

INSTRUCTIONS

for INSTALLATION OPERATION and MAINTENANCE

POWERSTAT®

VARIABLE TRANSFORMERS
WITH POWERKOTE® COILS
21, 21-40 and 22 Series

The right to make engineering refinements on all products is reserved. Dimensions and other details are subject to change.

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INSPECTION

A POWERSTAT Variable Transformer is a precision product packed with care. When unpacking, examine carefully for any shipping damage. Inspect the brush contact with particular care. The "Damage and Shortage" Instructions packed with the unit outline the proper procedure to follow if any parts are damaged or missing.

INSTALLATION

NOTE- The unit should be protected from any dust or debris that may be encountered while drilling holes, installing wiring, etc., during installation.

MANUALLY OPERATED ASSEMBLIES

Manually operated single units are designed for back-of-panel mounting. If they are to be bench or wall mounted, some cover should be provided to support the dial and prevent contact with the electrically "hot" radiator and commutator.

HARDWARE

Drilling Template No. 1 shows standard 4-hole mounting and an alternate 3-hole mounting. For standard 4-hole mounting use 1/4" bolt of appropriate type and length. The alternate mounting scheme allows the mounting screws to be hidden by the dial but requires 1/4 - 20 flat head type screws whose length can only be 1/8" to 3/16" longer than the thickness of the mounting panel. To accommodate longer length screws, use 1/4" flat washers as spacers between unit and the back of the panel. Three 6-32 x 3/16" binding head screws are provided for dial mounting.

ACCESSORY TERMINAL PACK

An accessory terminal pack, ordered separately, contains seven terminal adapters for quick-connect terminations or for easy soldering (only three adapters are required for any one connection).

SINGLE UNITS

BENCH OR WALL MOUNTING

- Using Drilling Template No. 1, locate and drill the desired set of mounting bolt holes (4 holes "A" or three holes "B").
- Insert the shaft and adjust it so it will protrude about 3/4" through the dial after installation. Tighten the setscrews.
- Place the unit in position. Insert and tighten the mounting screws.
- Mount the dial and its support(s). Place the knob on the shaft and position the pointer correctly in relation to the brush position and the dial indications. Tighten the knob setscrews.

BACK-OF-PANEL MOUNTING

- Using Drilling Template No. 1 locate and drill the desired set of mounting bolt holes (four holes "A" or three holes "B"), the three dial screw holes "C" and the center shaft hole. The dial screw holes must be tapped to accommodate the 6-32 screws supplied. Maximum panel thickness is 1/2 inch.
- Insert the shaft and adjust it so it will project about 3/4" through the panel after installation. Tighten the setscrews.
- Place the unit in position behind the panel. Insert and tighten the mounting screws.
- Mount the dial on the panel. Place the knob on the shaft and position the pointer correctly in relation to the brush position and the dial indications. Tighten the knob setscrews.

GANGED ASSEMBLIES

Manually operated ganged assemblies are designed for back-of-panel mounting. If they are to be mounted in an exposed position, some cover should be provided to prevent contact with the electrically "hot" radiator and commutator. Due to the weight of ganged assemblies, the four holes "A" of Drilling Template No. 1 are recommended for mounting.

MAINTENANCE

With ordinary care, a POWERSTAT Variable Transformer should require no servicing except possible replacement of the brush assembly. The brush should be inspected periodically and replaced if arcing takes place or if it is badly worn. Because the brush must be of a special material, replace only with the Superior Electric brush assembly listed below. The assembly is designed to assure perfect contact of the brush to the commutator regardless of brush position and length of time in use. Take care to avoid scraping, scratching or marring the commutator surface.

Follow these steps to install a new brush assembly.

- Unfasten the brush assembly anchor screws and discard the old brush assembly.
- Insert the new brush assembly in the radiator slot, replace the anchor screws and tighten to the radiator. Be sure the back end of the brush strap is under the projection at the rear of the radiator brush slot.
- Raise the brush and place a piece of crocus cloth or very fine sandpaper between the brush and the commutator so the smooth side is against the commutator and the abrasive side is toward the brush.
- While holding the cloth or sandpaper in place, rotate the radiator through a short arc. Blow out the excess carbon particles.

