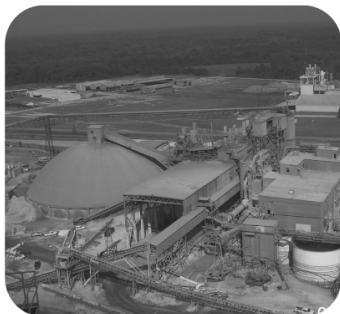


# Medium Voltage Contactor 800A, 2400-7200 V



Bulletin 1502 (Series D and E)  
User Manual



## Important User Information

Read this document and the documents listed in the Additional Resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.



**WARNING:** Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.



**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.

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### IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

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Labels may also be on or inside the equipment to provide specific precautions.



**SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.



**BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.



**ARC FLASH HAZARD:** Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

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## Contactor Product Description

### Scope

This User Manual pertains to Allen-Bradley's Bulletin 1502, 800A vacuum contactors. It applies to both Series D and E versions of the Bulletin 1502 (800 Amp) contactors.

Series D vacuum contactors are intended for use with electro-mechanical (relay) control circuits. They may **not** be used with IntelliVAC and IntelliVAC Plus control modules.

Series E vacuum contactors are used with IntelliVAC and IntelliVAC Plus control only (refer to publications 1503-UM053\_-EN-P and 1503-UM054\_-EN-P respectively).

### Description

Allen-Bradley's Bulletin 1502, 800 amp electrically held and mechanical latch vacuum contactors are designed for high horsepower applications in the 2400 to 7200 voltage range. These contactors are suitable for all types of AC loads, for example: three phase motors, transformers, power capacitors and resistive heating loads. Mechanically latched contactors are used mainly in situations requiring the contactor to remain closed in the event of power failure.

The contactor uses three (3) interrupters (hereafter referred to as vacuum bottles) operated by an electromagnet assembly through a mechanical linkage. They are resistant to adverse atmospheric conditions and provide a long mechanical and electrical life.

The contactors are utilized in various starter and drive configurations, e.g. full voltage non-reversing, full voltage reversing, two-speed, reduced voltage, synchronous, drive input/output and bypass applications. They are fixed mounted within the structures and the line and load terminations are made at the rear of the device. In most configurations, the main contactor is mechanically interlocked with the external operating handle and isolating switch.



Figure 1.1 – 800A Contactor

## Vacuum Bottle Description

The vacuum bottle (Figure 1.2) consists of two contacts enclosed in a ceramic housing. One contact is mounted on a fixed shaft, and the other is attached to a movable shaft. The bearing and stainless steel bellows ensure that the movable contact tracks accurately and maintains vacuum integrity within the bottle.

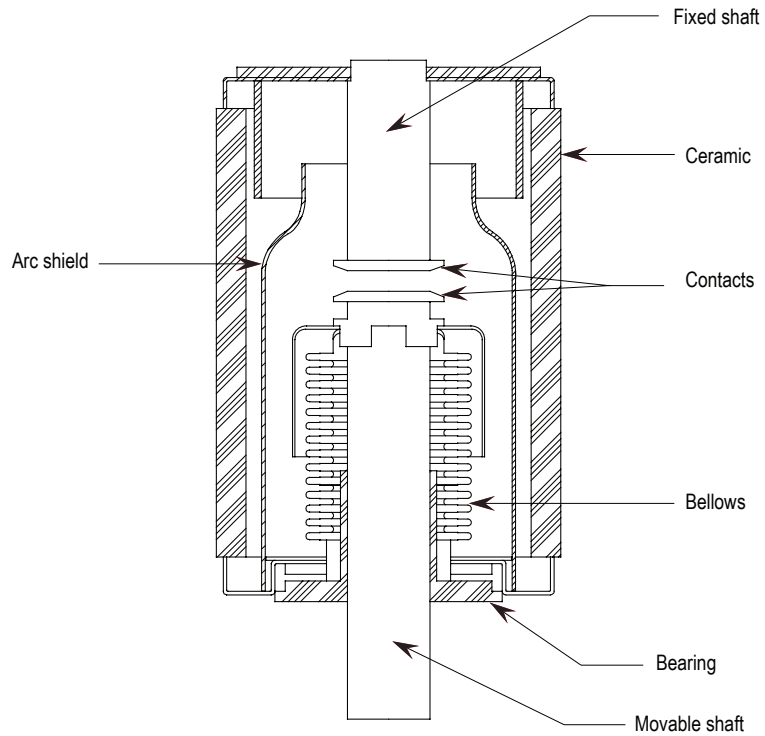


Figure 1.2 – Typical Vacuum Bottle Cross Section

## Contactor Operation

The standard electrically held contactor consists of three vacuum bottles operated by an electromagnet assembly through a mechanical linkage (See Figure 1.3).

### Electro-Mechanical Control (Series D)

- When the control circuit is energized, current flows through both a closing coil and hold-in coil, creating an electromagnet.
- This electromagnet pulls the armature plate towards the coil cores which also rotates the actuator shaft.
- The actuator plate, in turn, pushes the insulator and movable shaft up, closing the contacts inside the vacuum bottle.
- The control circuit economizing/auxiliary contacts, located on the left side of the contactor, change state once the contactor closes.
- The current that is energizing the closing coil is then switched off. The contactor remains closed by the hold-in coil only.
- The contactor is opened by de-energizing the hold-in coil.

The mechanical latch version of the contactor operates basically the same way with the following exceptions:

- Both coils are de-energized upon closing of the contactor, and the armature is held in the closed position by a spring-loaded latching mechanism.
- The contactor is opened by energizing a trip coil which pulls the latch away from the armature, or by engaging a manual trip mechanism via a pushbutton located on the front of the medium voltage door (see Figure 1.4).

**Note:** External control relays and a rectification circuit are used to control the standard DC closing and hold-in coils on the contactor.

## Contactor Operation (cont.)

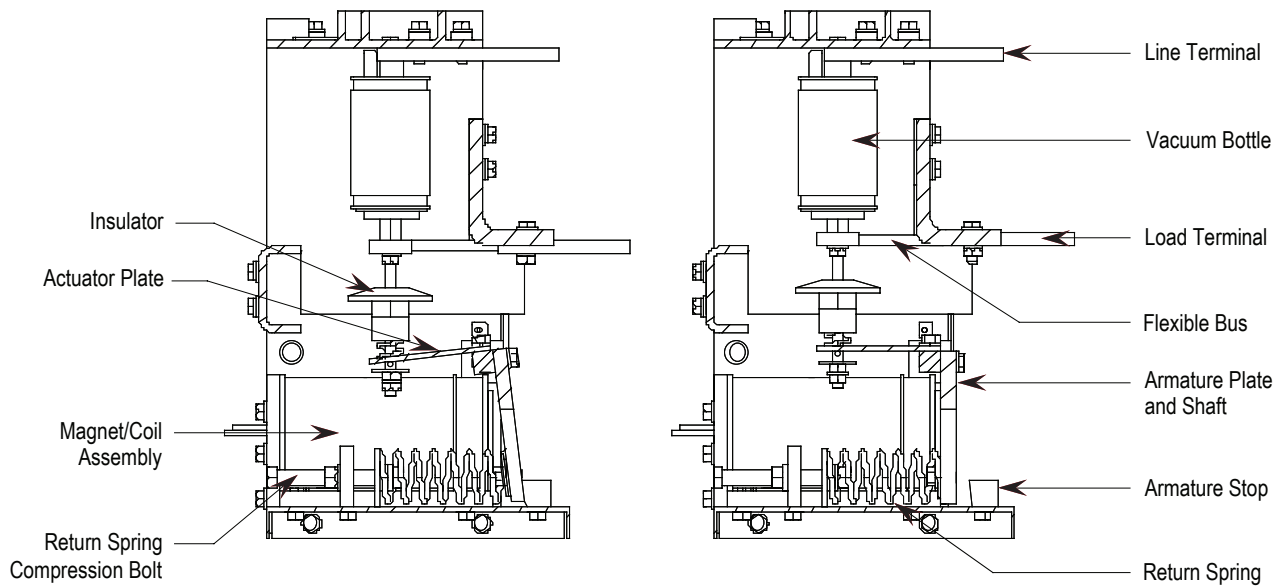
### IntelliVAC Control (Series E)

The electrically held vacuum contactor operates as follows:

- When the IntelliVAC and IntelliVAC Plus control modules receive a close command, the contactor coil is energized, the current creates an electromagnet in the coil.
- The electromagnet pulls the armature plate towards the coil core, rotating the shaft and causing the actuator plate to move upwards.
- As the actuator plate moves, it pushes the insulator and movable shaft up, closing the contacts in the vacuum bottle.
- The IntelliVAC and IntelliVAC Plus control modules supply the close current to the coil for approximately 200 milliseconds. Afterward, the coil current is reduced to a lower hold-in value.
- When the IntelliVAC and IntelliVAC Plus control modules have the close command removed, the coil is de-energized, opening the contactor.

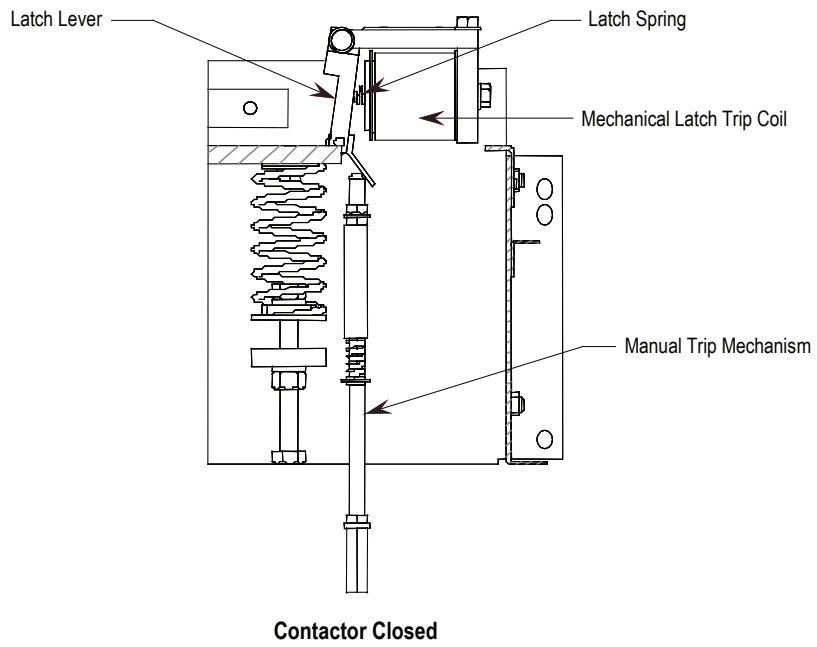
The mechanical latch contactor operates in much the same manner as the electrically held version (see above) with a few exceptions:

- Once the contactor is closed, a spring-loaded mechanism moves a roller against the armature plate to hold it against the electromagnetic core.
- The contactor can be opened electrically by energizing a trip coil (via IntelliVAC and IntelliVAC Plus 'open' output) which pulls the latch away from the armature, or by a push button mounted on the power cell door that mechanically releases the contactor.



**Figure 1.3 – Vacuum Contactor Operation**





**Figure 1.4 – Top Partial Section View Showing Mechanical Latch**

### Contactor Identification

Each contactor is identified with a nameplate (Figure 1.5) attached to the interphase barrier retainer at the front of the contactor. The nameplate information includes the Catalog Number, Series Letter, Voltage Rating, Non-enclosed Current Rating, Interrupting Capacity, Altitude Range, CSA and UL markings.

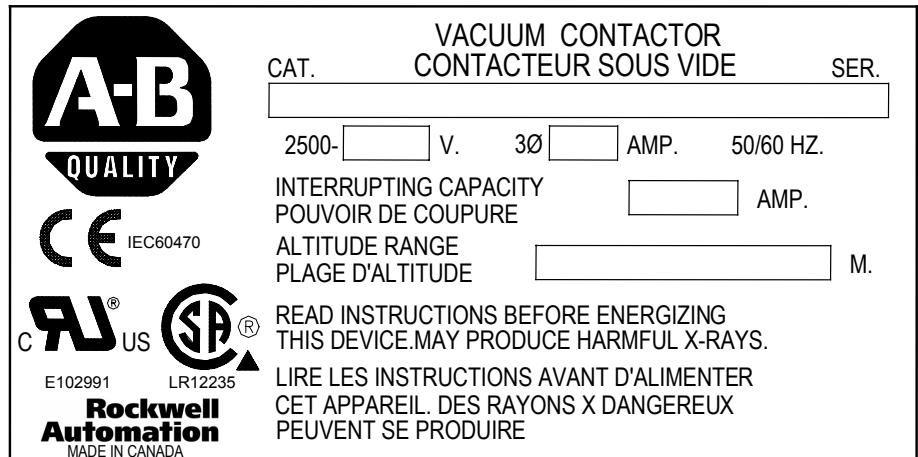


Figure 1.5 – Contactor Label

### Catalog No. Explanation

The following catalog number explanation will help identify the contactor and shall be used when contacting your local Rockwell Automation Sales office or the factory for assistance.

<b>1502</b>	<b>-</b>	<b>V</b>	<b>8</b>	<b>D</b>	<b>X</b>	<b>D</b>	<b>A</b>	<b>-</b>	<b>1</b>
First Position		Second Position	Third Position	Fourth Position	Fifth Position	Sixth Position	Seventh Position		Eighth Position
Bulletin Number <b>1502</b>		Contactor Type and Interlock <b>V</b> = Vacuum, no interlock <b>VC</b> = Vacuum, Optimized for IntelliVAC™ control	Contactor Size <b>8</b> = 800 A	Nominal Line Voltage <b>D</b> = 7200 V	Fuse Mounting Provisions <b>X</b> = None	Coil Voltage <b>D</b> = 110 V D C (120 V A C) <b>E</b> = 207 V D C (230 V A C)	Function <b>Refer to Table 1.A</b>		Altitude Code (meters) <b>1</b> = 0 – 1000 <b>2</b> = 1001–2000 <b>3</b> = 2001–3000 <b>4</b> = 3001–4000 <b>5</b> = 4001–5000

Table 1.A – Vacuum Contactor Function

<p><b>A</b> = 3 pole, electrically held contactor</p> <p><b>B</b> = 3 pole, mechanically latched contactor with electrical and mechanical release</p> <p><b>D</b> = 3 pole, electrically held contactor with fast drop-out time</p>
---

**Contactor Specifications**

**Table 1.B - Bulletin 1502 Medium Voltage 800 Amp Contactor Ratings**

Description		Specifications	
<b>Voltage Ratings ❶</b>			
Maximum Rated Voltage		7200	
System Voltages		2400 3300 4160 4800 6600 6900	
Dielectric Voltage Withstand Rating	For 60 seconds (kV)	18.2 / 20 (IEC)	
Basic Impulse Level (B.I.L.) Withstand	Phase to Ground, Phase to Phase (kV)	60	
<b>Frequency Ratings</b>		50 / 60	
<b>Current Ratings ❶</b>			
Rated Continuous Current (Amps)		800	
Maximum Interrupting Current Rating	2400 V (RMS Sym Amps)	12,500	
	5000 V (RMS Sym Amps)	12,500	
	7200 V (RMS Sym Amps)	12,500	
Maximum Interrupting MVA Rating	2400 V (Sym MVA)	50	
	5000 V (Sym MVA)	100	
	7200 V (Sym MVA)	150	
Short-Circuit Withstand at Rated Voltage	Current Peak ½ cycle (kA)	85	
Short Time Current Rating Capability	For 1 second (kA)	12.0	
	For 30 seconds (kA)	4.8	
Chop Current (Average RMS Amps)		0.5	
Make and Break Capability at Rated Voltage (kA)		8.0	
Ambient Temperature	°C	40	
<b>Contactor Coil Data (Series E)</b>			
Control Voltage (V <sub>CTL</sub> )	Coil Voltage (V <sub>CL</sub> )		
110 to 240 VAC or 110 to 250 VDC ❷	VAC: $V_{CL} = \sqrt{2} \times V_{CTL}$ (Max.)	Close Current (A <sub>DC</sub> , 200 milliseconds)	12
		Hold Current (A <sub>DC</sub> )	0.7
		Pick-up Voltage ❸	95
	VDC: $V_{CL} = V_{CTL}$	Drop-out Voltage ❹	75
		Trip Current (A <sub>DC</sub> , 200 milliseconds)	5.2
		Trip Voltage ❺	70
120 VAC	110 VDC	Close Current (A <sub>DC</sub> )	13.1
		Hold Current (A <sub>DC</sub> )	0.24
		Trip Current (A <sub>DC</sub> )	5.6
		Pick-up Voltage	102
		Trip Voltage	84
<b>Contactor Coil Data (Series D)</b>			
Control Voltage (V <sub>CTL</sub> )	Coil Voltage (V <sub>CL</sub> )		
120 VAC/ 230 VAC	110 VDC/ 208 VDC	Coil Inrush Current (A) – Electrically Held	13.1 / 7.1
		Coil Inrush Current (A) – Mechanical Latch	13.1 / NA
		Coil Inrush Current (A) – Mechanical Latch Trip	5.6 / NA
		Coil Continuous Current (A)	0.24 / 0.13
		Coil Pick-up Voltage (VAC)	102 / 196
		Coil Drop-out Voltage (VAC)	75 / 145

- ❶ The voltage and current ratings listed are valid up to 1,000 m (3,300 feet). Please refer to Table 1.C – Altitude Derating Chart, on page 1-8 for ratings above this altitude.
- ❷ Control voltage, as measured at the input of the IntelliVAC or IntelliVAC Plus control module.
- ❸ Provided that regular maintenance is performed.
- ❹ A contactor drop-out delay may be configured with the IntelliVAC control module (refer to publication 1503-UM053\_-EN-P), or the IntelliVAC Plus control module (publication 1503-UM054\_-EN-P).
- ❺ FDO = Fast Drop-Out. NDO = Normal Drop-Out.
- ❻ The number of contactor auxiliary contacts depends on the contactor type. Some of the contacts are used in the typical control schemes used.

