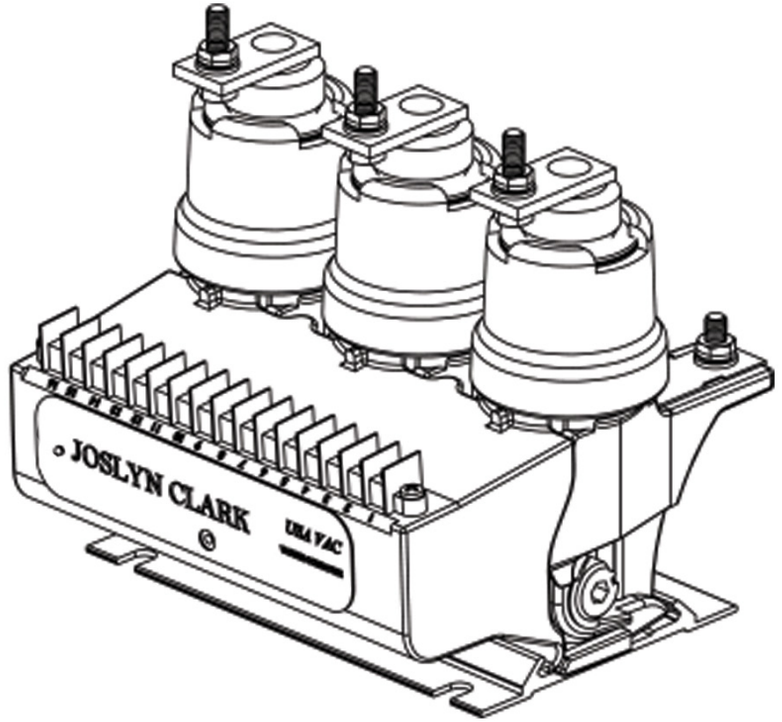
Joslyn Clark

7707 TYPE VC
VACUUM CONTACTOR



MAINTENANCE & INSTALLATION MANUAL

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467810-0002 Rev. C

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WARNING. Risk of electrical shock.
AVERTISSEMENT. Risque de choc electrique.

Disconnect all electrical sources before working on this equipment.
Couper toutes les sources d'ailmentation avant de travailler sur cet apparell.

HAZARD OF ELECTRICAL SHOCK OR BURN.

POWER MUST BE DISCONNECTED FROM THE CONTROLLER AND CONTACTOR PRIOR TO PERFORMING ANY INSTALLATION OR MAINTENANCE. THE EQUIPMENT HAS BEEN DESIGNED TO PERMIT MAINTENANCE AND/OR TESTING ON THOSE COMPONENTS THAT ARE DISCONNECTED FROM THE MAIN POWER. WHEN PERFORMING THIS WORK, EXTREME CAUTION MUST BE EXERCISED IN VIEW OF THE PRESENCE OF HAZARDOUS VOLTAGE.

The following precautions must be studied and followed during installation, operation, and servicing of this equipment.

1. Read this service bulletin prior to installation or operation of this equipment.
2. If motor controllers and/or contactor are to be stored prior to installation, they must be protected from the weather and be kept free of condensation and dust.
3. Use care when moving or positioning the contactors (even when boxed) as they contain devices and mechanisms, which may be damaged by rough handling.
4. Be sure all barriers and terminal covers are in place before operating the contactors.
5. Only authorized personnel should be permitted to operate or service the contactors and controllers.