CONNECTIONS AND RATINGS

Important connection notes. Please read carefully.

- CONNECTIONS AND RATINGS given in these instructions are those most commonly used. In addition, all ganged units may be connected so that the units operate electrically independent on a common shaft. When this is desired, connections and ratings for the individual units may be obtained from the RATINGS CHART and CONNECTION DIAGRAMS of the single unit.
- For ambient temperatures between -20°C and +50°C use current ratings given in the charts. Figure C shows the output current de-rating required above 50°C.
- Coil to terminal connections for all 21, 22 and 21-40 Series units are shown in Figures A.
- The CONNECTION DIAGRAMS are labeled "L" for Line Connections and "B" for Boost Connections.
- Clockwise (CW) and counterclockwise (CCW) rotation connections shown in the Ratings Chart and Connection Diagrams are for motor driven units and manual units with the knob on the radiator end. For connections with the knob on the base end, use the shown CCW connection for the CW operation, and shown CW connection for the CCW operation.
- Fuses are recommended on all units as shown (§). Recommended fuses are 18 ampere on 21-40, 5 ampere for the 21, and 3 ampere on the 22. If used for constant impedance load connection the fuses can be increased to a 25 ampere on the 21-40, 8 ampere on the 21, and 4 ampere on the 22.
- COMMON shown in the connection diagrams is used as third leg in 3-phase open delta, or neutral in single-phase 3-wire and 3-phase 4-wire wye configurations. COMMON is not used in single-phase 2-wire or 3-phase 3-wire wye configurations. Jumper(s) provided in standard common position should be moved or removed as required.
- Motor drive wiring is shown in Figure B.

HARDWARE
Three 6-32 x 3/16" binding head screws are provided for dial mounting. Four 1/4"-28 x 1/2" flat head screws are provided for mounting in panels 1/4" to 3/8" thick. For thinner panels use 1/4" flat washers as spacers between the unit and the panel. For thicker panels use 1/4"-28 screws 1/8" to 1/4" longer than the panel thickness.

ACCESSORY TERMINAL PACK

An accessory terminal pack, ordered separately, contains seven terminal adapters for quick-connect terminations or for easy soldering (only three adapters are required for any one connection).

BACK-OF-PANEL MOUNTING

- Using Drilling Template No. 1, locate and drill the four mounting bolt holes "A", the 3 dial screw holes "C" and the center shaft hole. The dial screw holes must be tapped to accommodate the 6-32 screws supplied. Maximum panel thickness is 1/2 inch.
- Loosen the knob setscrews and remove the knob. Remove the dial.
- Loosen the shaft setscrews in the hub of each radiator and adjust the shaft so it will project about 3/4" through the panel after installation. Tighten the setscrews on the first unit. Turn all radiators to the extreme limit of travel (zero position) and tighten the shaft setscrews on the remaining unit(s).
- Place the unit in position. Insert and tighten the four 1/4"-28 mounting screws. A 3-gang assembly, because of its added length and weight, requires extra support in the form of a bracket or shelf.
- Mount the dial on the panel. Place the knob on the shaft and position the pointer correctly in relation to the brush position and the dial indications. Tighten the knob setscrews.

MOUNTING ON SIDE BRACKETS

- Using Drilling Template No. 2, locate and drill the proper set of mounting holes. BE SURE TO USE THE PROPER SET OF HOLES.
- Loosen the shaft setscrews in the hub of each radiator and adjust the shaft so it will project about 3/4" through the dial after installation. Tighten the setscrews on the first unit. Turn all radiators to the extreme limit of travel (zero position) and tighten the shaft setscrews on the remaining unit(s).
- Insert the two top mounting bolts and screw them in part way.
- Place the unit in position and insert the two bottom bolts. Tighten all the bolts. Mount the dial and its supports. Place the knob on the shaft and position the pointer correctly in relation to the brush position and the dial indications. Tighten the knob setscrews.