## Contactor Specifications (cont.)

**Table 1.B - Bulletin 1502 Medium Voltage 800 Amp Contactor Ratings (cont.)**

Description		Specifications
<b>Operational Characteristics</b>		
Mechanical Life (Operations) x 1000 ③	Electrically Held	250
	Mechanical Latch	100
Electrical Life (Operations) x 1000 ③		250
Switching Frequency (Operations per hour)	Electrically Held	600
	Mechanical Latch	150
<b>Opening and Closing Times (Series E)</b>		
Maximum Closing Time	120/240 VAC (milliseconds)	150
Maximum Opening Time (without delay) ④	120 to 240 VAC (milliseconds)	60
<b>Opening and Closing Times (Series D)</b>		
Maximum Closing Time (120 VAC)	50 or 60 Hz (milliseconds)	200
Maximum Opening Time (Normal Drop Out)	50 or 60 Hz (milliseconds)	240
Maximum Opening Time (Fast Drop Out and Mechanical Latch)	50 or 60 Hz (milliseconds)	60
<b>Capacitor Switching (max. KVAR)</b>		
System Voltage	2400 V	2000
	4160 V	3000
	6900 V	4000
<b>General</b>		
Standard Altitude Capability (meters / feet) ① ⑦		-1,000 to 5,000 / -3,300 to 16,500
Contactor Weight (kg / lbs)		45 / 100
Auxiliary Contact Rating		A600
Auxiliary Contacts on the Vacuum Contactor (Max.) ⑥		3 N.O. / 3 N.C.

- ① The voltage and current ratings listed are valid up to 1,000 m (3,300 feet). Please refer to Table 1.C – Altitude Derating Chart on page 1-8 for ratings above this altitude.
- ② Control voltage, as measured at the input of the IntelliVAC and IntelliVAC Plus control modules.
- ③ Provided that regular maintenance is performed.
- ④ A contactor drop-out delay may be configured with the IntelliVAC and IntelliVAC Plus control modules (refer to publications 1503-UM053\_-EN-P and 1503-UM054\_-EN-P).
- ⑤ FDO = Fast Drop-Out. NDO = Normal Drop-Out.
- ⑥ The number of contactor auxiliary contacts depends on the contactor type. Some of the contacts are used in the typical control schemes used.
- ⑦ Altitude adjustment required.

**Table 1.C – Altitude Code/Derating**

Altitude Range	Reduce Max. 800 A Continuous Current Rating By :	Reduce B.I.L. Withstand Rating By :
0 to 1,000 m (0 to 3,300 ft.)	–	–
1,001 to 2,000 m (3,301 to 6,600 ft.)	20 A	6.0 kV
2,001 to 3,000 m (6,601 to 9,900 ft.)	40 A	12.0 kV
3,001 to 4,000 m (9,901 to 13,200 ft.)	60 A	18.0 kV
4,001 to 5,000 m (13,201 to 16,500 ft.)	80 A	24.0 kV

## Product Approvals

- UL347
- CSA22.2 No. 14 and T.I.L. D-21
- IEC60470
- CE Mark

## Receiving and Handling

### Receiving

Before leaving the factory, the contactors have been tested both mechanically and electrically. Immediately upon receiving the contactor, remove the packing material and check the contactor for possible shipping damage. If damage is found, do not discard any of the packaging material and, if possible, note the damage on the Bill of Lading before accepting receipt of the shipment. Report any damage immediately to the claims office of the common carrier. Provide a description of the damage and as much identification as possible.

### Preliminary Inspection

- Check for any cracks or breaks due to impact.
- Push on armature plate to ensure mechanisms are in good working order.
- Use a HiPot tester to ensure vacuum bottle integrity (refer to Vacuum Bottle Integrity Test later in this chapter).

### Handling

The contactor weighs approximately 42 kg (93 lb) and it is feasible for two (2) people to safely handle the contactor for a short duration (injury may occur should one person attempt to handle the equipment).

The following procedure shall be used if a crane or hoist is used to handle the contactor.

1. Insert two (2) 3/8"-16 UNC lifting bolts into the holes provided on the top of the contactor (Figure 2.1) and attach the lifting means to the contactor with ropes or cables. Use rigging with safety hooks or shackles.

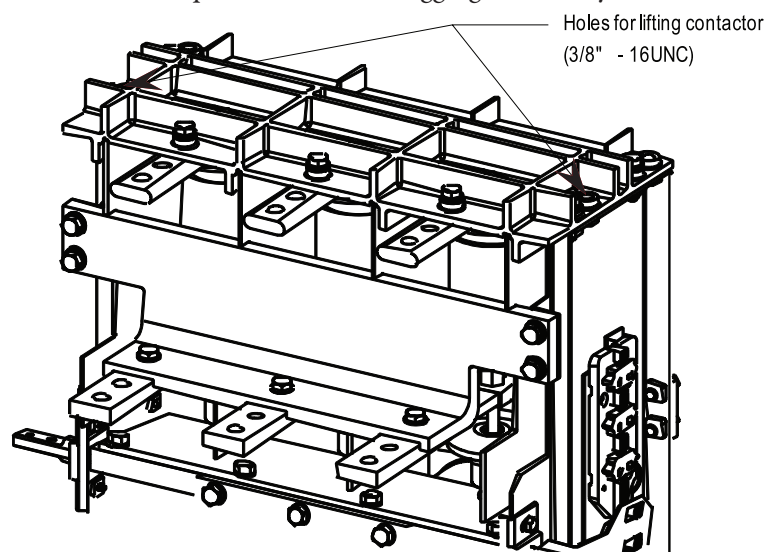


Figure 2.1 – Lifting Holes

## Handling (cont.)

2. Select or adjust the rigging lengths to compensate for an unequal weight distribution of the load and maintain the contactor in an upright position at all times.
3. To reduce the tension of the rigging and the compressive load on the lifting device, do not allow the angle between the lifting cables and vertical to exceed 45 degrees.
4. Never lift a contactor above an area where personnel are located.

When a forklift is used to handle the equipment, the following considerations should be taken:

1. Keep the contactor in an upright position.
2. Carefully balance the contactor on the forks.
3. Use a safety strap when handling to steady the contactor and avoid shifting or tipping.
4. Avoid excessive speeds and sudden starts, stops and turns when handling the contactor.
5. Never lift a contactor above an area where personnel are located.

## Pre-energization Inspection

Before placing the contactor in service, inspect it carefully for possible damage sustained in transit or during maintenance:

- Check that all interphase barriers are correctly installed.
- Check housing for any cracks or breaks due to impact.
- Push on the armature plate, rotating shaft to ensure mechanism is in good working order.
- Inspect the contactor for dirt, stray loose hardware, tools or metal chips and, if necessary, vacuum clean.

## Storage

If it is necessary to store the contactor before it is put into service, be certain to store it in a clean, dry, dust and condensation free area. Do not store the contactor outdoors.

Storage temperature should be maintained between -20°C to 75°C (-4°F to 149°F). If storage temperature fluctuates or if humidity exceeds 85%, space heaters should be used to prevent condensation. Preferably, the contactor should be stored in a heated building having adequate air conditioning.

## Vacuum Bottle Integrity Test

The internal dielectric condition and vacuum integrity of the vacuum bottles is determined by this test. Clean the outside of the vacuum bottles with a non-linting cloth or industrial type wiper before performing the test. Test each bottle individually during this test.

---

### SHOCK HAZARD



X-ray emissions may be produced if a voltage higher than 25,000 Volts is applied across the open contacts of a vacuum bottle.

---

### ATTENTION



The vacuum bottles are tested thoroughly at the factory prior to shipment. However, the bottles can be damaged by mishandling during shipment. This damage may not be visible, so this test should be performed before the contactor is energized for the first time and each time it is returned to service after maintenance, adjustment, or repair. Otherwise, this test should be performed annually.

---

Caution should be exercised during this test since high voltage testing is potentially hazardous.

High-potential test instruments can be purchased to perform the vacuum bottle integrity test. A megger can not be used to measure vacuum integrity because the megger voltage is too low. One of the following Hi-pot testers is recommended as a test instrument.

MANUFACTURER	ADDRESS
Mitsubishi Type VI #4U17	Chicago, Ill., USA
Jennings Model JHP-70A	San Jose, CA., USA
Hipotronics Model 7BT 60A	Brewster, NY, USA

## Vacuum Bottle Integrity Test (cont.)

### SHOCK HAZARD



High-voltage is present during this test. Caution should be exercised during this test since high voltage testing is potentially hazardous.

Caution should be exercised during this test since high voltage testing is potentially hazardous.

### ATTENTION



Before doing any work on the contactor, the controller isolating switch must be in the open position and locked out. If any control power is used from a separate source, it should also be isolated. It is also suggested that a “Hot Stick” be used to ensure equipment is voltage free.

1. The contactor may be tested while it is in the power cell. The line connection of the contactor must be disconnected and the ground lead from the Hi-pot tester must be connected to the load side of the contactor.
2. With the contactor in the open position, connect the test leads to the contactor power terminals as shown in Figure 2.2. It is recommended that an AC hi-pot tester be used. Apply 16 kV for 60 seconds and monitor the leakage current. It should not exceed 5 mA.
3. If no breakdown occurs, the bottle is in an acceptable condition. If a breakdown occurs, the bottle should be replaced.  
**Note:** Rockwell Automation recommends that, if the contactor has been in service, all three (3) bottles be replaced at the same time.
4. After the HIGH POTENTIAL VOLTAGE is removed from the bottles, the metal end caps of the bottles should be discharged with a grounding rod to remove any residual electrical charge.

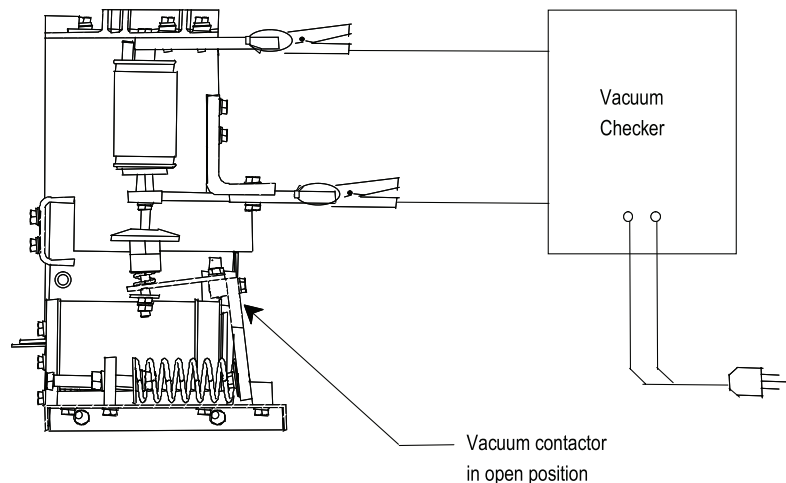


Figure 2.2 – Vacuum Bottle Integrity Test Circuit



The allowable leakage current of 5 mA is a maximum for new dry equipment, and is exclusive of leakage due to test equipment leads. The test setup leakage can be determined by running the dielectric test with test leads not connected to the contactor and noting the maximum leakage current. If this value is more than 2 milliamperes, it should be added to the 5 mA limit when testing the vacuum bottles.

**NOTE:** Rockwell Automation does not recommend DC HiPot testing because the values obtained during the test are not a reliable indication of vacuum bottle integrity.

DC HiPot testing is unreliable due to the occurrence of a phenomenon known as Cathode Ray Tube Effect. This occurs when one contact of the vacuum bottle has a deformity, such as a burr or deposit, while the other contact remains flat and true. This sets up leakage currents which flow from a small surface to a large surface in one direction and vice versa when the polarity of the tester is changed. The resultant current is large in one direction which would indicate, incorrectly, a faulty vacuum bottle.

At best, DC testing will verify vacuum integrity if both contact surfaces are perfectly smooth. It will not, however, give any indication of the degree of vacuum since the contact surface can feasibly change with each operation of the vacuum contactor. AC testing, on the other hand, will provide reliable vacuum integrity indication. As well, the degree of vacuum within the bottle can be determined by comparing initial test results to the present readings. Increases in leakage current indicates a reduction in vacuum within the vacuum bottle.

For these reasons, Rockwell Automation recommends AC testing as the only reliable method of testing vacuum bottles.

## **Insulation Resistance Test**

Using a 1000 volt Megger, the resistance from phase to phase or phase to ground shall be greater than 500 megohms.

## Installation

### Mounting

The Allen-Bradley vacuum contactor is normally fixed mounted (bolted down) in the enclosure of the controller. There are four (4) mounting holes at the base of the contactor (Figure 3.1) to secure it to the enclosure. For reversing, autotransformer and 2-speed controllers, one contactor may be mounted on top of the other. There are four (4) threaded mounting holes at the top of the contactor to accommodate this configuration.

**IMPORTANT:** The contactor is a bolted assembly and is therefore subject to twisting if fastened to an uneven surface. The contactor mounting plate has small stand-offs that permit the contactor to be fastened without twisting the frame. The contactor may not function correctly if it is forced onto an uneven mounting surface.

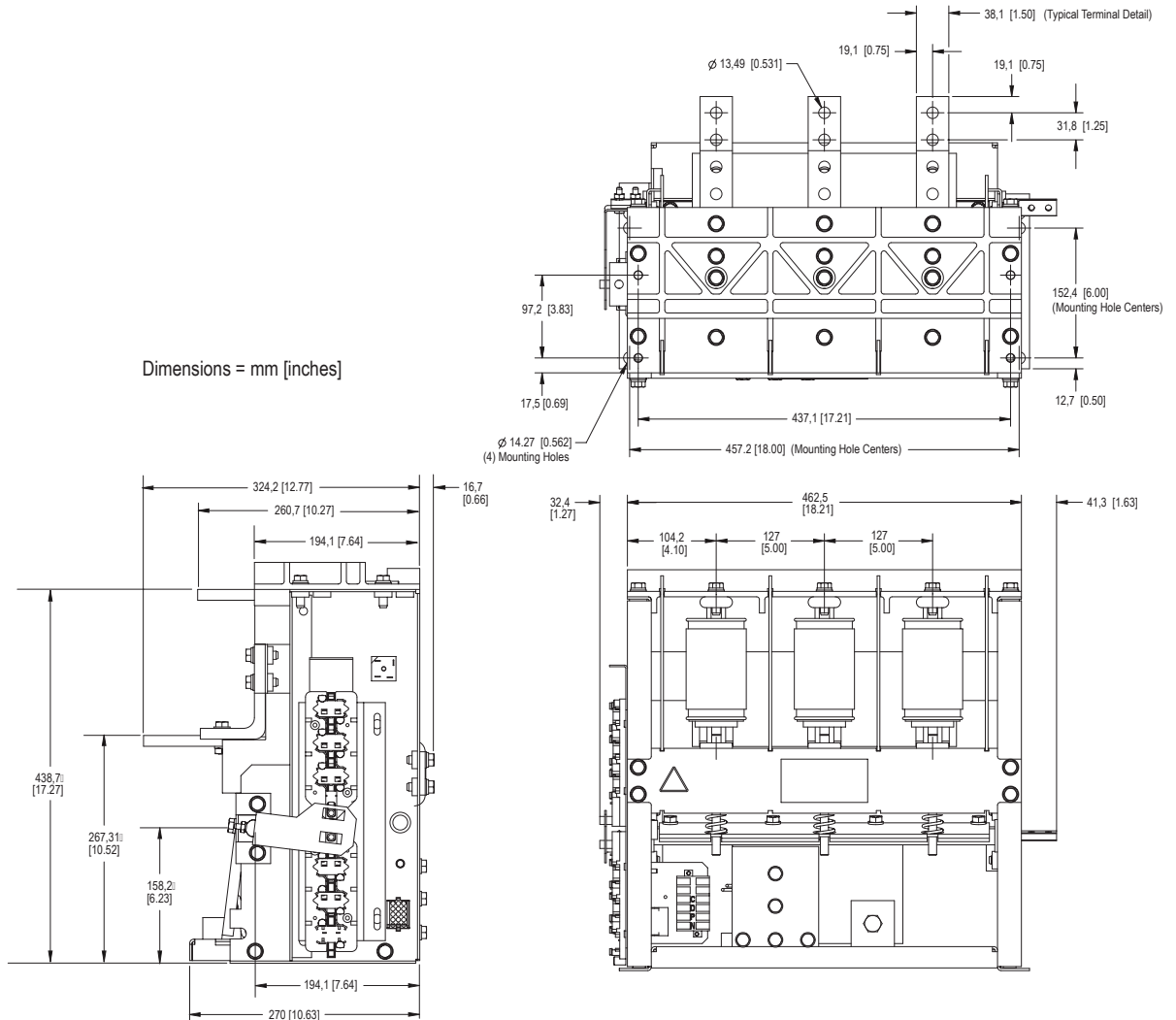
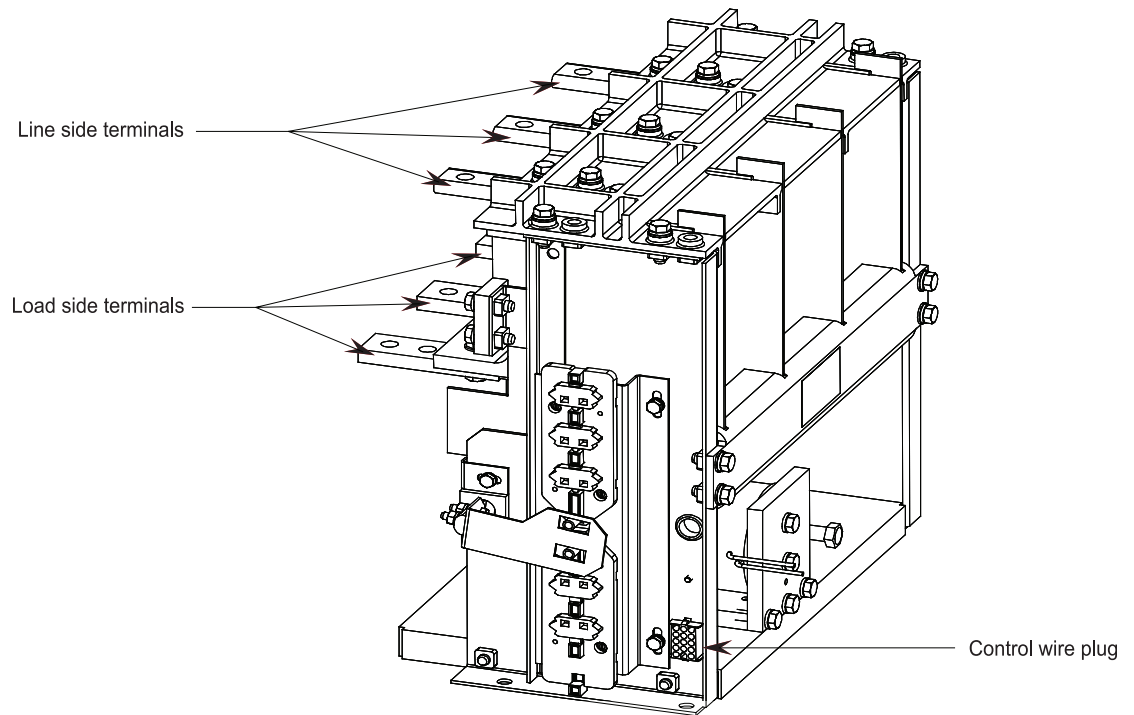


Figure 3.1 – Contactor Mounting Details

## Electrical Connections

The control wiring from the low voltage panel to the contactor is made through a wire harness and connects to the left side of the contactor with a male and female configured wire plug.