INTRODUCTION

A HISTORY OF SETTING THE STANDARD BY WHICH OTHERS ARE MEASURED

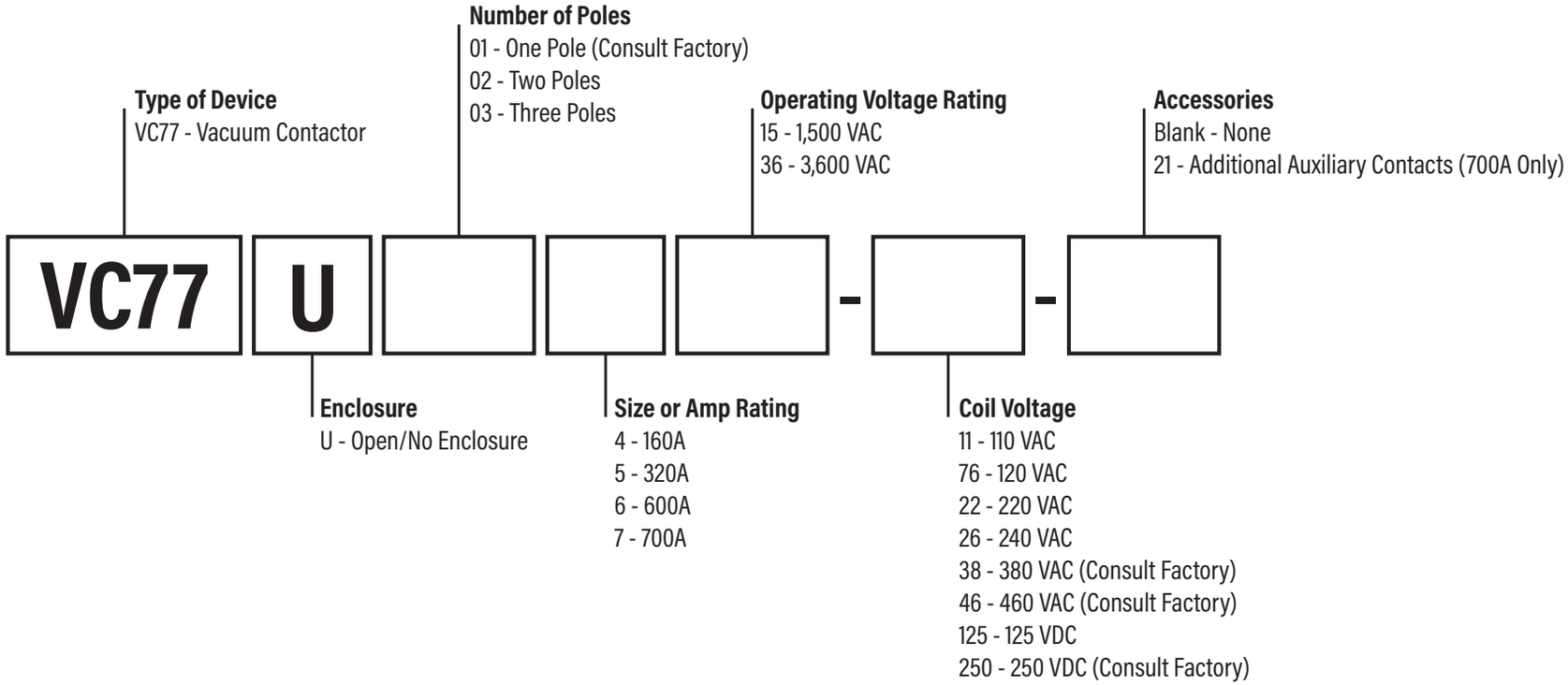
As the world leader in vacuum contactors, starters and controllers, we are dedicated to continually raising the bar for industry standards of in life safety. Dating back to the 1920's, Joslyn Clark began as the Clark Controller Company. Instantly recognized as a pioneer of innovation and quality, Clark products were recognized for their advanced design and reliability. And although the name has changed a couple times over the years, the only thing that hasn't is our commitment to excellence and unrivaled safety and reliability.

We currently maintain a state-of-the-art modern manufacturing facility in Elizabethtown, North Carolina. Our long history of loyalty and commitment is reflected in our employees, many of whom were on the original development team for some of our products, and are still with us today as we continue to refine and implement new improvements and innovations every year. This culture of low turnover and long-term dedication is one of the ways we've been able to build and incorporate so much innovation and long-lasting quality into our products.

This instruction manual covers the description, inspection, installation, operation and maintenance of Joslyn Clark's USAVAC VC Series of low and medium voltage vacuum contactors. These contactors are rated both by current and voltage and must be applied at all times with coordinated short circuit protection devices in accordance with national or local electrical codes.