MOUNTING ON STANDOFFS

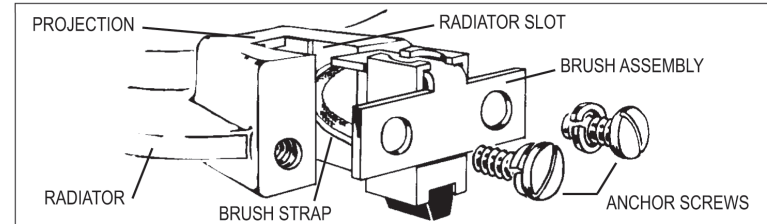
- Using Drilling Template No. 1 locate and drill the four mounting bolt holes "A".
- Loosen the knob setscrews and remove the knob. Remove the dial.
- Loosen the shaft setscrews in the hub of each radiator and adjust the shaft so it will project about 3/4" through the dial after installation. Tighten the setscrews on the first unit. Turn all the radiators to the extreme limit of travel (zero position) and tighten the shaft setscrews on the remaining unit(s).
- Place the unit in position. Insert and tighten the mounting bolts. A 3-gang assembly, if mounted on a vertical panel, requires extra support in the form of a bracket or shelf.
- Mount the dial and its supports. Place the knob on the shaft and position the pointer correctly in relation to the brush position and the dial indications. Tighten the knob setscrews.

MOTOR-DRIVEN ASSEMBLIES

Motor-driven POWERSTAT Variable Transformers of the 21, 21-40 and 22 Series, both single units and ganged assemblies, may be mounted on side brackets or on standoffs in the same manner as manually operated ganged assemblies. 3-gang assemblies, however, have 3 side brackets, requiring 6 mounting bolts as shown in Template No. 2.

- Remove the cloth or sandpaper and rotate the radiator over the full range several times to check for smooth travel of the brush over the commutator surface. The brush should fit flat over the entire commutator range. No space should be visible between the brush and the surface.