The power wiring terminates on the rear side of the contactor to the line and load terminals. Holes are provided to accommodate 12 mm (1/2 in.) size hardware (Figure 3.2).



**Figure 3.2 – Electrical Connections**

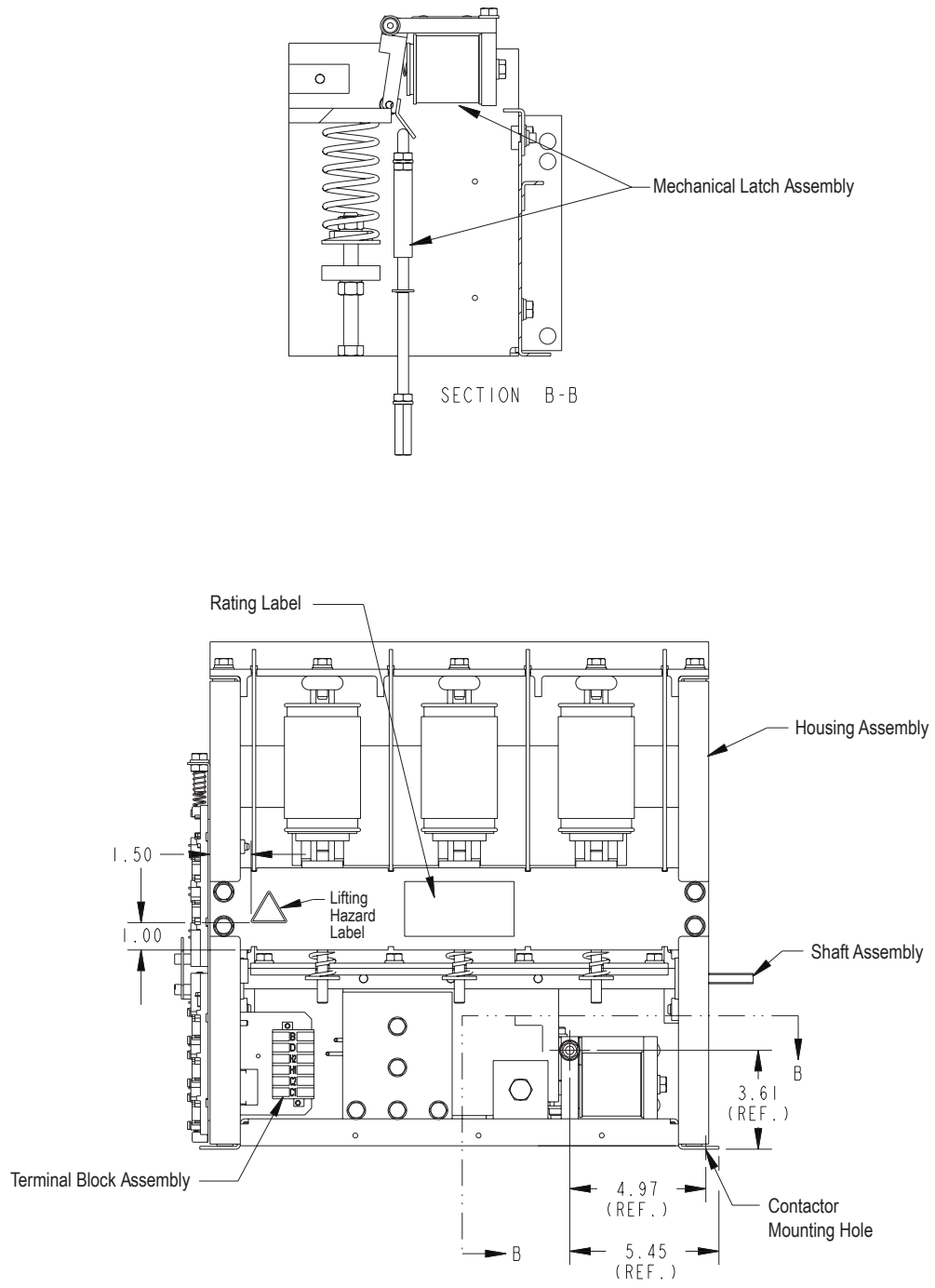
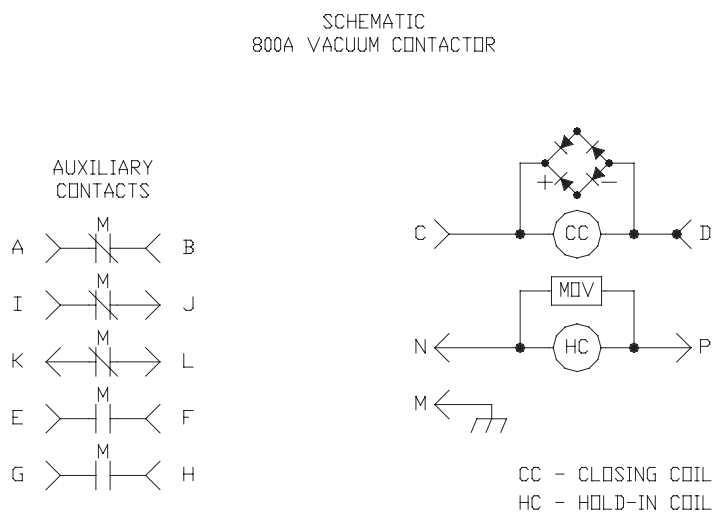
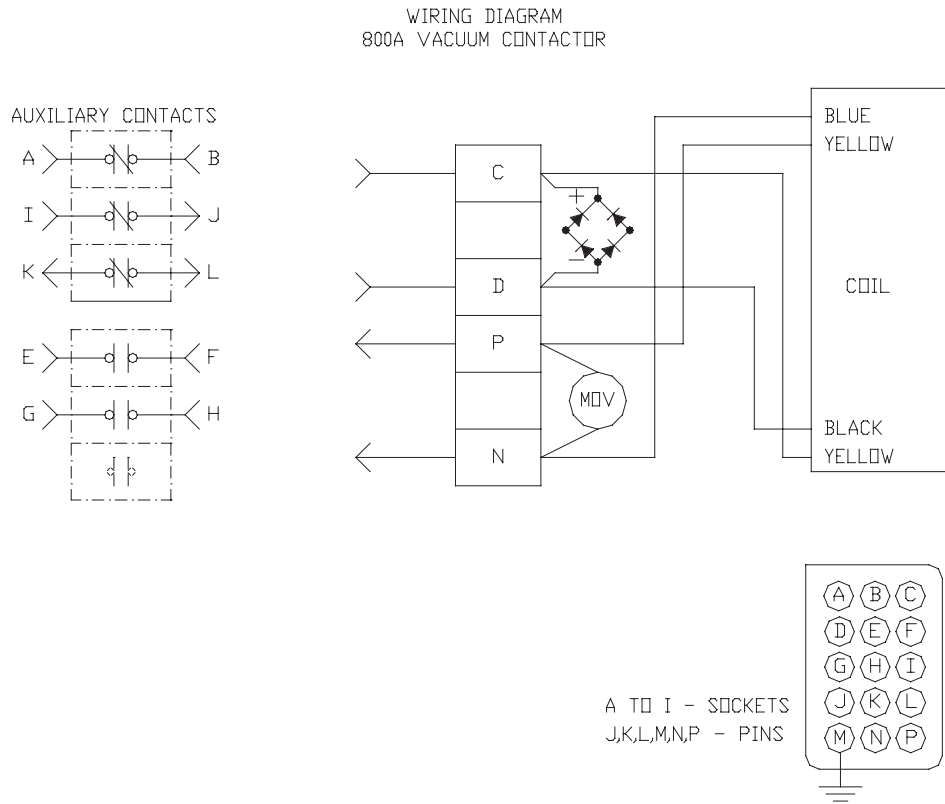
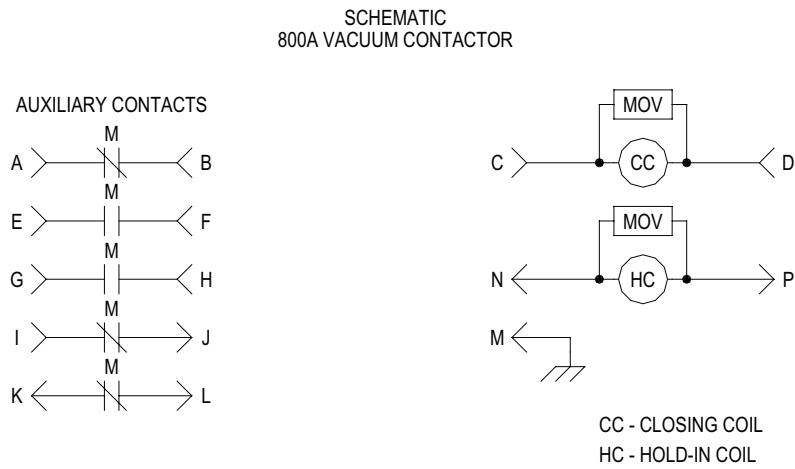
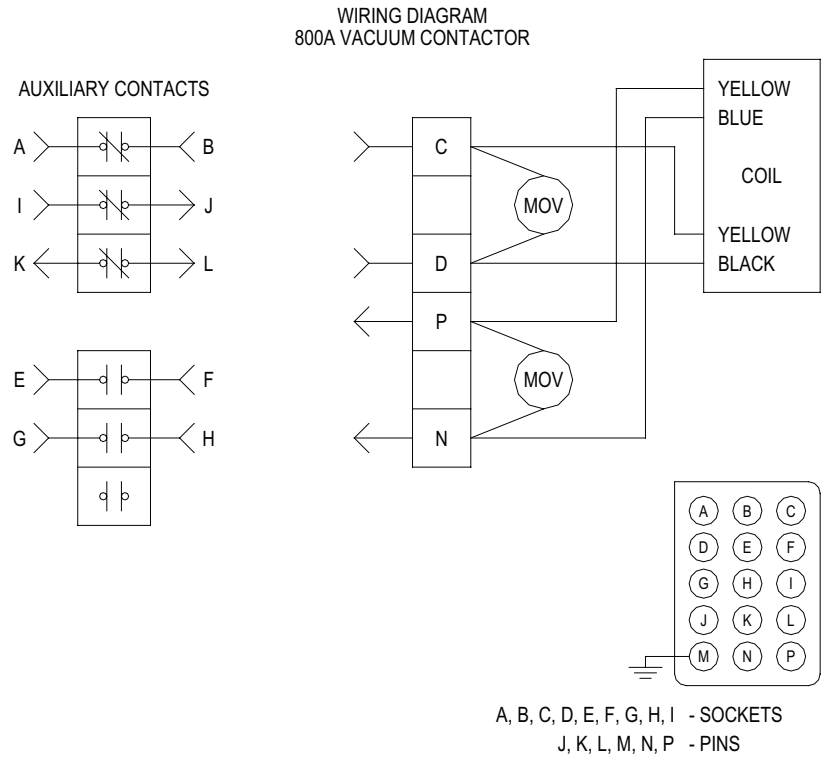


Figure 3.3 – Electrical Connections

### Wiring and Schematic Diagrams



**Figure 3.4 – Wiring and Schematic Diagram • Series D Electrically Held Contactor (normal drop-out time)**



80113-646-28

**Figure 3.5 – Wiring and Schematic Diagram • Series D Electrically Held Contactor (fast drop-out time)**

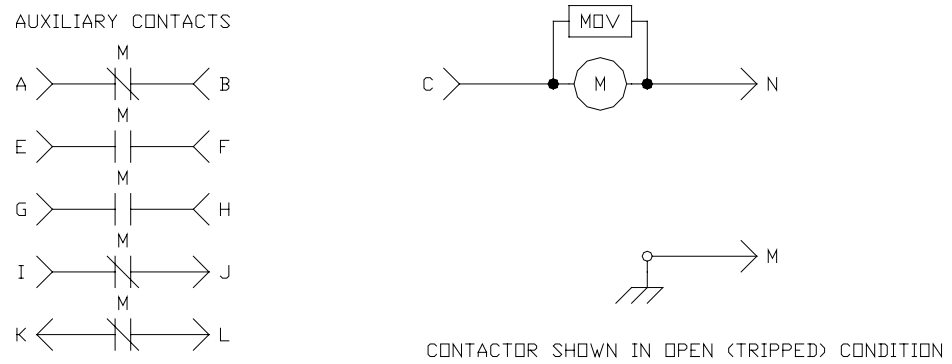
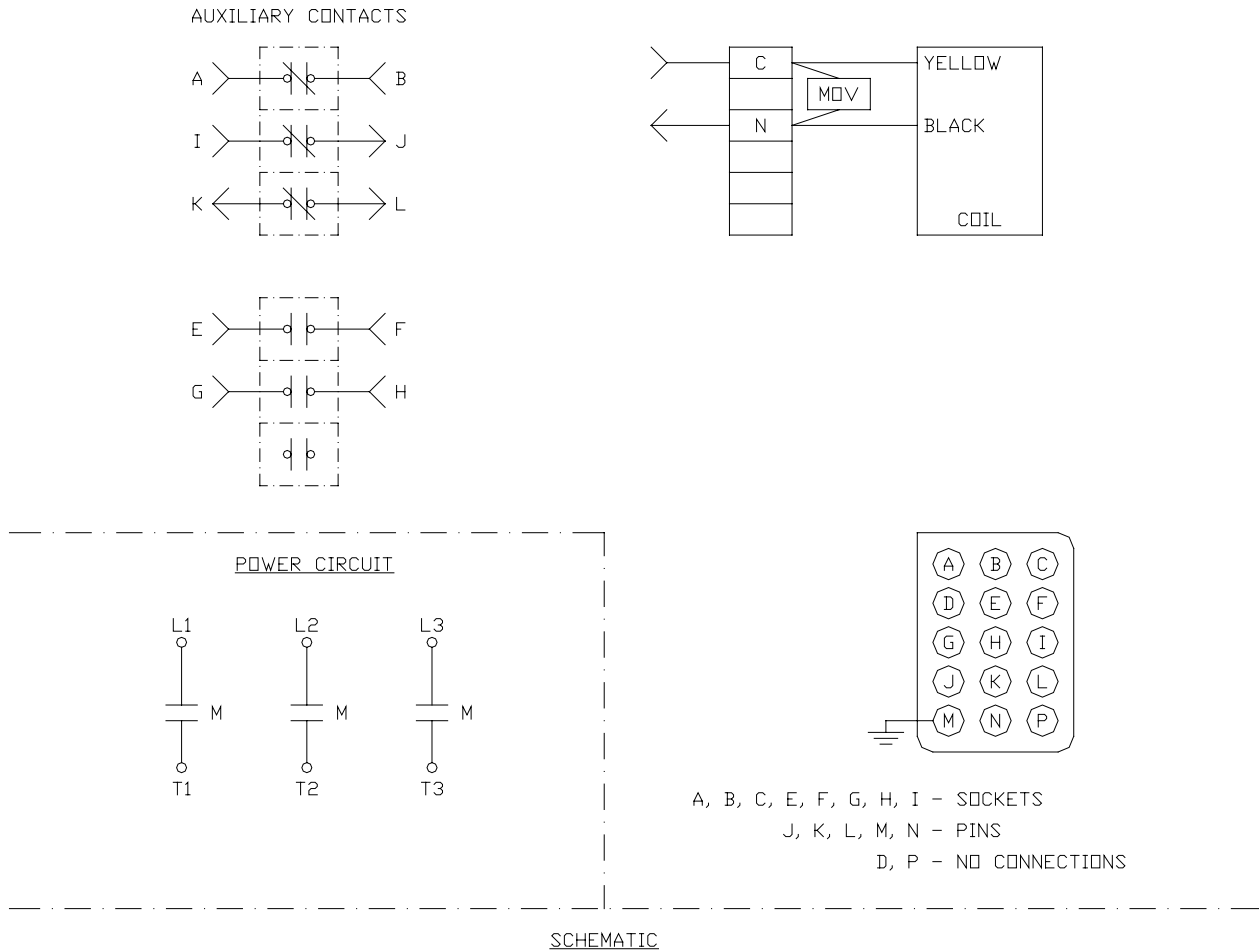
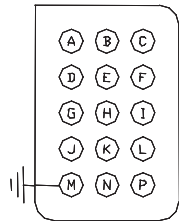


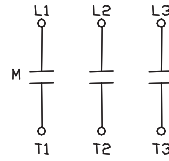
Figure 3.6 – Wiring and Schematic Diagram • Series E, Electrically Held Contactor

WIRING DIAGRAM  
800A MECHANICAL LATCH

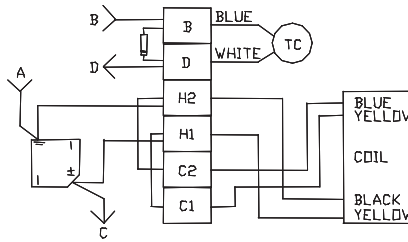
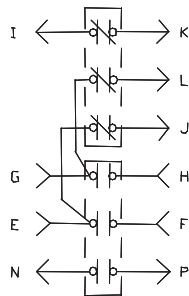


C,D,I,J,K,L,M,N,P - PINS  
A,B,E,F,G,H - SOCKETS

POWER WIRING



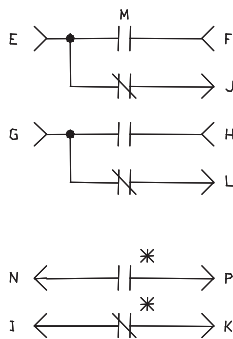
AUXILIARY CONTACTS



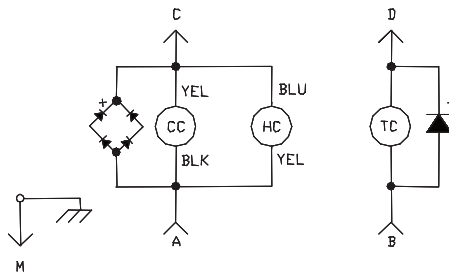
SCHEMATIC

800A MECHANICAL LATCH VACUUM CONTACTOR

AUXILIARY CONTACTS



\* THESE CONTACTS ARE USED  
IN THE CONTACTOR CONTROL  
SCHEME TO INTERLOCK  
COIL SWITCHING.