INTRODUCTION

VC SERIES PART CONFIGURATION



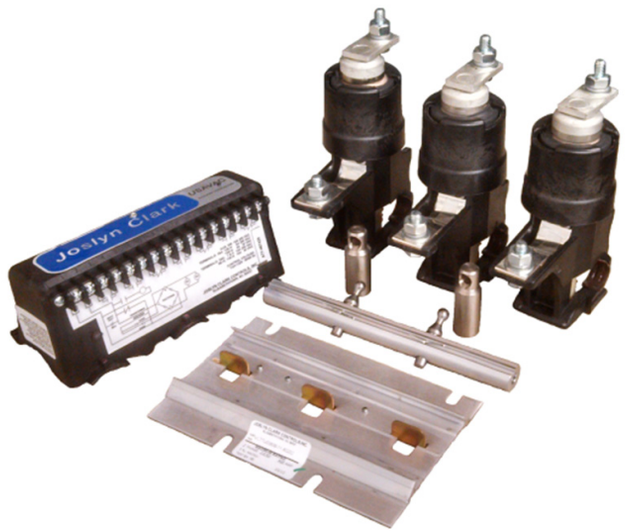
DESIGN OVERVIEW

The contactor is a modular design using high strength molded housings. The construction has very limited hardware. The contactors can be assembled or dismantled without the use of any tools. The principle parts are:

1. Phase Assembly
   The design allows two, three, or other multi-pole configuration to be easily assembled. The pole assembly contains the vacuum interrupter, its protective housing, pull rod, opening and overtravel springs. The assembly is factory set and has no requirement for adjustment or resetting.

2. Control Module
   The control module is a removable assembly containing all control components, ie., coils, rectifier, economizing circuit, auxiliary switches and terminal board. The design allows for easy removal and quick replacement of a spare module. The removed control module can then be more easily checked in a service area or workshop.

3. Drive Shaft and Base
   These parts are designed to hold the modular components together to form a composite assembly.



INSPECTION

INSPECTION – UNPACKING

Before the contactor is placed in service, check carefully for shipping damage. Any damage should be reported to the carrier within (3) three days of receipt. For overseas deliveries, it is important to obtain a certificate of examination from the nearest insurance inspector and photographs of the damage. This and other evidence should accompany any communication to the insurance company or shippers. In the event equipment is to be returned to the factory, contact Joslyn Clark Customer Service Department or our local representation for return authorization. A returned material authorization (RMA) number will be issued which should appear on all correspondence on the returned container.

The USAVAC Vacuum Contactor is shipped in a shock resistant cardboard box. The following steps should be taken when unpacking the contactor:

1. Check the packing list against the order to make sure the shipment is complete and components are received. Some contactors require phase insulating boots. Refer to the contactor electrical decal for more information.
2. Examine the shipping box before unpacking the contactor to make sure it has not been damaged in shipment. If the shipping box is damaged, pay particular attention when unpacking to see if the contents are also damaged. Notify the carrier if damage is found and notify Joslyn Clark Customer Service or local representative of damage.

INSTALLATION

The vacuum contactor may be used in any mounting plane. In any non-horizontal mounting plane, the top of the contactor should point up (so that the label appears right-side up). Care should be taken to insure that the mounting hardware does not warp the mechanism frame. If the surface of the contactor to which the contactor is mounted is twisted, shims should be used to correct the condition. Any appreciable degree of end to end twist will result in phase to phase discrepancies and timing of the main contact could cause increased pick-up in control voltage values.