BRUSH ASSEMBLY



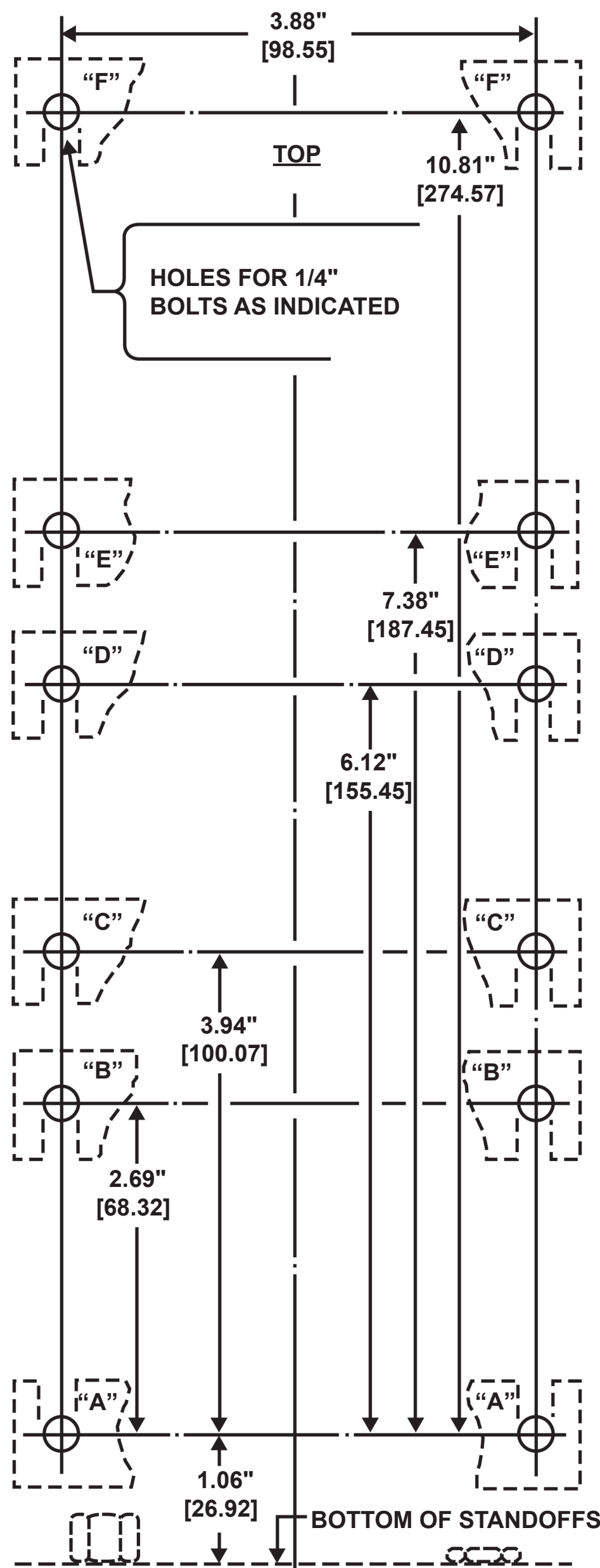
REPLACEMENT BRUSH ASSEMBLIES

MODEL NUMBER	PART NUMBER	DESCRIPTION
21	060098-001	RB21/Brush Assembly
21-40	060098-002	RB21-40/Brush Assembly
22	060117-001	RB22/Brush Assembly

Whenever unusual mechanical or electrical difficulties are encountered in the operation or installation of your POWERSTAT Variable Transformer, consult Superior Electric.

MOUNTING TEMPLATE NO. 2

NOTE: All dimensions are in inches [millimeters]



MOTOR DRIVEN

- 3-GANG UNIT — "A", "D", "F"
- 2-GANG UNIT — "A", "E"
- SINGLE UNIT — "A", "C"

MANUALLY OPERATED

- 3-GANG UNIT — "A", "D"
- 2-GANG UNIT — "A", "B"

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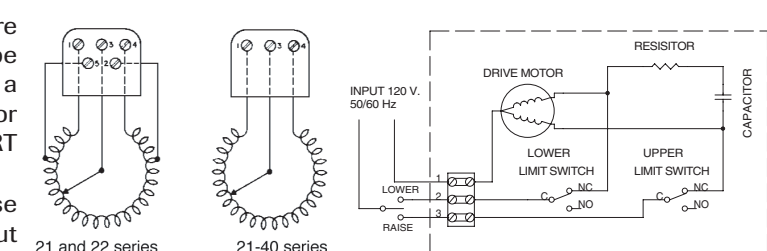