CC - CLOSING COIL  
TC - TRIP COIL  
HC - HOLDING COIL

Figure 3.7 – Wiring and Schematic Diagram - Series D Mechanical Latch Contactor



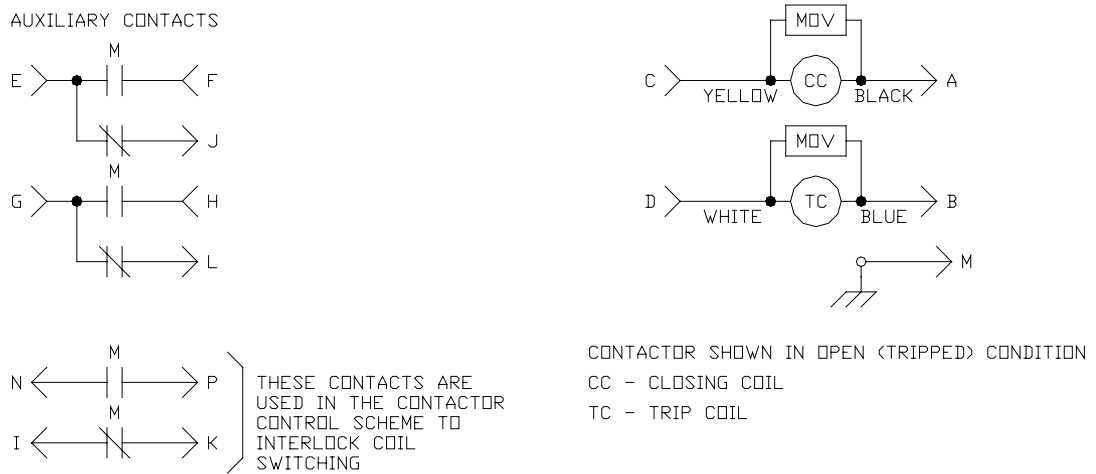
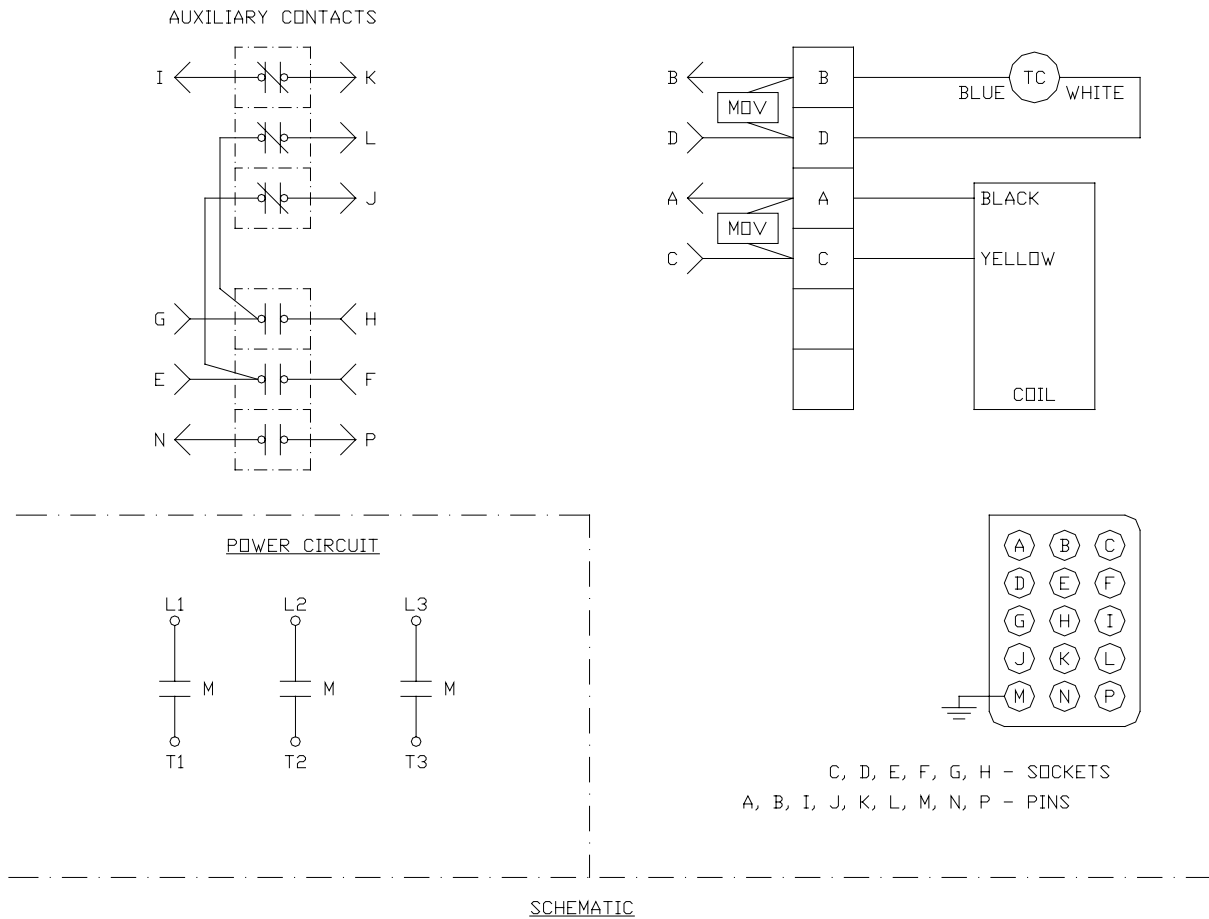
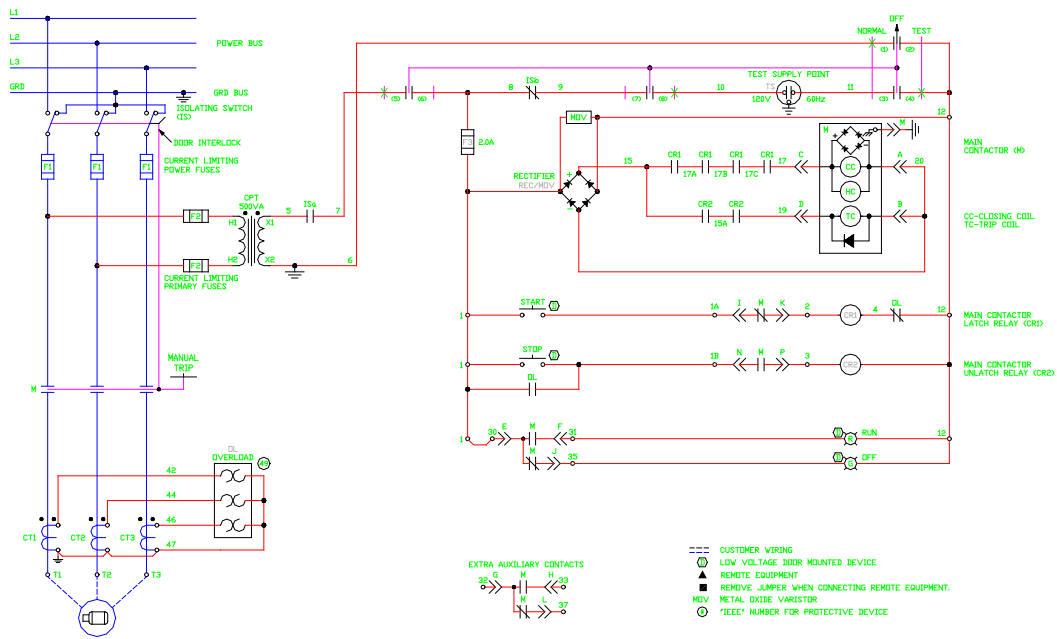
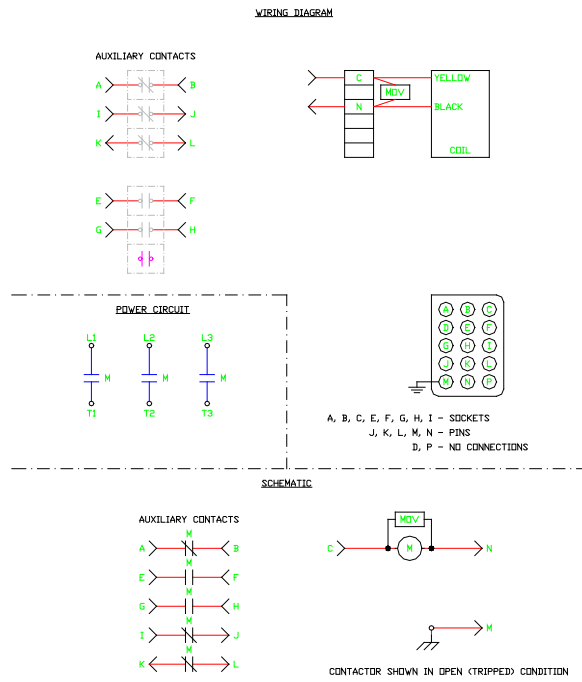


Figure 3.8 – Wiring and Schematic Diagram • Series E, Mechanical Latch Contactor

### Typical Electrical Diagrams



**Figure 3.9 – Typical Electrical Diagram for 800 amp FVNR Controller (Series D Electrically Held Contactor, 120 VAC, normal drop-out time)**



**Figure 3.10 – Typical Electrical Diagram for 800 amp FVNR Controller (Series D Mechanical Latch Contactor, 120 VAC)**

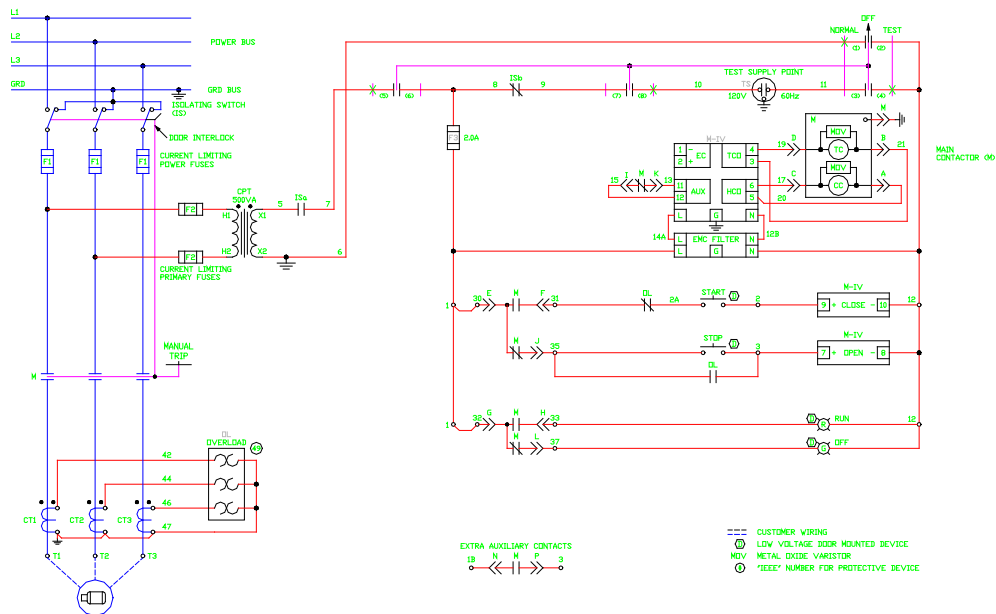


Figure 3.11 – Typical Wiring and Schematic Diagram for 800 amp FVNR Controller (Series E • Electrically Held Contactor)

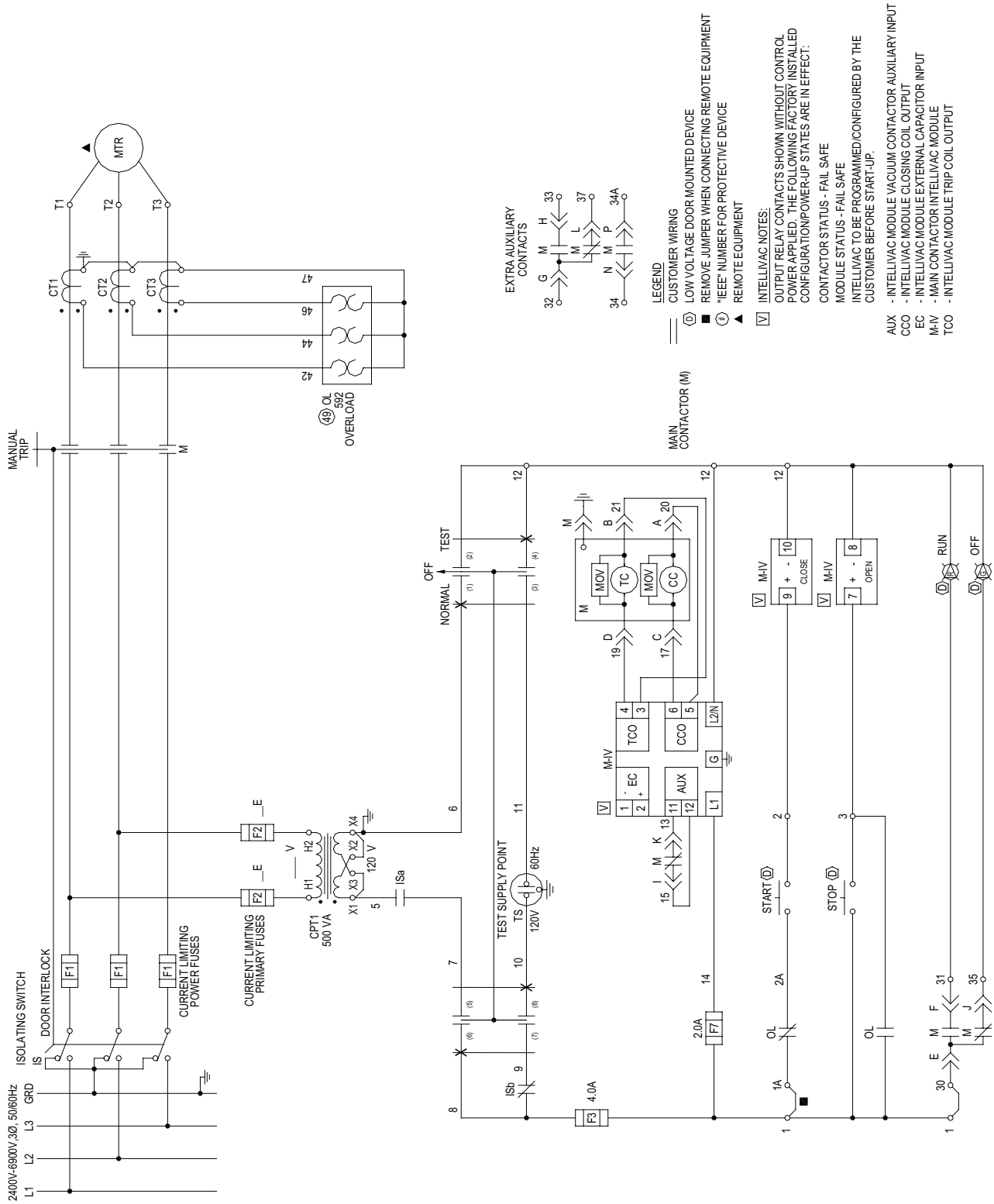


Figure 3.12 – Typical Wiring and Schematic Diagram for 800 amp FVNR Controller (Series E • Mechanical Latch Contactor)

## Maintenance

### Tool Requirements

When maintenance is performed on the vacuum contactor, one or all of the following tools may be required.