1. Mount the contactor with 5/16" mounting hardware. Loosely install the (4) four mounting bolts into the intended mounting surface. Torque the mounting bolts to 50-75 inch-lbs.
2. Connect control wires to the vacuum contactor power terminals 1 & 2 located on the Control Pack using #12 to #26 gauge 75°C stranded copper or tin stranded copper wire tightening screw terminals to 7 inch-lbs torque.
3. Using 75°C wire copper cable, connect the line and load conductors to the main terminals (FIGURE 1) and proper phase rotation, tighten the main terminal bolts to 11 ft-lbs torque. Maximum cable sizes arc specified on the electrical decal. Cable supports should be used where large cables might transmit large mechanical loads to the contactor terminals. Insulated terminal boots must be used when provided. (Refer to Terminal Boots). Lug connections can be used on the line and load terminals using 3/8" hardware. Torque lug connection bolts to 20 ft. lbs. If box type lugs are used, re-torque lug connection bolts after clamping cable into lug.
4. Check all connections for accuracy and mechanical connection before energizing.

CAUTION:
TO PREVENT DAMAGE AND TERMINAL DEFORMATION USE DOUBLE WRENCHES TO CONNECT LUGS TO LINE/LOAD TERMINALS SECURE LUG WHILE TIGHTENING CABLE. DO NOT WRENCH CABLE OR LUG BY PULL ING ON CABLE WHEN LUG IS TORQUED DOWN.

TERMINAL BOOT INSTALLATION

The purpose of this measurement is to determine how much electrical life remains on the contact and is performed using a standard wire gauge in a "go, no go" check.

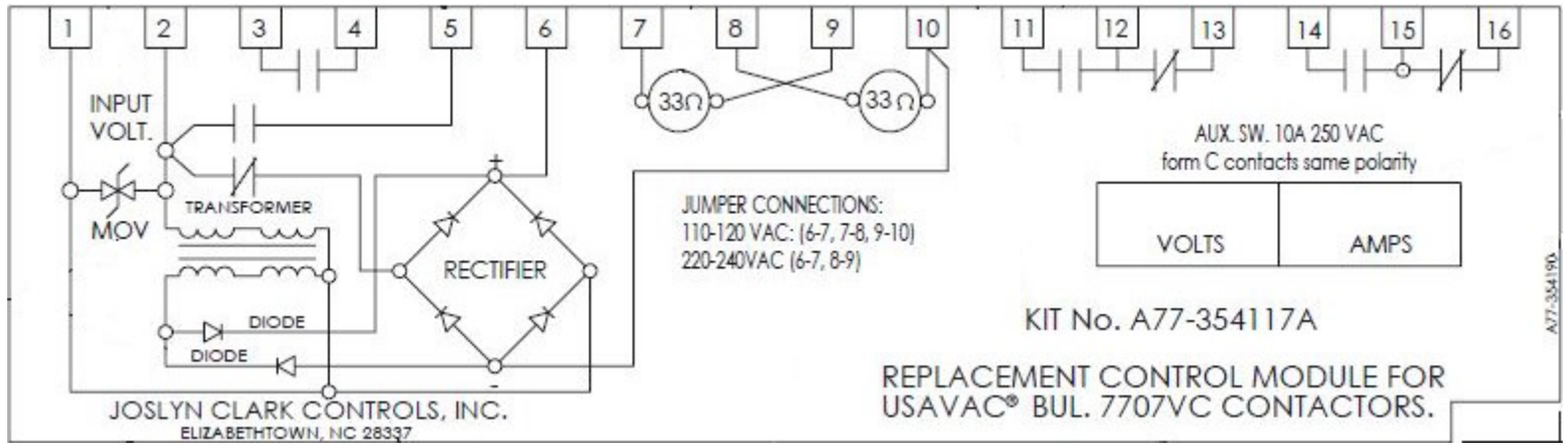
1. Terminal boots are required on the center pole of the 160A and 320A contactors only. Boots are not required on the 600A contactors. Boots are also required when cable or bus is installed.
2. Remove boot from contactor and cut end of boot to make an opening just big enough for conductor to slide through (See diagram below).
3. Slide boot down conductor and terminateconductor on contactor.
4. Slide boot back onto contactor so that it is completely seated as shown below.
5. Terminal boots are sized according to the maximum cable size to be used on the contactor.
6. Terminal boots are required on all phases of contactors rated 1501 - 3600V.