FIGURE A

FIGURE B - MOTOR DRIVE WIRING

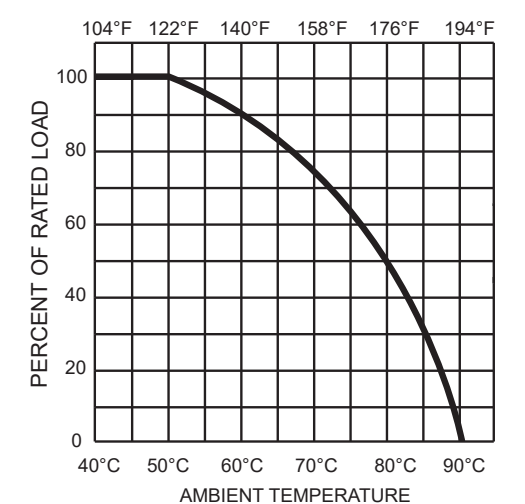
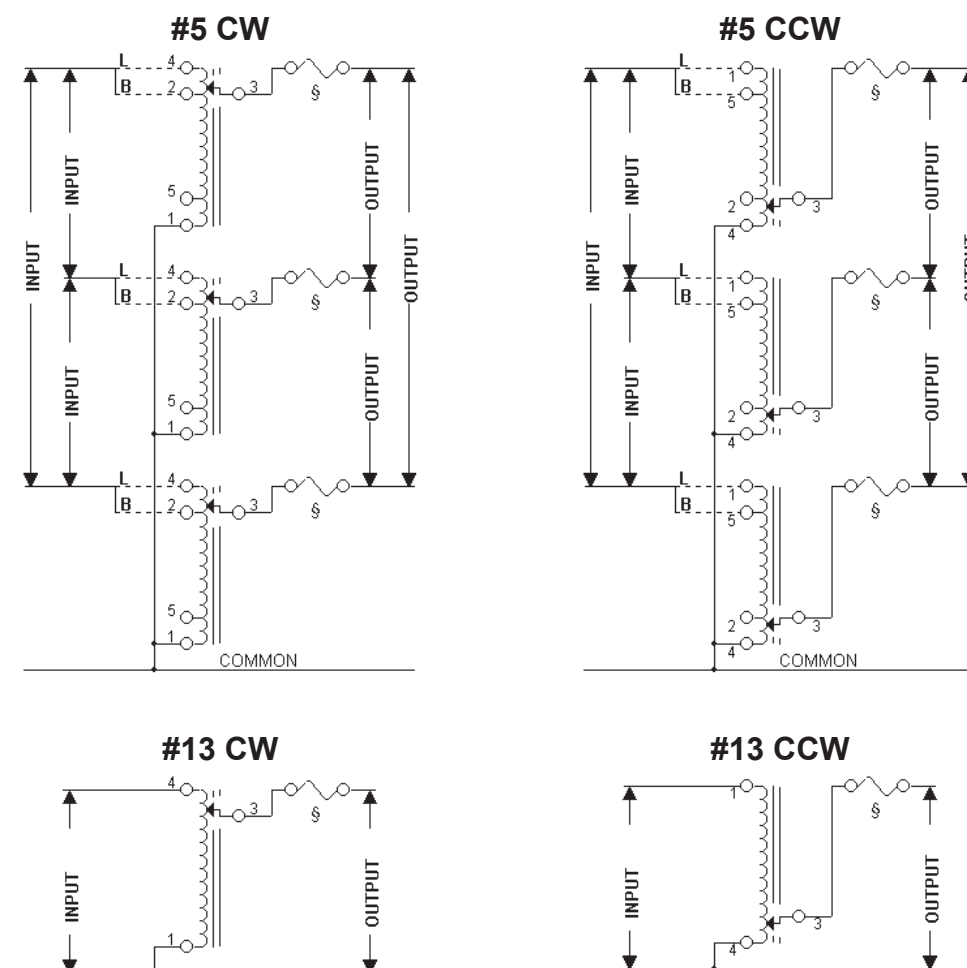
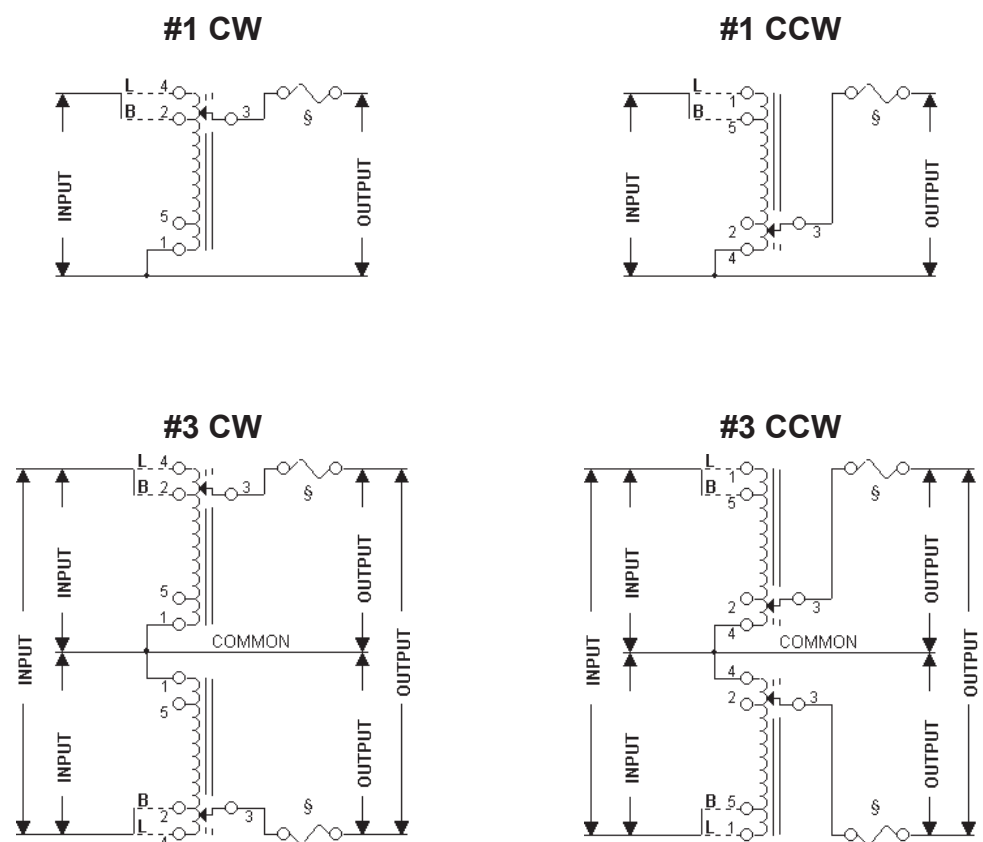