- 3/8" drive ratchet wrench with extension
- 3/8" drive torque wrench
- Standard 3/8" drive sockets; 7/16", 9/16", 3/4"
- Open end wrenches: 7/16", 9/16", 11/16", 3/4", 7/8"
- 3/16" Allen key
- 3/16" dia. rod
- Slot head screwdrivers; 1/8" wide, 1/4" wide
- Feeler gauge set (0.125" and 0.300")
- Digital caliper capable of depth measurement
- High potential tester

### Recommended Torque Values

Part of the contactor may have to be disassembled for maintenance or replacement. There are appropriate torque requirements for particular bolt sizes when reassembling the contactor. For the following bolt sizes, use the specified torque values listed below:

1/4" Hardware	6 ft-lb (8 N-m)
3/8" Hardware	20 ft-lb (27 N-m)
1/2" Hardware	48 ft-lb (65 N-m)

### Routine Maintenance

The following should be carried out on an annual basis or whenever a contactor is serviced:

#### Cleaning

- Ensure that metal chips or filings are cleaned from around the electromagnet assembly (coil core pole face and mating armature plate) as they may affect proper operation of the contactor. If necessary, vacuum clean.

**Note:** Do not use compressed air to clean or remove dirt from surfaces or the enclosure as it will only redistribute the dirt.

- If dirty, clean the white ceramic area of vacuum bottles with a clean lint-free cloth.

## Routine Maintenance (cont.)

### Main Contact Inspection

- Visually inspect the wear of the main contacts with the contactor energized. When any part of the wear indicator line, located on the front side of the hex shaft, moves up into the bearing, replace all three vacuum bottles. (Refer to Figure 4.11) Under normal conditions, this will not be necessary until the contactor has gone beyond the 250,000 rated life (100,000 for mechanical latch contactors).

### HiPot Test (Refer to Chapter 2)

- Check the vacuum bottle integrity.
- Check the insulation resistance.

### Lubrication

**Note:** Lubrication of the contactor is not necessary. Do not grease the armature shaft plastic bearings, nor the vacuum bottle plastic bearings.

The grease will dry out and impede the free motion of the contactor.

### Mechanical Latch Roller Replacement

- The roller on the mechanical latch mechanism must be replaced every 50,000 operations. See Mechanical Latch Roller Replacement Procedure (refer to page 4-17).

---

**SHOCK HAZARD**

High voltage may be present, which can result in severe injury or death. It is suggested that a “Hot Stick” be used to ensure that the equipment is dead. Lock-out any incoming power and disconnect the control plug from the contactor before working on this equipment

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**ATTENTION**

Before performing any maintenance on the contactor that is installed inside a starter configuration, for safety, be sure to follow all procedures noted in the appropriate User Manual for complete instructions on accessing the power cell compartment.

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## Vacuum Bottle Replacement Set-Up Procedure

The following procedure shall be used to remove and replace the vacuum **and** bottles. This procedure can be performed with the contactor remaining in the power cell of the controller. After this procedure has been completed, the contactor will be set up to operate properly at 1000 m (3300 ft). Refer to the Altitude Adjustment procedure for other altitude setting on page 4-18.

**ATTENTION**

For the safety of the maintenance personnel, remove the control wiring from the contactor by disconnecting the control wire plug before starting any disassembly of the contactor.

1. Before removing the vacuum bottles, mark the installed bottles clearly to avoid confusing them with the replacement vacuum bottles.
2. Remove the front retaining brace and all four interphase barriers as shown in Figure 4.1.

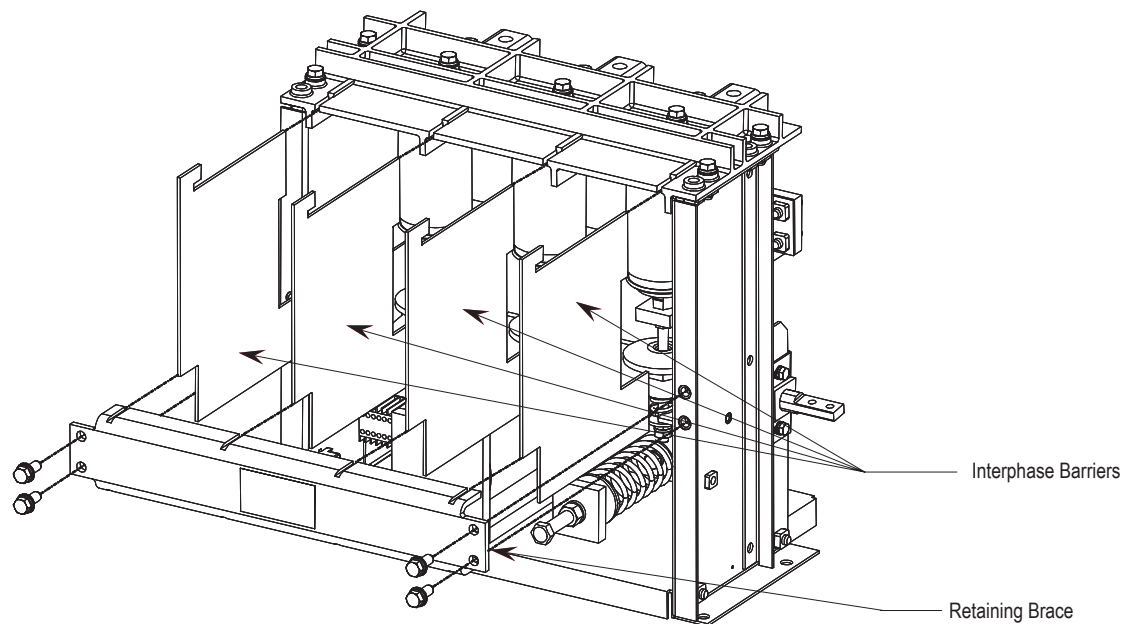
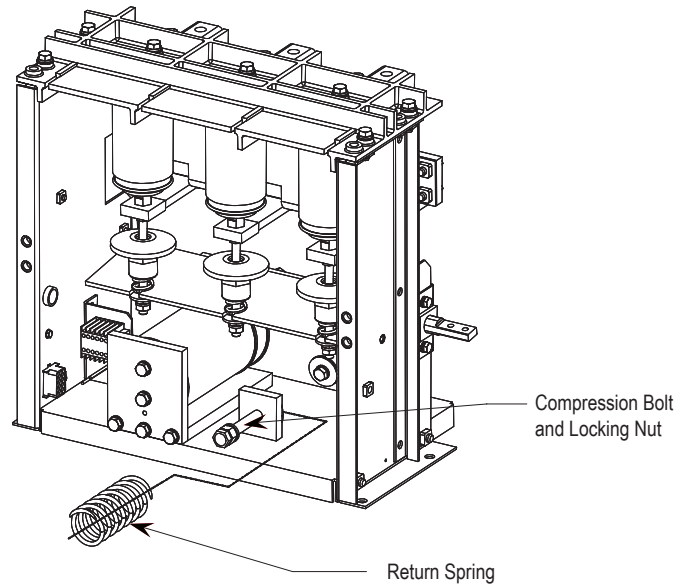


Figure 4.1 – Removal of Interphase Barriers



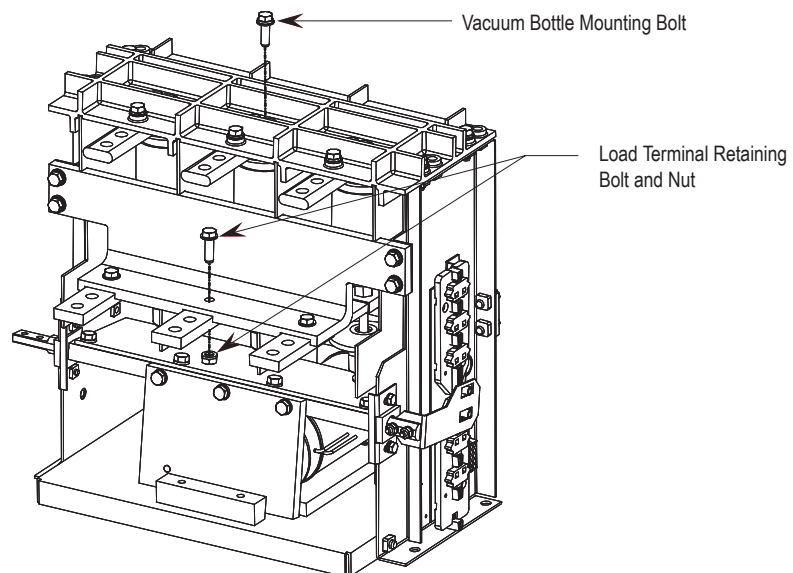
## Vacuum Bottle Replacement and Set-up Procedure (cont.)

- Loosen the locking nut on the return spring compression bolt and withdraw the compression bolt until the return spring is relaxed. Remove the return spring as shown in Figure 4.2.



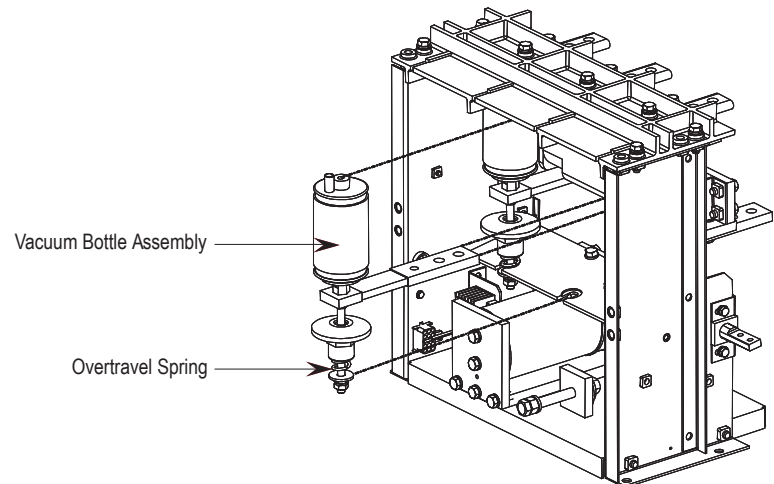
**Figure 4.2 – Removal of Return Spring**

- Remove the bolts which retain the load terminals at the rear of the contactor and the main mounting bolt at the top of one vacuum bottle as shown in Figure 4.3 (if the contactor is still mounted in the controller, disconnect cables from the load terminals first).



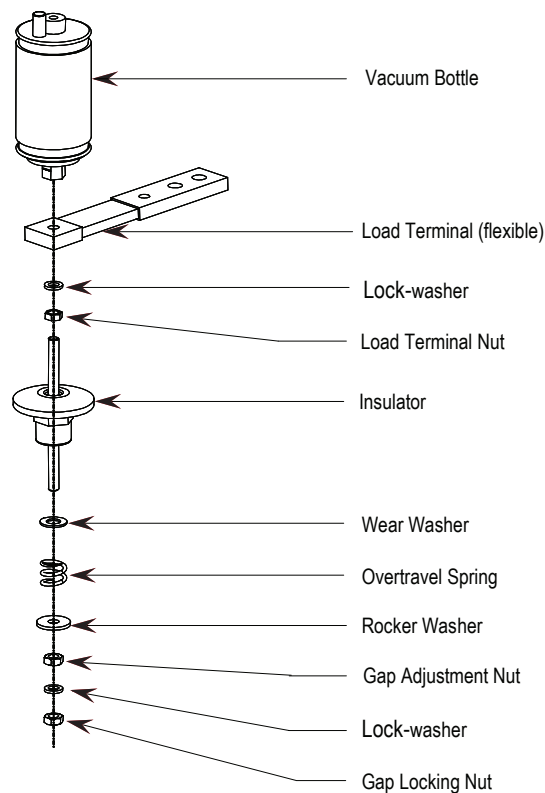
**Figure 4.3 – Mounting and Retaining Bolt Removal**

5. Slide the vacuum bottle assembly out of the contactor as shown in Figure 4.4 (the overtravel spring may need to be compressed slightly). Repeat this for the remaining vacuum bottle assemblies.



**Figure 4.4 – Removal of Vacuum Bottle Assembly**

6. Disassemble one assembly at a time as shown in Figure 4.5. Leave the gap adjustment nut directly below the rocker washer on the insulator stud near the bottom.

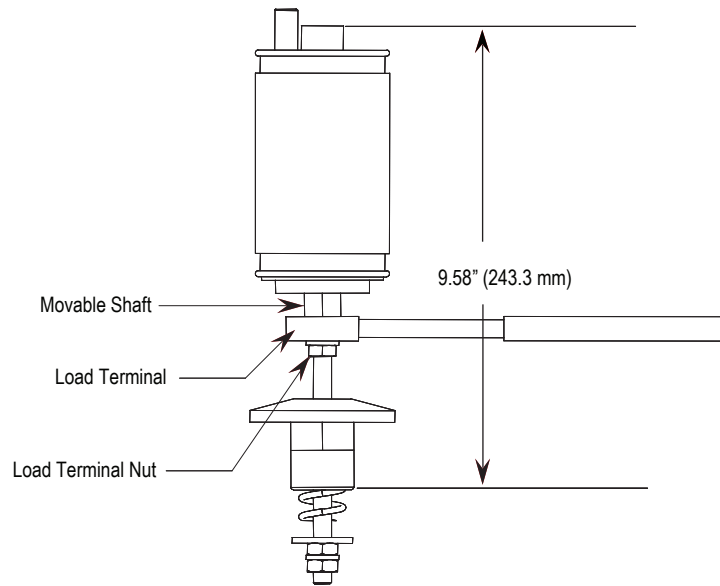


**Figure 4.5 – Vacuum Bottle Assembly**

## Vacuum Bottle Replacement and Set-up Procedure (cont.)

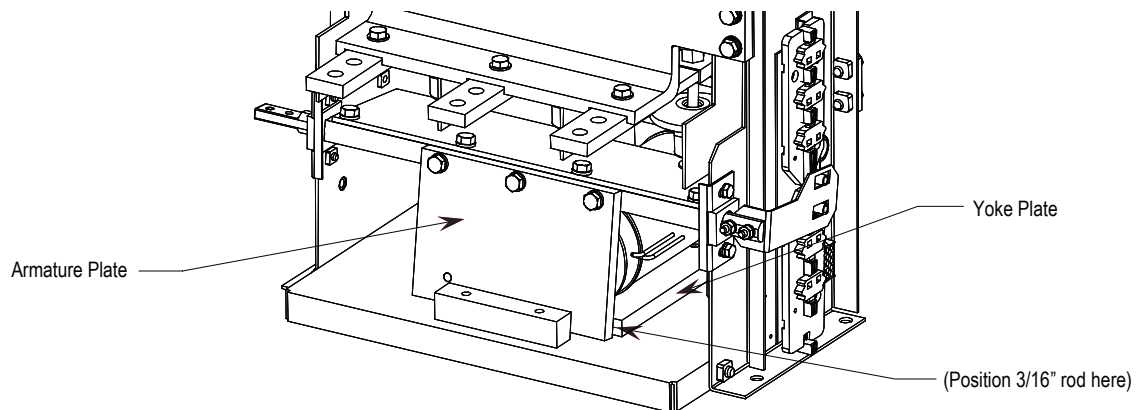
- Reassemble the assembly using a new vacuum bottle, leaving the bottom gap locking nut and lock washer off. Position the insulator to achieve the 243.3 mm (9.58 in.) dimension as shown in Figure 4.6 and leave the load terminal nut loose (the position of the load terminal shall be in the opposite direction of the wear indicator line on the movable shaft). Repeat this procedure for the remaining vacuum bottle assemblies.

The 9.58" dimension is not critical, it is simply a good starting point in order to make the installation easier.



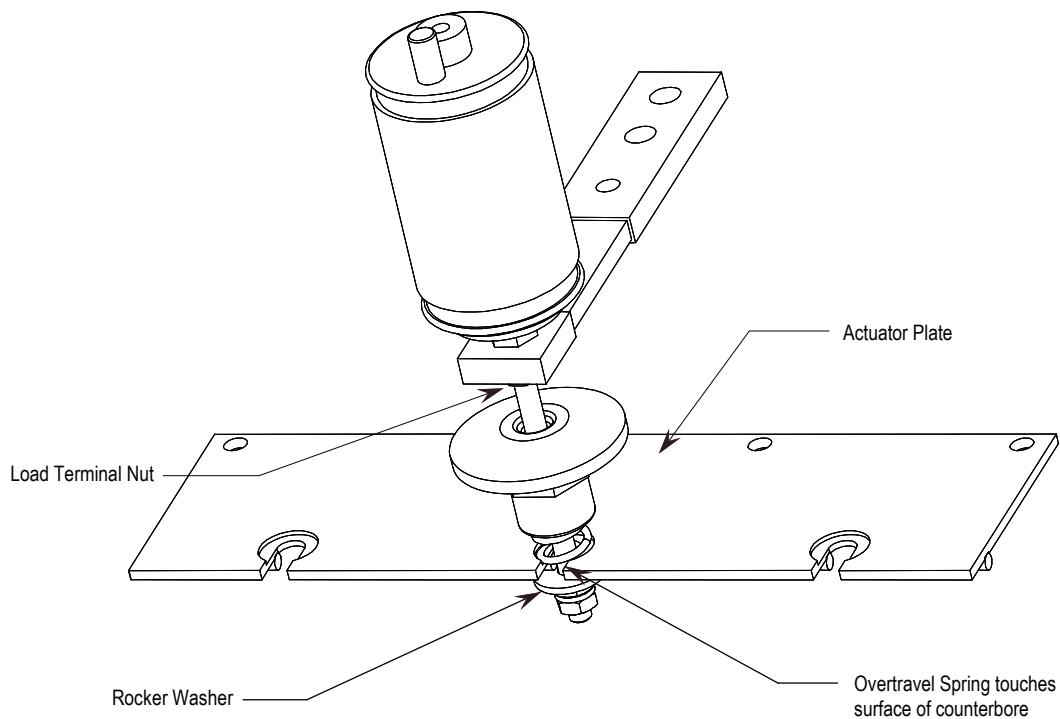
**Figure 4.6 – Reassembled Vacuum Bottle Assembly**

- Position a 4.76 mm (0.1875 in.) diameter rod, e.g. drill bit or screw, between the armature plate and the yoke plate to prevent the contactor from closing as shown in Figure 4.7.