CONTROL POWER

DANGER

Contactors are shipped configured for 120 VAC. The wiring diagram below shows contactor schematic for both 120 VAC and 240 VAC input power. If input power is 240 volt AC, then remove jumpers between 7 and 8, and between 9 and 10. Reconnect both jumpers (to avoid losing one) between terminal points 8 and 9. Jumper between 6 and 7 should remain at all times. After terminal jumpers are properly configured connect either 120 or 240V ac control power to terminals 1 and 2.

The wiring diagrams below shows 120 VAC, 10A auxiliary contacts (2 form C & 1 N.O.) for customer use. The "M" contact connected to terminal 5 is not an isolated contact and should be used only for a "Run" pilot light connected between terminals 2 and 5.



OPERATION

The vacuum interrupter contacts are held by an opening spring held in compression. Two closing coils are provided per control module, are DC activated and designed to overcome the force of the opening springs. During closing, the main contacts touch and additional overtravel force is provided by an additional spring held in compression mounted on the interrupter stem. The overtravel spring, one per interrupter, provides additional contact force. The overtravel allows for contact erosion and therefore provides a self-adjusting feature should contact erosion occur.

Contact pressure is applied immediately behind the moving contact, which eliminates contact bounce, and provides considerable stored energy to open the contacts before the armature mechanism begins to move. In the final closing movement of the armature, the economizing circuit is activated. This contact is housed in the molded dust-protected module housing and requires no adjustment. Activation of the economizing circuit reduces the power consumption in the "hold in" mode to 8.7 watts per module. The heat dissipation is extremely low, to maximize component life.

CLEANING & MAINTENANCE

DANGER - DE-ENERGIZE THE CONTACTOR AND ISOLATE FROM ALL CONTROL AND POWER SOURCES

CLEANING & MAINTENANCE

The contactor is designed for long life with minimal maintenance. The mechanical life is approximately two million and electrical life on normal motor switching is approximately one million operations. An operaion is considered as one closed and one open operation.

The contaclor requires no adjustments. Preventative maintenance is at least suggested to be done on a routine basis through a general inspection of the contactor every twelve months. This should involve mechanically operating the device for freedom of movement and a cleanliness check with regard to dust or other contaminents. Pay particular attention to molded parts and tracking surfaces. Foreign materials on these surfaces should be removed.

The interrupters are well protected from mechanical damage. The phase assembly has anti-torque and over-compression features that prevent possible damage to the flexible bellows at any time in the interrupter's life.

CONTACT RESISTANCE

A contact resistance test can be peiformed using a micro-ohmmeter. This test determines the condition of contact tip surfaces.

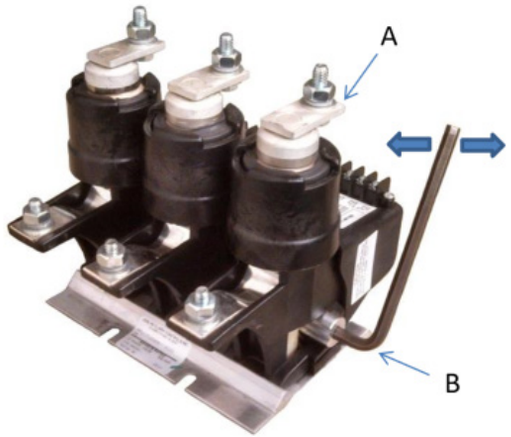
With the contactor closed, the resistance across the terminals should be less than 200 microohms. If higher contact resistance values are measured then the high potential test should be performed.

