGER

HAZARDOUS VOLTAGE.
Disconnect all power before working on equipment.
 Electrical shock will cause severe injury or death.

SERIES

Series B applies only to the Type S Starter Form B (three ambient-compensated overloads). All parts of Form B Series A and B starters are interchangeable; only the overload relay block differs. If the overload relay block of a Form B Series A starter is replaced with the Series B block, the overload relay thermal units must be selected from the Series B thermal unit selection tables for proper motor protection.

AUXILIARY CONTACTS

All contactors are supplied with a normally-open holding circuit contact as standard. Additional normally-open or normally-closed auxiliary contacts can be installed in the field. Refer to Table 5 on page 4 for class and type. For application information, refer to Bulletin 9999-287 or the Square D Digest.

COVER MOUNTED CONTROL UNITS

NEMA Type 1 general purpose enclosures with slip-on or hinged covers are supplied with knockouts for field addition of the kits listed in Table 1 on page 2.

Table 1 Field Modification Kits, Class 9999

Kit	Slip-On Enclosure	Hinged Door Enclosure	Form (Factory Mod.)
Push button, Start-Stop	SA2	SA3	A
Push button, On-Off	SA10	SA3	A3
Selector switch, Hand-Off-Auto	SC2	SC8	C
Selector switch, On-Off	SC22	...	C6
Red pilot light	SP15R	SP28R ^[1]	P1

^[1] For 120 V only. For other voltages, use Class 9001 Type KP units.

OVERLOAD RELAYS

A melting alloy overload relay is supplied as standard with provisions for three thermal units. The contact unit (item 6 of Figure 1 on page 1) of the melting alloy overload relay is available with a normally-open or normally-closed isolated alarm contact in addition to the standard normally-closed contact. The contact unit with alarm circuit contacts can be installed in the field (refer to Table 5 on page 4).

Non-temperature compensated bimetallic overload relays are available as an optional feature: Form B1 has provisions for two thermal units; Form B2 has provisions for three thermal units. Ambient-temperature compensated bimetallic overload relays (Form B) are also available as an optional feature, with provisions for three thermal units.

An SPDT contact is supplied as standard on all Type S bimetallic overload relays. The N.O. contact can be used in an alarm circuit and must be wired on the same polarity as the N.C. contact. Contacts are not replaceable. In order to directly replace any bimetallic overload relay, the appropriate part number listed on the parts list should be used.

These overload relays are not designed for field repair and should not be disassembled.

TERMINALS

Use **copper wire only** on device power and control terminals. Pressure wire power terminals are suitable for wire sizes #14-8 AWG, solid or stranded. Pressure wire control terminals are suitable for wire sizes #16-12 AWG, solid or stranded.


INSPECTING AND REPLACING CONTACTS

Contacts are not harmed by discoloration and slight pitting. **Do not file contacts**, as it wastes contact material. Replacement is necessary only when the contact has worn thin. Replacement contacts for starters or contactors are available as kits. Order from Table 5.

Replacement contacts and springs for the **power pole kits only** are contained in a Class 9998 Type SL22 kit. One kit is required for each N.O. or N.C. contact.

It is unnecessary to remove any wiring to inspect or replace the contacts. To inspect or replace contacts, loosen the two captive screws (item C in Figure 1) holding the contact actuator to the contact block. Lift the contact actuator to expose the contacts.

MANUAL OPERATION

 <p>WARNING</p> <p>HAZARDOUS VOLTAGE.</p> <p>Disconnect all power before manually operating equipment.</p> <p>Manual operation with power on can cause contact arcing and unexpected energization of load, resulting in personal injury or equipment damage.</p>
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Manual operation of contactors and starters may be accomplished by pushing the contact carrier down with a screwdriver. A slot suitable for this use is provided in the coil cover.

COIL REPLACEMENT

To remove the coil, loosen the two captive cover screws (item A in Figure 1). Disconnect wires from the coil terminals and remove the cover. Remove and disassemble the magnet, coil and armature unit.

To replace the coil, first assemble the magnet, replacement coil and armature. Manually operate the contact carrier and insert the complete unit. Before installing the cover, manually

operate the device as described in "Manual Operation" to ensure all parts are functioning properly. Follow recommended tightening torques (see Table 2) when reassembling device.

**ASSEMBLY
INSTRUCTIONS**

Figure 1 on page 1 shows how contactors and starters are assembled. Factory recommended torques for mechanical, electrical and pressure wire connections are listed in Table 2 and the device instruction sheet. These torques must be followed to ensure proper device operation.

Table 2 Factory Recommended Tightening Torques

Item	Description	Tightening Torque (in-lb)
A	Cover screw (2 per cover)	18-21
B	Coil terminal pressure wire connector (2 per coil)	9-12
C	Power plant screw (2 per device)	18-21
D	Internal auxiliary contact pressure wire connector (2 per contact)	9-12
E	Stationary contact fastener (2 per pole)	6-9
F	Lug screw (2 per pole)	[1]
G	Auxiliary wire binding screw	18-21
H	Overload relay fastening screw (2 per overload block)	18-21
J	Overload switch module fastening screw (1 per module)	9-12
K	Switch module pressure wire connector (2 per module standard; 4 per module w/ alarm circuit contact)	9-12
L	Overload-to-contactor fasteners (1 per pole)	18-21 [2]
M	Overload thermal unit fastening screw (2 per pole)	18-21

[1] See instruction sheet.