**Figure 4.7 – Set-up Position**

9. Position the middle vacuum bottle assembly (phase B) in the contactor. Ensure that the rocker washer is below the actuator plate and that the wear indicator line is facing towards the front. Install and torque the load terminal retaining bolt and the vacuum bottle mounting bolt to 20 ft•lb (27 N•m).
10. With the armature plate held tightly against the 3/16" rod, turn the insulator as required such that the bottom of the overtravel spring touches the surface of the actuator plate inside the counter bore. The spring must be held securely in place, slightly compressed (as shown in Figure 4.8). Tighten the load terminal nut.

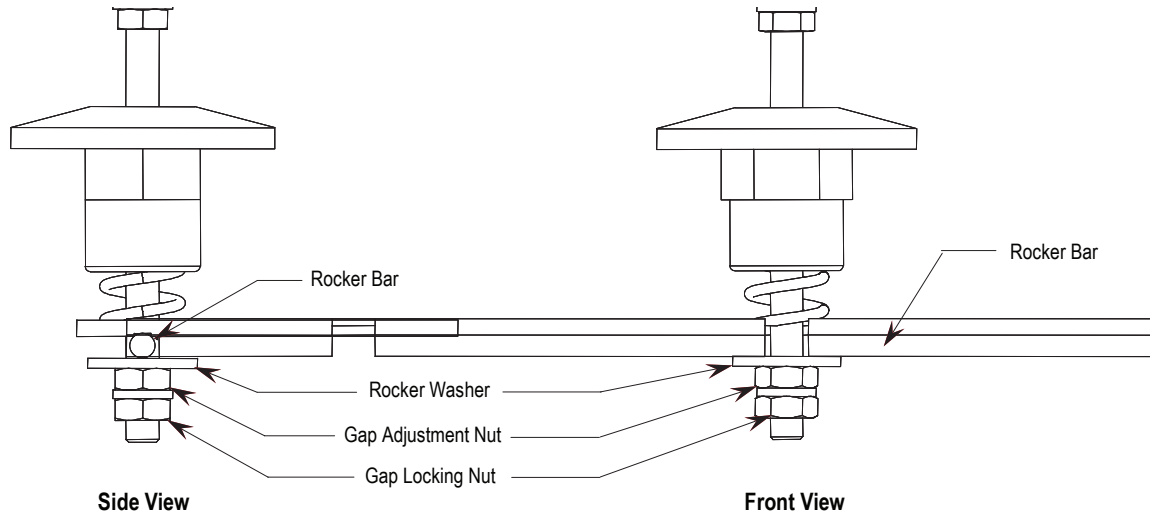


**Figure 4.8 – Insulator/Actuator Plate Set-up**

11. With the armature plate still held tightly against the rod, turn the gap adjustment nut until the rocker washer makes contact with the round rocker bar as shown in Figure 4.9. Install the lockwasher and gap locking nut and tighten the two nuts against each other making sure that the top gap adjustment nut does not turn.

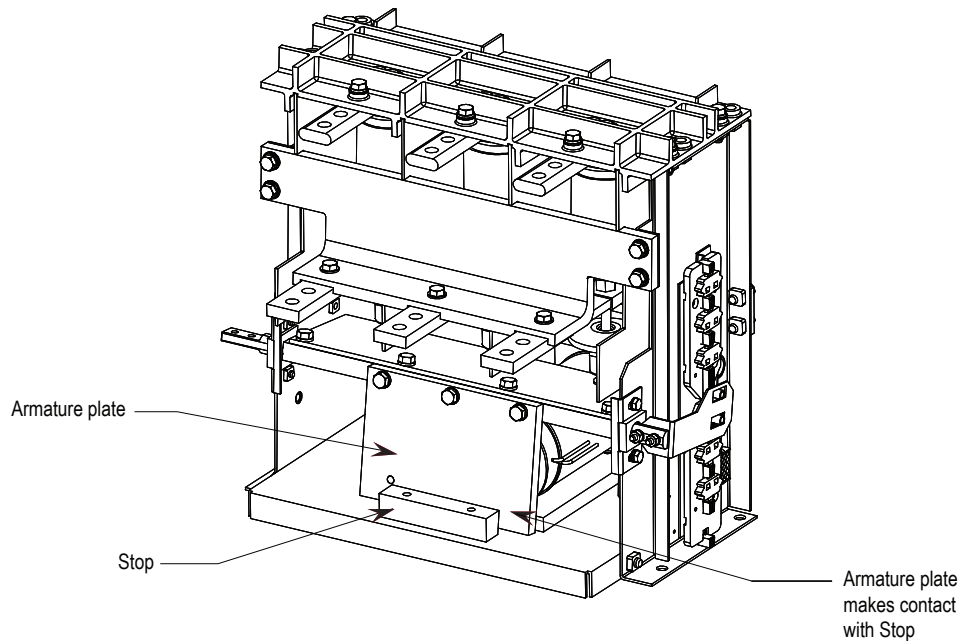
**Note:** Ensure that the overtravel spring is held securely in place with no play. Should there be play in the positioning of the spring, loosen the load terminal nut and repeat Steps 10 and 11.

## Vacuum Bottle Replacement and Set-up Procedure (cont.)



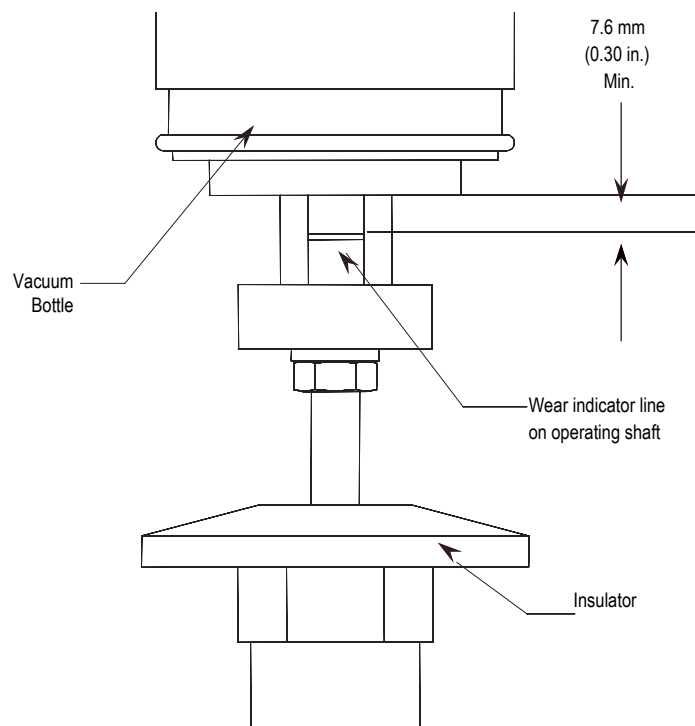
**Figure 4.9 – Rocker Washer Adjustment**

12. Repeat steps 9, 10 and 11 for the remaining vacuum bottle assemblies.  
**Note:** Make sure that the rocker washers for all three assemblies just make contact with the rocker bars as this will ensure synchronized contact movement.
13. **REMOVE THE 3/16" ROD DRILL BIT OR SCREW INSERTED IN STEP 8 FROM BETWEEN THE ARMATURE AND YOKE PLATES.**
14. Move the actuator plate up and down manually and check that the rocker washers make contact simultaneously. If they do not, loosen the nuts below the appropriate washers and adjust accordingly.
15. Reinstall the return spring and advance the compression bolt until the armature plate makes contact with the stop as shown in Figure 4.10. Advance the bolt one additional full turn to ensure that the contactor opens fully. Holding the Compression bolt in position with a wrench, tighten the compression bolt locking nut.



**Figure 4.10 – Return Spring Installation**

16. With the contactor in the open position, measure the distance between the bottom of the bearing and the top of the wear indicator line on all three vacuum bottles with a feeler gauge. This dimension shall be 7.6 mm (0.300 in.) minimum as shown in Figure 4.11.



**Figure 4.11 – Vacuum Bottle Contact Gap (Front View)**

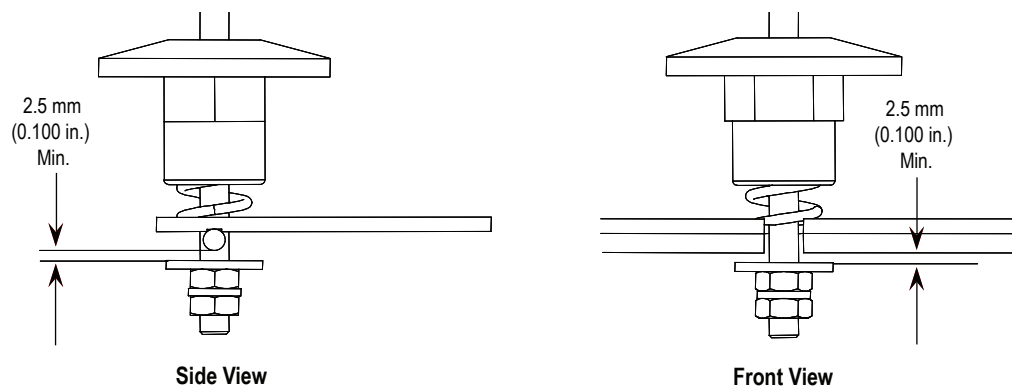
## Vacuum Bottle Replacement and Set-up Procedure (cont.)

If the dimension is less than 7.6 mm (0.300 in.), loosen the gap locking nut on all three (3) bottles. Starting on phase B, turn the gap adjustment nut upwards until 7.6 mm (0.300 in.) is achieved. Repeat this procedure for phases A and C, ensuring that the measurements are equal for all three (3) phases. Tighten and torque the gap locking nuts for all three (3) phases.

**Note:** Ensure that the armature plate is solidly positioned against the stop and compress the return spring further if necessary.

**Note:** Account for all tools, including the set-up rod, used during the above procedure. If any tools are unaccounted for, do not energize the equipment.

17. Using the “TEST” control circuit in the starter, energize the contactor and check for minimum allowable overtravel on all three vacuum bottle assemblies with a feeler gauge. The overtravel dimension shall be 2.5 mm (0.100 in.) minimum as shown in Figure 4.12.



**Figure 4.12 – Minimum Allowable Overtravel**

If the overtravel dimension is less than 2.5 mm (0.100 in.), leave the contactor energized and loosen the load terminal nut on all three (3) phases. Turn the insulator downwards on phase B until the dimension of 2.5 mm (0.100 in.) is achieved, then tighten the load terminal nut. Repeat this procedure for phases A and C, ensuring that the measurements are equal for all three (3) phases. Tighten and torque the gap locking nuts on all three (3) phases.

**Note:** Both the 7.6 mm (0.300 in.) and 2.5 mm (0.100 in.) dimensions must be achieved for proper function. If it is not possible to achieve these dimensions, consult your local Rockwell Automation field support representative.

18. Operate the contactor several times to ensure proper function.
19. Wipe down the exterior surface of each vacuum bottle with a clean lint-free cloth.
20. Replace the interphase barriers and retaining brace.
21. Again, account for all tools used during the above procedure. If any tools are unaccounted for, do not energize the equipment.

## Main Coil Replacement Procedure

### ATTENTION

Before beginning work on the contactor, ensure that it is isolated from all power sources and locked out.



For the safety of maintenance personnel, remove the control wiring from the contactor by disconnecting the control wire plug before starting any disassembly of the contactor.

1. Disconnect the coil leads from the terminal block assembly. The closing and hold-in coils are both wound on one bobbin, therefore, all four coil leads must be removed (the MOVs and/or bridge diode leads may come loose as well). See Figures 4.15 to 4.19 for the appropriate connections.
2. Remove the three bolts from the bottom of the magnet assembly and withdraw the assembly from the contactor as shown in Figure 4.13.

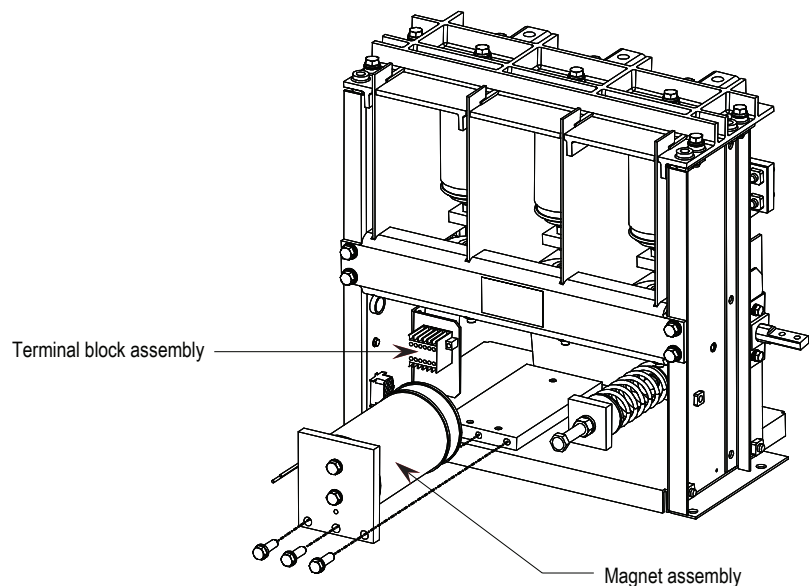
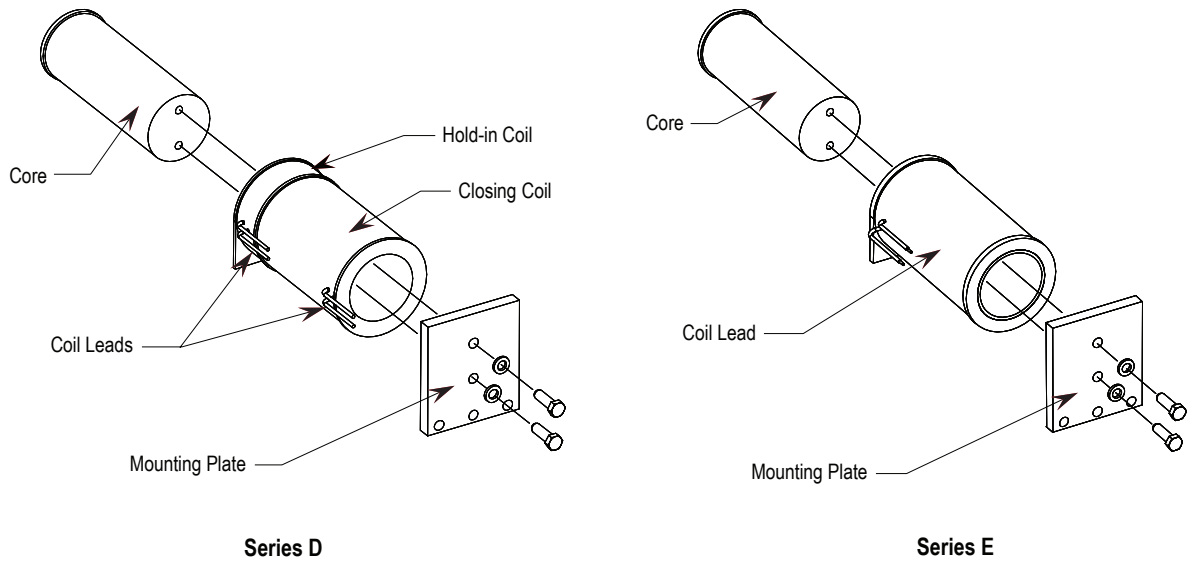


Figure 4.13 – Magnet Assembly Removed



## Main Coil Replacement Procedure (cont.)

3. Remove the two bolts which connect the magnet core to the core mounting plate as shown in Figure 4.14.
4. Slide the core out of the coil as shown in Figure 4.14. If there is a tight fit, tap the core out with a hammer.



**Figure 4.14 – Magnet Assembly**

5. Slide the core into the new coil with the mounting hole end located towards the closing coil. Ensure that the coil leads are oriented properly with respect to the core mounting holes.
6. Bolt the core to the mounting plate and position the magnet assembly in the contactor. Install the three (3) bolts which retain the assembly and torque all bolts to 20 ft-lb.
7. Referring to Figures 4.15 and 4.16 for Series D or Figure 4.17 for Series E **electrically held contactors**, connect the leads from the coil to the terminal block assembly as follows:

- Series D:**
- Closing coil (yellow lead) to “C”
  - Closing coil (black lead) to “D”
  - Hold-in coil (yellow lead) to “P”
  - Hold-in coil (blue lead) to “N”

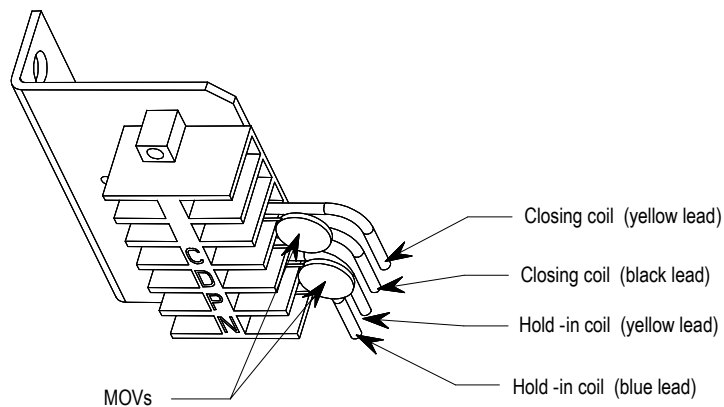
- Series E:**
- Closing coil (yellow lead) to “C”
  - Closing coil (black lead) to “N”

Referring to Figure 4.18 for Series D or Figure 4.19 for Series E **mechanically latched contactors**, connect the leads from the coil to the terminal block assembly as follows:

- Series D:**
- Closing coil (yellow lead) to "H1"
  - Closing coil (black lead) to "H2"
  - Hold-in coil (yellow lead) to "C1"
  - Hold-in coil (blue lead) to "C2"
  - Trip Coil (white lead) to "D"
  - Trip Coil (blue lead) to "B"

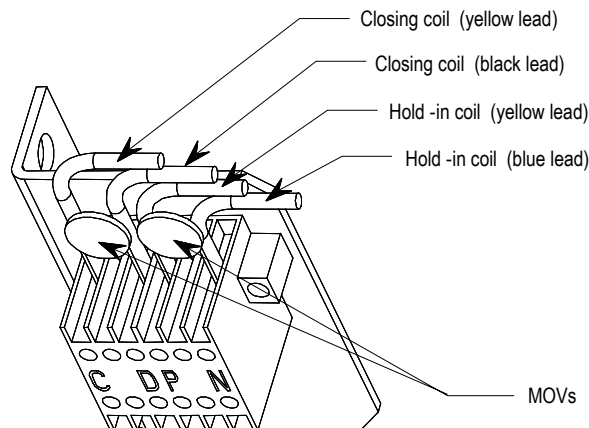
- Series E:**
- Closing coil (yellow lead) to "C"
  - Closing coil (black lead) to "A"
  - Trip Coil (white lead) to "D"
  - Trip Coil (blue lead) to "B"

**Note:** The contactor will have either a high density (1492-HC6) or a regular (1492-HJ86) terminal block. The wiring convention is the same for both types.