FIGURE C

CONNECTION DIAGRAMS (Viewed from the Radiator End)

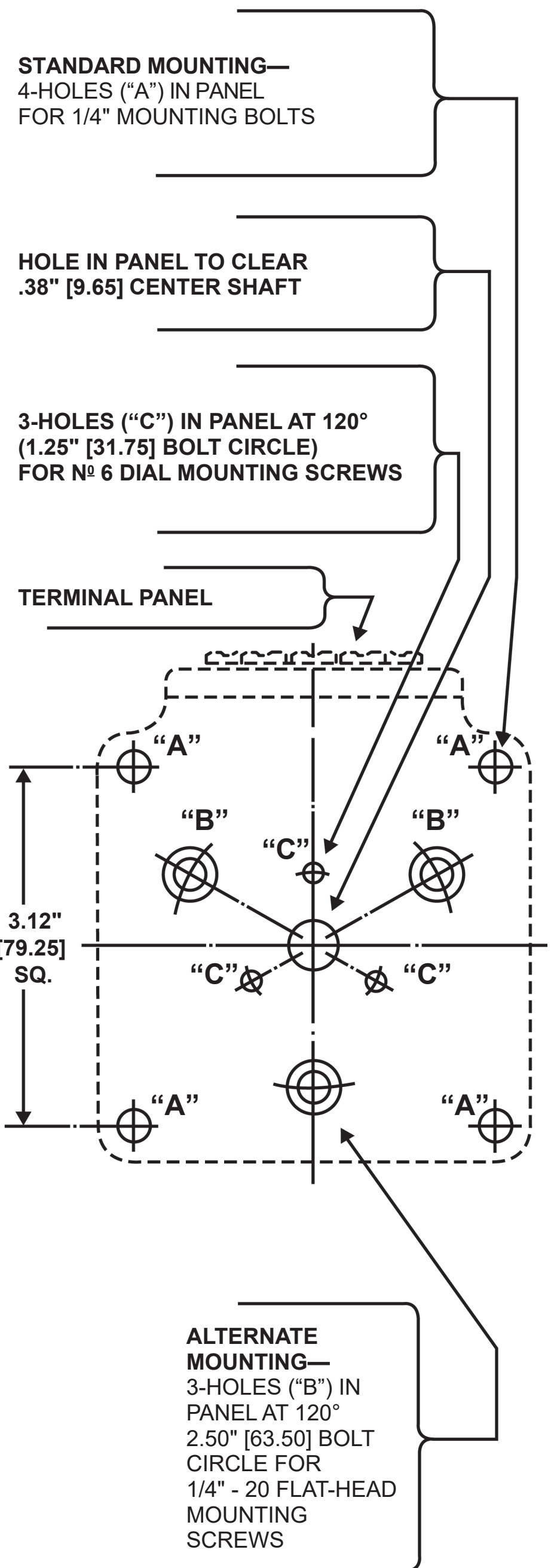


RATINGS CHART

40 VOLT, SINGLE PHASE																	
"LINE" CONNECTION						"BOOST" CONNECTION						Model Numbers					
Input Voltage: 40						Output Voltage: 0-40											
Constant Current Load			Constant Impedance Load			Terminals & Rotation			Constant Current Load			Terminals & Rotation					
Freq. (Hz)	Max. Amps	Max. KVA	Max. Amps	Max. KVA	Max. KVA	Input CW	Output CW	Jumper CW	Freq. (Hz)	Max. Amps	Max. KVA	Input CW	Output CW	Jumper CW	Manually Operated	Motor Driven	Conn. Diag.
60	18	0.72	22	0.88		1-4	1-3	1-3				1-4	1-3	3-4	21-40	ME21-40	13
120 VOLT, SINGLE PHASE																	
"LINE" CONNECTION						"BOOST" CONNECTION						Model Numbers					
Input Voltage: 120						Output Voltage: 0-120											
50/60	5	0.6	7	0.84		1-4	1-3	1-3	50/60	5	0.7	1-2	1-3	3-4	21	ME21	1
240 VOLT, SINGLE PHASE																	
"LINE" CONNECTION						"BOOST" CONNECTION						Model Numbers					
Input Voltage: 240						Output Voltage: 0-240											
50/60	2.25	0.54	3.25	0.78		1-4	1-3	1-3	50/60	2.25	0.63	1-2	1-3	3-4	22	ME22	1
50/60	5	1.2	7	1.7		4-4	3-3	1-1	50/60	5	1.4	2-2	3-3	1-1	21-2	ME21-2	3
480 VOLT, SINGLE PHASE																	
"LINE" CONNECTION						"BOOST" CONNECTION						Model Numbers					
Input Voltage: 480						Output Voltage: 0-480											
50/60	2.25	1.1	3.25	1.6		4-4	3-3	1-1	50/60	2.25	1.3	2-2	3-3	1-1	22-2	ME22-2	3
50/60	5	2.25	7	2.9		4-4	3-3	1-1	50/60	5	2.4	2-2	3-3	1-1	21-3	ME21-3	5
600 VOLT, SINGLE PHASE																	
"LINE" CONNECTION						"BOOST" CONNECTION						Model Numbers					
Input Voltage: 600						Output Voltage: 0-600											