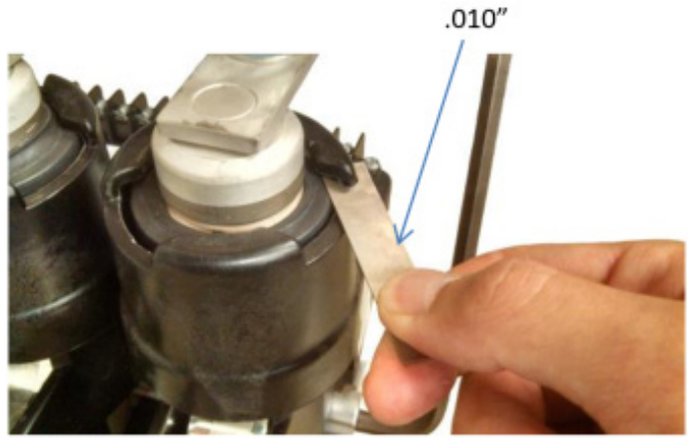
CONTACT LIFE OVER TRAVEL MEASUREMENT

DANGER - DE-ENERGIZE THE CONTACTOR AND ISOLATE FROM ALL CONTROL AND POWER SOURCES

The remaining electrical life can he checked by measuring overtravel. This can be done electrically or mechanically without dismantling or requiring the use of special tools (a wire gauge can be used).

1. Remove power connections on fixed terminal "A" on all phases.
2. Unscrew all caps by rotating counterclockwise 1/2 to 3/4 of a turn. Do Not Unscrew Further.
3. Close the contactor by either hand rotation with 1/4" hexagonal key on shaft at "B" or electrically by providing control isolated test power supply voltage on terminals 1 and 2.
4. Closing the contactor will lift the intenupter by its overtravel distance. Screw cap down clockwise to intenupter and stop when resistance is felt, do not tighten further.
5. De-energize or release hexagonal key at point "B" so that the contactor is now in the open position.
6. The gap between the top of the contactor and cap is remaining overtravel and represents remaining electrode life. This can be measured with a wire gauge and must not be less than .010". An alternative measurement is, that when retightening caps clockwise, they must be able to be rotated at least 15 °. If less than these figures, erosion is excessive and the interrupter must be replaced.
7. After measuring contact tip gap make sure caps have been retightened.
8. After contactor is completely reassembled reconnect power. Before putting contactor back into service, a general inspection of the contactor should also be made. Manually operate the contactor , check for freedom of movement and general cleanliness.





VACUUM INTERRUPTER INTEGRITY TEST

DANGER

The following test should be performed using a 50/60 Hz test set, where the voltage is continuously variable up to at least 6 kV. X-radiation at this level is negligible. However, personnel should not be closer than ten feet to the interrupter and the test cables to avoid high voltage shock hazards. The contactor should be free of dust and other contaminants before conducting this test.

A high potential test will determine the dielectric condition and vacuum integrity for each vacuum interrupter. The vacuum integrity test should be performed if contactor has been exposed to fault conditions. In addition, it is recommended that a vacuum integrity test be performed once a year as part of regular maintenance.

If contactor has been exposed to fault conditions, as indicated by blown fuses or tripped circuit breaker, the following checks must be made on the vacuum interupter assemblies.

1. Physical evidence of stress (distorted, discolored, or cracked bottles).
2. Contact wear measurement (Refer to Contact Over Travel Measurement).
3. Contact resistance.
4. High Potential Test (Dielectric Test) If contactor is mounted in a controller, remove before performing inspections and tests.

The following test should be performed using a 50/60 Hertz test set, where the voltage is continuously variable up to at least l0KV R.M.S. X-radiation at this level is neglibible, however, personnel should not be closer than 10 feet to the inten-upter under test to avoid high voltage shock hazards. The contactor should be free of dust and other contaminents before conducting this test.

Connect output leads of test set across the interrupter terminals with the contactor in the OPEN position. Slowly raise the voltage from zero to l0KV R.M.S. and hold for 15 seconds. During voltage ramping any discharge or test tripping should be ignored unless it becomes impossible to reach l0KV R.M.S. The leakage current should not exceed 5 milliamps during the test. Reverse the test set leads on interrupter terminals and repeat the test. If unit fails test, then contact should be replaced.