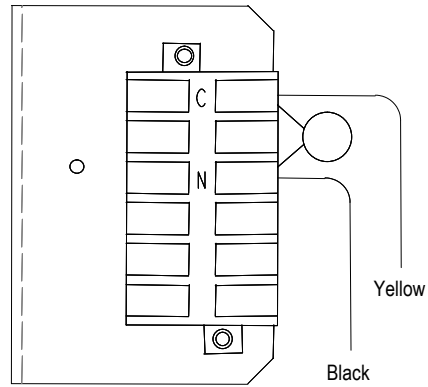
**Figure 4.15 – Terminal Block Assembly (Electrically held Series D Contactor, regular terminal block)**

**Note:** Figures 4.15 and 4.16 show the fast drop-out configuration. The normal drop-out contactor has only one (1) MOV.

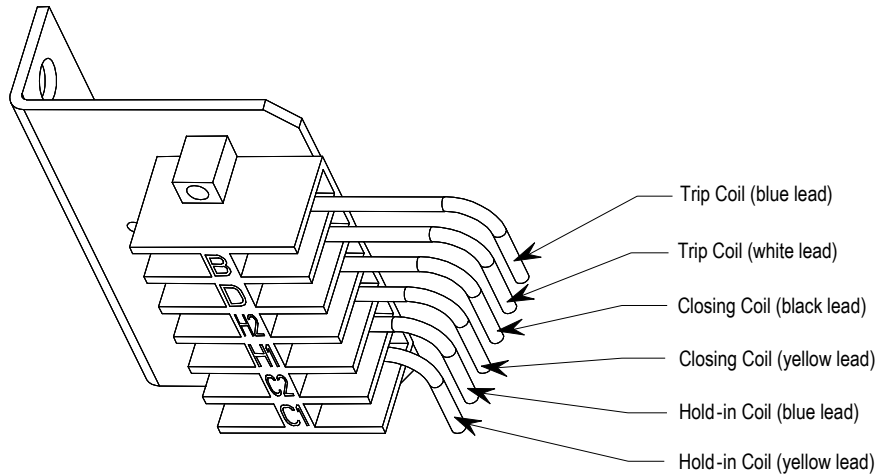


**Figure 4.16 – Terminal Block Assembly (Electrically Held Series D Contactor, high density terminal block)**

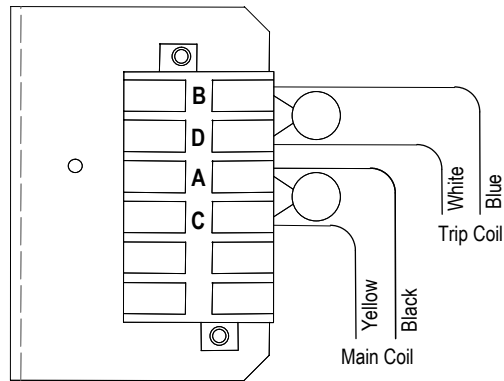
**Main Coil Replacement Procedure (cont.)**



**Figure 4.17 – Terminal Block Assembly (Electrically Held Series E Contactor)**



**Figure 4.18 – Terminal Block Assembly (Mechanically Latched Series D Contactor)**



**Figure 4.19 – Terminal Block Assembly (Mechanically Latched Series E Contactor)**

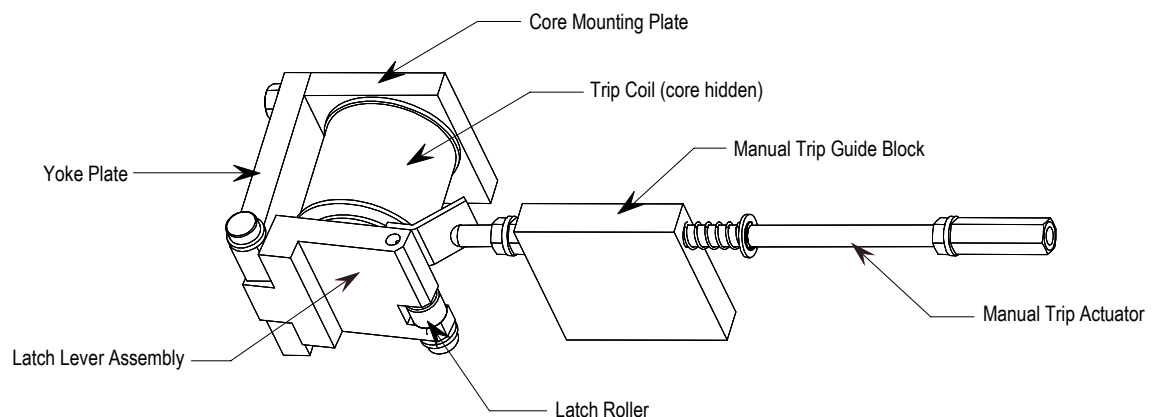
8. The closing coil is the larger of the two (Series D only) and is located toward the front of the contactor. Refer to the appropriate wiring diagram (Chapter 3 – Installation) to ensure that the bridge diode and/or MOV leads are properly connected and for complete control wiring details.
9. Ensure that all leads, diodes and MOVs are secured tightly. Operate the contactor several times to ensure that the core is located properly.

## Mechanical Latch Trip Coil Replacement Procedure

### ATTENTION



Before beginning work on the contactor, ensure that it is isolated from all power sources and locked out, and that the contactor is in the open (or tripped) state.

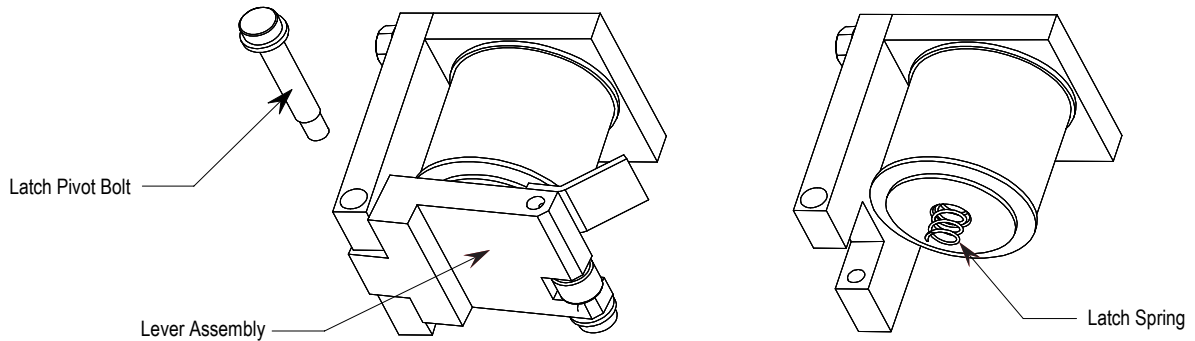


**Figure 4.20 – Mechanical Latch Assembly**

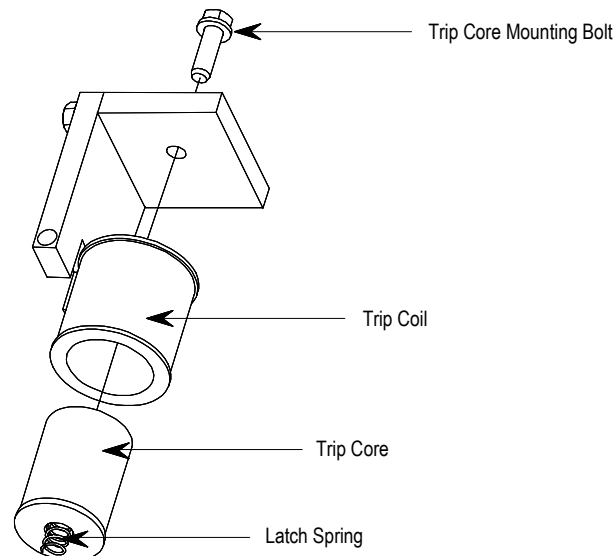
1. Disconnect the trip coil leads from the terminal block assembly. The trip coil leads are the blue and white wires connected to terminals "B" and "D" respectively (see Figure 4.18 or 4.19). Cut any wire ties fastening the leads to the contactor base.
2. Remove latch pivot bolt with a 3/16" Allen key as shown in Figure 4.21, and remove the lever assembly. The latch spring is no longer retained at this point and may fall out of the core – do not misplace this spring.
3. Remove the trip core mounting bolt as shown in Figure 4.22 and slide the core out of the coil allowing the coil to be removed.
4. Slide the core into the new coil and install the core mounting bolt.

## Mechanical Latch Trip Coil Replacement Procedure (cont.)

5. Make sure that the latch spring is seated properly in the core, position the lever assembly and install the latch pivot bolt. The spring must be seated properly in the retaining holes in both the core and the lever.
6. Route the trip coil leads as they were and connect to the terminal block assembly as shown in Figure 4.18 or 4.19.



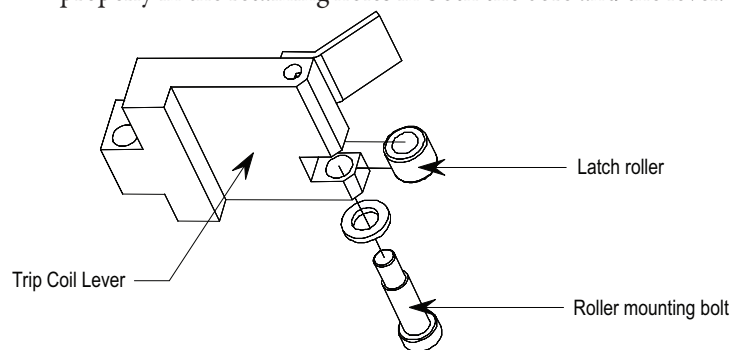
**Figure 4.21 – Mechanical Latch Trip Coil Replacement**



**Figure 4.22 – Mechanical Latch Trip Coil Replacement**

## Mechanical Latch Roller Replacement Procedure

1. Make sure the contactor is in the open (or tripped) state.
2. Remove latch pivot bolt with a 3/16" Allen key as shown in Figure 4.21, and remove the lever assembly. The latch spring is no longer retained at this point and may fall out of the core – do not misplace this spring.
3. Remove the roller mounting bolt as shown in Figure 4.23 allowing the roller to be removed.
4. Insert the new roller and install the roller mounting bolt.
5. Make sure that the latch spring is seated properly in the core, position the lever assembly and install the latch pivot bolt. The spring must be seated properly in the retaining holes in both the core and the lever.



**Figure 4.23 – Mechanical Latch Assembly**

## Mechanical Latch Mechanism Refurbishing Procedure

With the exception of the roller, the latch mechanism will last the rated life of the contactor. If the contactor is used beyond the rated life, the latch mechanism should be refurbished by replacing the lever assembly, latch spring and the armature plate. These parts can be ordered pre-assembled as Refurbishing Kit #80158-058-51.

1. Remove latch pivot bolt with a 3/16" Allen key as shown in Figure 4.21, and remove the lever assembly. The latch spring is no longer retained at this point and can be removed and discarded.
2. Make sure that the new latch spring is seated properly in the core; position the new lever assembly and install the latch pivot bolt. The spring must be seated properly in the retaining holes in both the core and the lever.
3. Loosen the locking nut on the return spring compression bolt and withdraw the compression bolt until the return spring is relaxed. Remove the return spring as shown in Figure 4.2.
4. Remove the armature plate mounting bolts. Discard the armature plate and install the new armature plate. Reinstall the return spring and advance the compression bolt until the armature plate makes contact with the stop as shown in Figure 4.10. Advance the bolt one additional full turn to ensure that the contactor opens fully. Holding the compression bolt in position with a wrench, tighten the compression bolt locking nut.

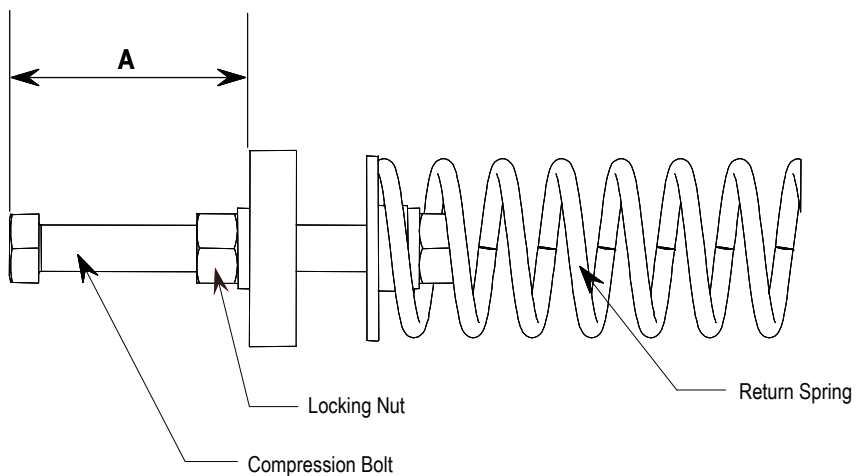
## Altitude Adjustment

Vacuum contactors are sensitive to the altitude at the installation site. This is due to the fact that the atmospheric pressure assists in closing the main contacts by exerting force on the bellows at the movable end of the vacuum bottles. Since this force is proportional to the difference between internal bottle pressure and external atmospheric pressure, the return spring must be adjusted for the appropriate altitudes. Contactors are factory set for the altitude at which they are originally installed. If a contactor is relocated to a different altitude range (see Table 4.A), a spring adjustment is necessary for proper operation.

The following procedure shall be used to make the correct settings.

1. Determine what altitude range the contactor is set up for by checking the rating label (also refer to the Catalog Number Explanation).
2. Measure and record dimension "A" as shown per Figure 4.24.

**Note:** Dimension "A" will vary from contactor to contactor, there is no predetermined value.



**Figure 4.24 – Return Spring Assembly**

3. Loosen the compression bolt locking nut and adjust the position of the compression bolt according to Table 4.A. Dimension "A" is changed by the amount shown on the table. For example, if the contactor's existing range is 0-1000 m and the desired range is 3000-4000 m, increase dimension "A" by 4.93 mm (0.194 in.). If the contactor's existing range is 4000-5000 m and the desired range is 2000-3000 m, decrease dimension "A" by 2.69 mm (0.106 in.). After dimension "A" has been set for the desired altitude range, re-tighten the locking nut.

**Table 4.A – Dimension “A” Settings in Inches (millimeters in brackets)**

EXISTING ALTITUDE RANGE	NEW ALTITUDE RANGE				
	Increase or Decrease Dimension “A” by:				
	0-1000 m	1000-2000 m	2000-3000 m	3000-4000 m	4000-5000 m
0-1000 m	N/A	+0.073 (1.85)	+0.140 (3.56)	+0.194 (4.93)	+0.246 (6.25)
1000-2000 m	-0.073 (-1.85)	N/A	+0.067 (1.70)	+0.121 (3.07)	+0.173 (4.39)
2000-3000 m	-0.140 (-3.56)	-0.067 (-1.70)	N/A	+0.054 (1.37)	+0.106 (2.69)
3000-4000 m	-0.194 (-4.93)	-0.121 (-3.07)	-0.054 (-1.37)	N/A	+0.052 (1.32)
4000-5000 m	-0.246 (-6.25)	-0.173 (-4.39)	-0.106 (-2.69)	-0.052 (-1.32)	N/A

4. On the rating label, change the catalog number (altitude suffix), the stated altitude range and the current rating. Refer to Table 4.B for the derated continuous current and B.I.L. withstand ratings for each altitude range.

**ATTENTION**

A contactor will only function properly in the altitude range for which it is set up. If functional tests are required, they must be performed at the proper altitude or in a pressure chamber which simulates the proper altitude.

**Table 4.B – Contactor Deratings**

Altitude Range	Continuous Current Rating	B.I.L. Withstand Rating
0-1000 m	800 A	60 kV
1000-2000 m	780 A	54 kV
2000-3000 m	760 A	48 kV
3000-4000 m	740 A	42 kV
4000-5000 m	720 A	36 kV



## Drop-out Time Conversion

### Series D

The average normal drop-out time for the contactor is 200 ms. The "fast drop-out" contactor has a drop-out time less than 60 ms. Conversion from "normal" to "fast" or vice-versa is easily achieved by changing the control component wired in parallel with the closing coil (see Figures 3.3 and 3.4). The required components can be ordered from Rockwell Automation and installed per the appropriate schematic.

#### **Normal drop-out parts:**

(1) Rectifier bridge	24808-451-01
(1) Mounting screw	M-8765
(1) Wire assembly	80018-457-32
(1) Wire assembly	80018-457-33

#### **Fast drop-out parts:**

(1) MOV assembly	80145-581-03
------------------	--------------

The rectifier bridge for the normal drop-out mounts on the outside of the left side plate above the auxiliary assembly (mounting hole provided). The MOV for the fast drop-out mounts directly on the terminal blocks as shown in Figures 4.15 and 4.16.