60	2.25	1.35	3.25	1.95		4-4	3-3	1-1	60	2.25	2.2	2-2	3-3	1-1	22-3	ME22-3	5
120 VOLT, THREE PHASE OPEN DELTA																	
"LINE" CONNECTION						"BOOST" CONNECTION						Model Numbers					
Input Voltage: 120						Output Voltage: 0-120											
50/60	5	1	7	1.5		4-1-4	3-1-3	1-1	50/60	5	1.2	2-1-2	3-1-3	1-1	21-2	ME21-2	3
50/60	2.25	0.94	3.25	1.4		4-1-4	3-1-3	1-1	50/60	2.25	1.1	2-1-2	3-1-3	1-1	22-2	ME22-2	3
240 VOLT, THREE PHASE OPEN DELTA																	
"LINE" CONNECTION						"BOOST" CONNECTION						Model Numbers					
Input Voltage: 240						Output Voltage: 0-240											
50/60	2.25	0.94	3.25	1.4		4-1-4	3-1-3	1-1	50/60	2.25	1.1	2-1-2	3-1-3	1-1	22-2	ME22-2	3
50/60	5	2.1	7	2.9		4-4-4	3-3-3	1-1-1	60	5	2.4	2-2-2	3-3-3	1-1-1	21-3	ME21-3	5
240Y/138 VOLT, THREE PHASE WYE																	
"LINE" CONNECTION						"BOOST" CONNECTION						Model Numbers					
Input Voltage: 240						Output Voltage: 0-240											
50/60	2.25	1.9	3.25	2.7		4-4-4	3-3-3	1-1-1	60	2.25	2.2	2-2-2	3-3-3	1-1-1	22-3	ME22-3	5
480Y/277 VOLT, THREE PHASE WYE																	
"LINE" CONNECTION						"BOOST" CONNECTION						Model Numbers					
Input Voltage: 480						Output Voltage: 0-480											
50/60	2.25	1.9	3.25	2.7		4-4-4	3-3-3	1-1-1	60	2.25	2.2	2-2-2	3-3-3	1-1-1	22-3	ME22-3	5
600Y/346 VOLT, THREE PHASE WYE																	
"LINE" CONNECTION						"BOOST" CONNECTION						Model Numbers					
Input Voltage: 600						Output Voltage: 0-600											
60	2.25	2.3	3.25	3.4		4-4-4	3-3-3	1-1-1	60	2.25	2.3	2-2-2	3-3-3	1-1-1	22-3	ME22-3	5

MOUNTING TEMPLATE NO. 1

NOTE: All dimensions are in inches [millimeters]



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