REPLACEMENT PARTS

CONTROL MODULES

CATALOG NUMBER	DESCRIPTION
A77-354117A-1	120VAC Control Module
A77-354117A-2	240VAC Control Module
A77-452580A-2	125VDC Control Module
A77-452580A-4	250VDC Control Module

PHASE ASSEMBLY KITS

CATALOG NUMBER	DESCRIPTION
A77-354115A-1P1	160A 1-Pole Contactor Kit
A77-354115A-1P2	160A 2-Pole Contactor Kit
A77-354115A-1P3	160A 3-Pole Contactor Kit
A77-354115A-2P1	320A 1-Pole Contactor Kit
A77-354115A-2P2	320A 2-Pole Contactor Kit
A77-354115A-2P3	320A 3-Pole Contactor Kit

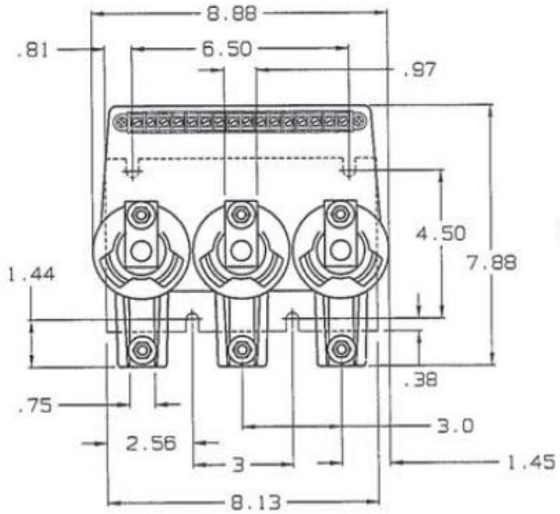
TERMINAL BOOTS

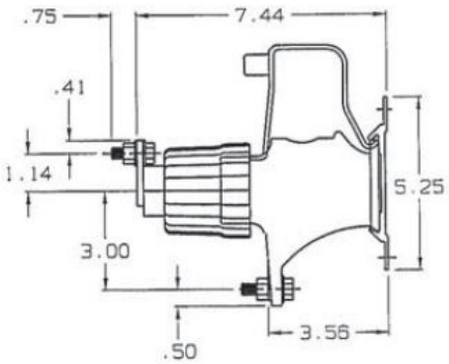
CATALOG NUMBER	DESCRIPTION
KVC-UB-1	Line Side Terminal Boot
KVC-UL-1	Load Side Terminal Boot

TERMINAL LUG KIT

CATALOG NUMBER	DESCRIPTION
KVCL-250-1	(1)#6-250MCM (3pcs/kit)
KVCL-300-2	(2)#6-300MCM (3pcs/kit)

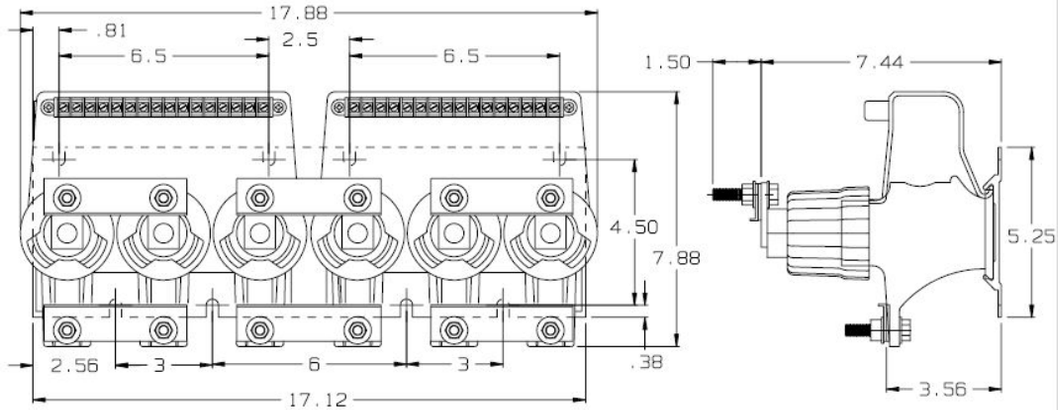
DIMENSIONS





160A-320A

600A



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