[2] For contactor, see instruction sheet.

**SHORT CIRCUIT
PROTECTION**

Provide branch-circuit overcurrent protection for starters, referring to instructions supplied with the thermal unit selection table. Provide branch-circuit overcurrent protection for contactors (Class 8502 or 8702) in accordance with the National Electrical Code. Do not exceed the maximum protective device ratings listed in Table 3.

Table 3 Maximum Ampere Ratings

Maximum Voltage (V)	Class K5, RK5 or RK1 Fuse (A)	Class J or T Fuse (A)	Inverse-Time Circuit Breaker (A)
600	20	30	20
250	25	30	35

DISTANT CONTROL

Series impedance and shunt capacitance of the control circuit must be considered to assure proper operation of contactors and starters when controlled from remote operator stations. Depending upon the voltage, wire size and number of control wires used, series impedance or shunt capacitance may limit the maximum distance of the wire run. If distances to start or stop stations are longer than those listed in Table 4, the wire-run configuration and materials must be analyzed. For further information, contact your local Square D field office for Product Data Bulletin M379.

Table 4 Maximum Control Distance

Coil Voltage (60 Hz)	Maximum Control Distance (feet)	
	#14 AWG Copper Wire	#10 AWG Copper Wire
120	845	1500
240	595	395
480	145	95

ORDERING INSTRUCTIONS

Specify quantity, part number or class and type and description of part, giving complete nameplate data of the device. For example, one armature and magnet kit 31041-605-50 for a Class 8536 Type SBO2 Series A starter.

Table 5 Parts List

Item	Description	Part Number	Quantity				
			1-Pole	2-Pole	3-Pole	4-Pole	5-Pole
1	Armature and magnet kit	31041-605-50	1	1	1	1	1
2	Coil	See Table 6 below	1	1	1	1	1
3	Internal auxiliary contact Normally-open Normally-closed	Class 9999: Type SX11 Type SX12	[3] ...	[3] ...	1 ...	1 ...	1 ...
4	Contact kit	Class 9998: Type SL2 Type SL12 Type SL12 & SL22	1	1	1 ... ...	... 1 ...	... ... 1
5	Melting alloy overload relay assembly 1 Element 2 or 3 Element	Class 9065: Type SDO4 Type SDO5	1 ...	1 ...	... 1	... 1	... 1
[1] 5	Bimetallic overload relay Non-compensated 2 element (Form B1) 3 element (Form B2) Compensated 3 element (Form B)	Class 9065: Type SDO5B1 Type SDO6B2 Class 9065: Type SDO6B	.........	.........	.........	.........	.........
6	Melting alloy overload contact unit	Class 9998 Type SO1	1	1	1	1	1
[1] 6	Melting alloy overload contact unit w/ alarm circuit Normally-open alarm contact Normally-closed alarm contact	Class 9999 Type SO4 Class 9999 Type SO5	......	......	......	......	......
7	Reset bar	31034-042-01	1	1	1	1	1
8	Cover	31127-013-01	1	1	1	1	1
[1]	External auxiliary contact One normally-open One normally-closed One normally-open and one normally-closed One normally-open, overlapping One normally-closed, overlapping	Class 9999: Type SX6 Type SX7 Type SX8 Type SX9 Type SX10	...............	...............	...............	...............	...............
[1]	Power pole kit One normally-open Two normally-open	Class 9999: Type SB6 Type SB9	... ... ...	... ... ...	... ... ...	1 ... ...	... 1 ...
[2] 10	Lever bearing	31041-032-01	1	1	1	1	1
A	Cover screw	21937-14341	2	2	2	2	2
B	Coil terminal pressure wire connector	31051-007-50	2	2	2	2	2
C	Power plant screw	21916-14501	2	2	2	2	2
F	Wire clamp and screw (Size 0 contactor)	30018-018-50	...	...	...	2	4
G	Auxiliary wire binding screw	21819-25081	2	2	2	2	2
L	Wire clamp and screw (Size 0 contactor)	30018-070-50	2	4	6	6	6
M	Overload thermal unit fastening screw	21920-16160	...	4	6	6	6

[1] Not shown.

[2] To ensure proper device operation: when installing the lever bearing onto the lever, the oval concavity on the inside surface of one leg of the bearing must mate with the corresponding oval convexity on the bottom of the lever.

[3] Furnished on 2-pole starters, however 1- and 2-pole contactors are furnished with a holding circuit contact rated the same as a power pole.

Table 6 Magnet Coil Part Numbers [1]

Coil Prefix	Hz	Coil Suffix													
		24 V	110 V	120 V	120/240 V	208 V	220 V	240 V	240/480 V	277 V	380 V	440 V	480 V	550 V	600 V
31041-400	60	20	Use 120 V	42	[2]	48	Use 240 V	51	[2]	52	56	Use 480 V	60	Use 600 V	62
	50	22	42	43	...	...	51	53	...	...	57	60	...	62	64

[1] Complete part number of coil consists of the prefix followed by the suffix (i.e.: for 120 V 60 Hz coil, select 31041-400-42). When ordering replacement coils, give part number, voltage and frequency of coil being replaced.

[2] Dual voltage coil. Order 120/240 V 60 Hz as 31041-402-02. Order 240/480 V 60 Hz as 31041-402-04.

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