### Series E

Contactor drop-out times are set within and controlled by the IntelliVAC or IntelliVAC Plus control modules (refer to publications 1503-UM053\_-EN-P or 1503-UM054\_-EN-P).

## Auxiliary Contact Replacement and Set-Up Procedure

1. If replacing a single contact cartridge, remove the appropriate leads and turn the plastic retaining screws to allow removal of the cartridge as shown in Figures 4.25 and 4.26. Insert the new cartridge and position the retaining screws to hold it in place. Reconnect the leads to the cartridge. Ensure that the cartridge is in the proper configuration (the top cartridges are normally closed, the bottom cartridges are normally open, refer to Figure 4.27). The “normal” state is when the contactor is “off” (open position).

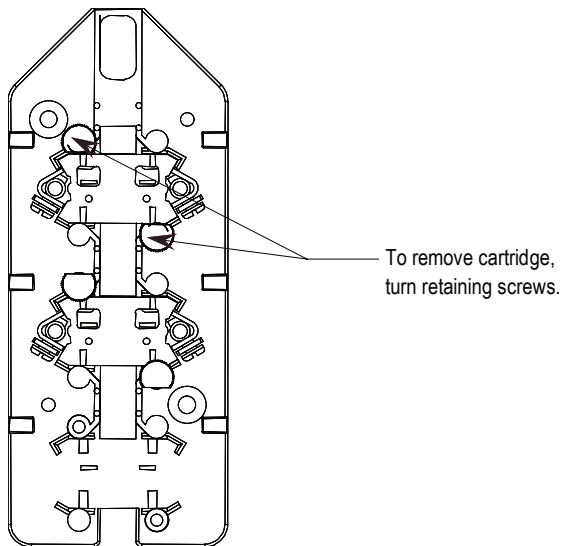


Figure 4.25 – Retaining Screws

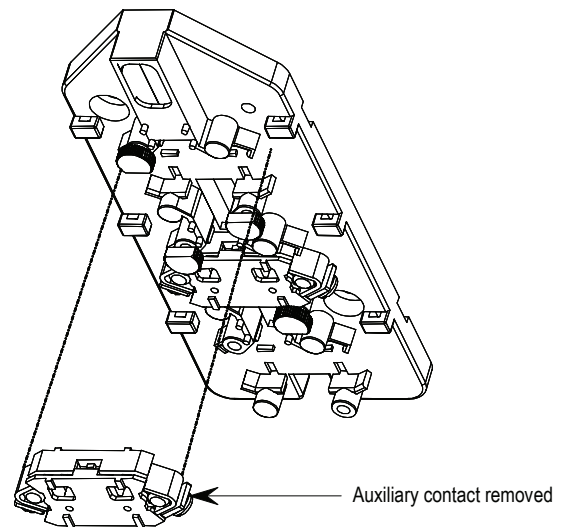
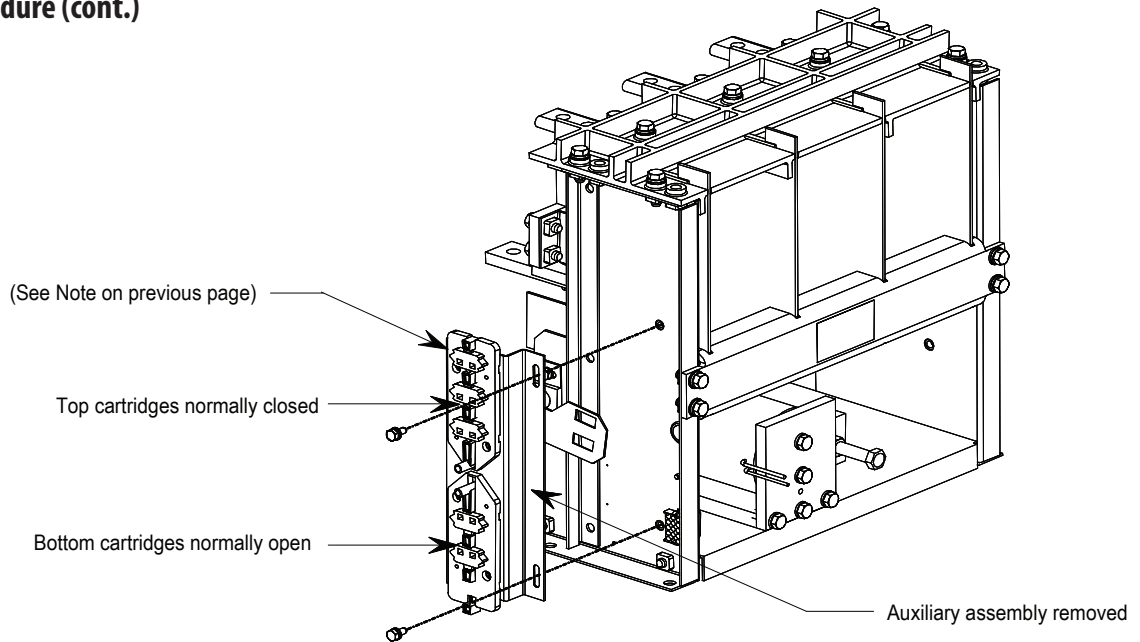


Figure 4.26 – Cartridge Removal

**Note:** For Series E contactors, the top auxiliary contact position must use a 700-CP1 cartridge. All other positions must use 700-CPM cartridges.

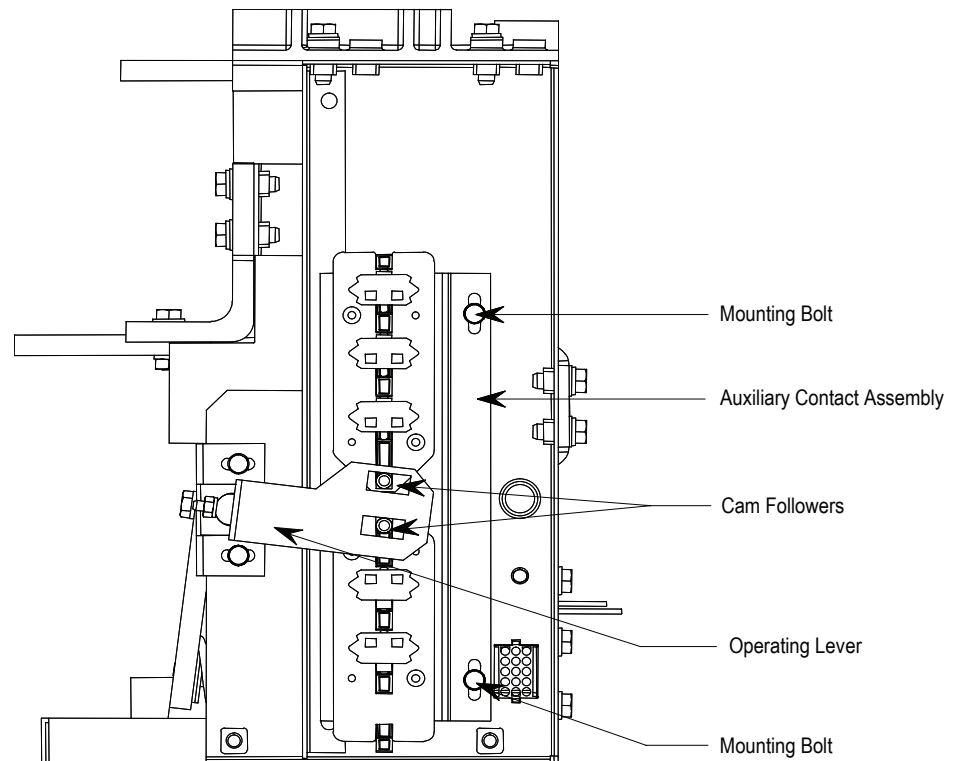
2. If replacing the entire auxiliary assembly, remove the leads from all cartridges and remove the assembly complete with mounting plate by removing the mounting bolts as shown in Figure 4.27.

## Auxiliary Contact Replacement and Set-Up Procedure (cont.)



**Figure 4.27 – Auxiliary Contact Assembly**

3. Position the new assembly on the left side plate of the contactor with the cam followers (see Figure 4.28) protruding through the rectangular holes in the operating lever. Install and allow the mounting bolts to remain loose so that the assembly can slide vertically on its mounting slots.
4. With the contactor “off”, push the entire auxiliary assembly up until the cam followers bottom out against the top of the rectangular holes in the operating lever as shown in Figure 4.28 (make sure the armature plate is against the stop such that the contactor is fully open). At this point, the top set of auxiliary contacts are “closed” and the bottom set of auxiliary contacts are “open”.
5. Tighten and torque (6 ft-lb) the mounting bolts to fix the position of the auxiliary assembly.



**Figure 4.28 – Auxiliary Contact Assembly Set-up**

6. Connect all control wire leads to the appropriate cartridge terminals per the appropriate electrical diagram (Chapter 3), or per the specific electrical drawing “ED” supplied with the starter unit.
7. Operate the contactor several times to ensure proper positioning of the auxiliary assembly as well as proper connection of the control wires.



## Troubleshooting

If an operating problem occurs, use the following troubleshooting chart to isolate the cause of the failure and find the corrective action. If the corrective action fails to resolve the problem, consult your local Rockwell Automation field support representative.

**Table 5.A – Troubleshooting (Series D contactors) ❶**

Symptom	Possible Cause	Remedy
<b>Contactors chatters</b>	<ul style="list-style-type: none"> <li>Loose connections in control circuit</li> <li>Improper control wiring</li> <li>Control voltage</li> <li>Mechanical latch not engaging</li> <li>Improper set-up of auxiliary contact assembly</li> <li>Faulty auxiliary contacts</li> <li>Faulty CR1 or CR2 interposing relay</li> </ul>	<ul style="list-style-type: none"> <li>Check all connections in control circuit for tightness. Check wiring from the coil to the terminal block assembly.</li> <li>Check wiring per schematic.</li> <li>Measure control voltage. Refer to Contactor Specifications for minimum pick-up voltage.</li> <li>Check for free movement of latch lever.</li> <li>Check set-up of auxiliary contact assembly.</li> <li>Check master contact cartridges on contactor.</li> <li>Check CR1 and CR2 relay.</li> </ul>
<b>Coil burnout</b>	<ul style="list-style-type: none"> <li>Coil leads improperly wired</li> <li>Control voltage too high</li> <li>Contactors operated too frequently</li> </ul>	<ul style="list-style-type: none"> <li>Check wiring from the coil to the terminal block assembly.</li> <li>Check for correct control voltage</li> <li>Check switching frequency:                             <ul style="list-style-type: none"> <li>600 ops/hr electrically held</li> <li>150 ops/hr mechanically held</li> </ul> </li> </ul>
<b>Contactors does not energize</b>	<ul style="list-style-type: none"> <li>Loose connections in control circuit</li> <li>Improper control wiring</li> <li>Control voltage</li> <li>Improper set-up of auxiliary contact assembly</li> <li>Faulty CR1 or CR2 interposing relay</li> </ul>	<ul style="list-style-type: none"> <li>Check all connections in control circuit for tightness. Check wiring from the coil to the terminal block assembly.</li> <li>Check wiring per schematic.</li> <li>Measure control voltage. Refer to Contactor Specifications for pick-up voltage.</li> <li>Check set-up of auxiliary contact assembly.</li> <li>Check CR1 and CR2 relay.</li> </ul>

❶ For Series E contactors with IntelliVAC control or IntelliVAC Plus control, refer to Publications 1503-UM053\_-EN-P or 1503-UM054\_-EN-P respectively.

**Table 5.B – Typical Contactor Coil Resistance Values**

Coil Part Number	Description	Resistance ( $\Omega$ ) ❶
80025-697-01	Closing and Hold-in Coil Assembly (Series D)	8.4 (Close) 4.55 (Hold)
80026-231-02	Closing and Hold-in Coil Assembly (Series E)	7.0
80025-853-01 ❷	Mechanical Latch Trip Coil (Series D and E)	19.4

❶ Resistance values listed have a tolerance of  $\pm 10\%$  at 20°C. Refer to Chapter 3 for measurement points at the contactor receptacle.

❷ Supplied only with mechanical latch option.



## Renewal Parts

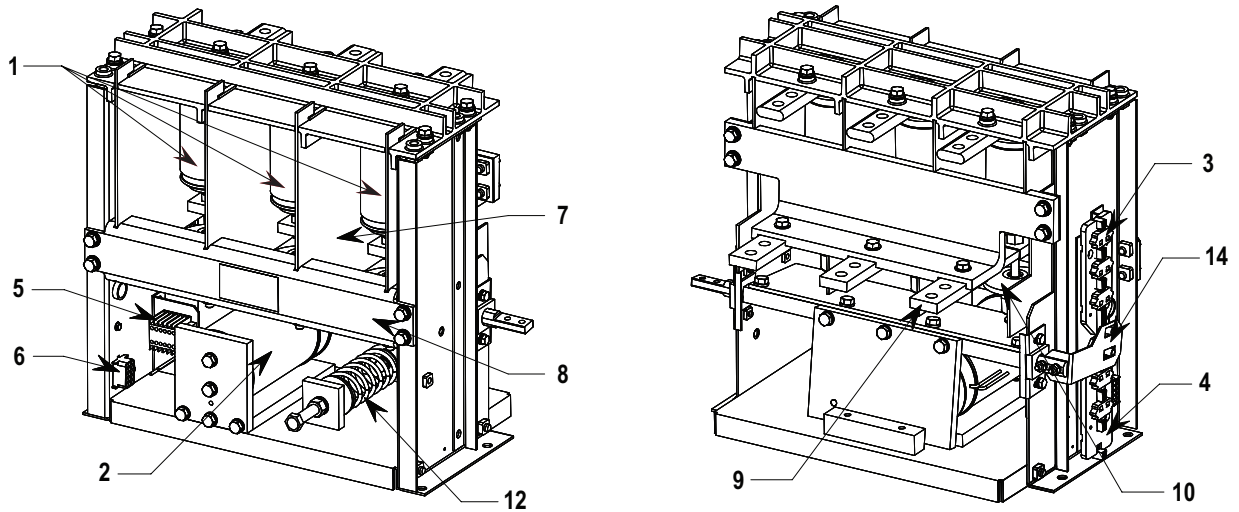


Figure 6.1 – Bulletin 1502, 800A Electrically Held Vacuum Contactor

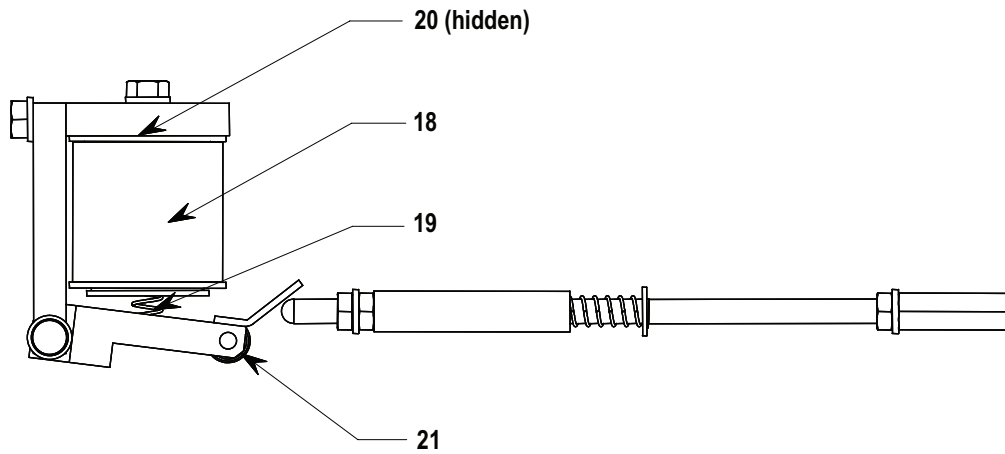


Figure 6.2 – Mechanical Latch Assembly



**Table 6.A – Renewal Parts**

Item	Description of Parts		Part Number	
1	Three (3) Vacuum Bottles ❶		80157-496-56	
2	Closing and Hold-in Coil Assembly	Series D	80025-697-01	
		Series E	80026-231-02	
3	Master Contact Cartridge	General	700-CPM	
		IntelliVAC or IntelliVAC Plus feedback – Series E	700-CP1	
4	Auxiliary Assembly	Electrically Held	Series D	80157-305-51
			Series E	80158-870-51
		Mechanical Latch	Series D	80157-305-52
			Series E	80158-870-52
5	6-pole Terminal Block Assembly (high density) ❷		1492-HC6	
5A	6-pole Terminal Block Assembly (regular) ❷		1492-HJ86	
6	Control Wire Connector (Female only)		22105-221-01	
7	Interphase Barrier		80157-311-01	
8	Barrier Retainer		80157-312-01	
9	Load Terminal		80157-315-02	
10	Insulator		80157-314-01	
11	Overtravel Spring ❸		80026-012-02	
12	Return Spring		80026-011-02	
13	Rocker Washer ❸		80012-021-01	
14	Auxiliary Operating Lever		80157-313-02	
15	Cam Follower ❹		80154-422-01	
16	One (1) MOV ❺		80145-581-08	
17	One (1) Rectifier Bridge (not shown)		24808-451-01	
18	Mechanical Latch Trip Coil		80025-853-01	
19	Mechanical Latch Spring		80026-013-02	
20	Brass Washer ❹		28300-614-01	
21	Mechanical Latch Roller		80153-748-01	
22	Mechanical Latch Refurbishing Kit		80158-058-51	

**Notes:**

- ❶ Rockwell Automation recommends that if the contactor has been in service, all three (3) bottles should be replaced at the same time.
- ❷ Refer to Figure 4.4.
- ❸ Refer to Figure 4.28.
- ❹ Refer to Figure 4.15 to 4.19.
- ❺ Do not install washer if it was not originally supplied.

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