

INSTRUCTIONS
for
STABILINE[®]
Automatic Voltage Regulators

WHR40069

Three Phase
380Y/220 X 480Y/277 Volt
Individual Phase Control

Superior Electric reserves the right to make engineering changes on all its products. Such refinements may affect information given in the instructions. Therefore, USE ONLY THE INSTRUCTIONS THAT ARE PACKED WITH THE PRODUCT.

WARNING: High voltages are present inside this unit during operation, Do not operate this unit unless all covers are in place. Installation and servicing should only be done by qualified personnel.



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1.0. INSPECTION

1.1. UNPACKING

When unpacking the unit, examine it carefully for any shipping damage. The "Damage and Shortage" instructions packed with the unit outlines the procedure to follow if any parts are missing or damaged.

2.0. DESCRIPTION

2.1. GENERAL

WHR40069 STABILINE® Automatic Voltage Regulators are three phase, 380Y/220 X 480Y/277 volt, fast acting electromechanical regulators. These WHR Series voltage regulators regulate each line-to-neutral voltage independently. These voltage regulators are wye connected, have an analog electronic control section for each phase, and have a power section for each phase consisting of one or more motor driven, POWERSTAT® Variable Transformers and a buck/boost transformer. The units are equipped with standard options. Refer to

the WHR model numbering system in the next section for more details. See the rating sections and unit nameplate for complete specifications.

Advantages of all WHR Series voltage regulators include high efficiency (99% typical), high overload capacity and low impedance. These voltage regulators are insensitive to the magnitude and power factor of the load, and have little to no effect on system power factor. This means these regulators can be used with any type load.

2.2. MODEL NUMBER ASSIGNED

A special model number was assigned to this voltage regulator. The WHR40069 is similar to the WHR34*T*** series except limited range POWERSTAT® Variable Transformers are replaced by full range POWERSTAT® Variable Transformers and buck/boost transformers. The unit Ratings are similar to a **WHR34WT***-CSMT150** except it cannot be reconnected for all-buck or all-boost operation.

2.3. STANDARD MODEL NUMBER SYSTEM

The model number for each WHR Series voltage regulator identifies the various characteristics of that specific unit. The following table explains the meaning of each character in a standard model number.

Typical Model Number →		W	H	R	S	3	2	W	T	F32	T	-	CB	D	M	T	3	6	7	
<input type="checkbox"/> WHR	Wide Range High Power Regulator																			
<input type="checkbox"/> S	Transient Voltage Suppression §																			
<input type="checkbox"/> 1	Single Phase (Parallel Connected)																			
<input type="checkbox"/> 2	Single Phase (Parallel Series connected)																			
<input type="checkbox"/> 3	Three Phase (wye in / wye or delta out)																			
<input type="checkbox"/> 6	Three Phase (delta in / delta out) §																			
<input type="checkbox"/> 9	Three Phase (delta in / wye or delta out) w/ zig-zag §																			
<input type="checkbox"/> 1	Nominal Voltage 120-127 (100)																			
<input type="checkbox"/> 2	Nominal Voltage 208 X 220-230-240 (277)																			
<input type="checkbox"/> 4	Nominal Voltage 380-400-415 X 480																			
<input type="checkbox"/> 6	Nominal Voltage 480 X 600 ①																			
<input type="checkbox"/> N	Narrow Range																			
<input type="checkbox"/> W	Wide Range																			
<input type="checkbox"/> S	Single Control																			
<input type="checkbox"/> D	Double Control																			
<input type="checkbox"/> T	Triple Control																			
<input type="checkbox"/> LNN	Size Code (3 or 4 digits)																			
<input type="checkbox"/> R	Rack Cabinet																			
<input type="checkbox"/> T	Tall Cabinet																			
<input type="checkbox"/> CB	Input Circuit Breaker																			
<input type="checkbox"/> CS	Input Circuit Breaker w/ 120vac Shunt Trip																			
<input type="checkbox"/> CR	Input Circuit Breaker w/ 120vac Under voltage Trip Release																			
<input type="checkbox"/> D	Delayed Output																			
<input type="checkbox"/> M	Manual Bypass Switch																			
<input type="checkbox"/> T	Tropicalization Treatment																			
<input type="checkbox"/> 0	No Meter Options																			
<input type="checkbox"/> 1	Ammeter(s)																			
<input type="checkbox"/> 2	Frequency Meter w/ Alarm Contacts																			
<input type="checkbox"/> 3	Both 1 & 2 above																			
<input type="checkbox"/> 0	No Alarm Circuit Options																			
<input type="checkbox"/> 4	Input Voltage Range Alarm(s)																			
<input type="checkbox"/> 5	Phase loss/Phase reversal Alarm																			
<input type="checkbox"/> 6	Both 4 & 5 above																			
<input type="checkbox"/> 0	No Miscellaneous Options																			
<input type="checkbox"/> 7	Manual Raise / Lower Switch(s)																			
<input type="checkbox"/> 8	Soft Start																			
<input type="checkbox"/> 9	Both 7 & 8 above																			

§ Base model numbers (no options) as shown in catalog include the characters up to the hyphen (-) with the exclusion of the TVS and Delta options.

- For lettered options not selected the letters and spaces are omitted from the model number.
- The last three numbers in the model number are all used unless all three are zero then they are omitted.

2.4. THEORY OF OPERATION

These units regulate AC voltage by automatically adjusting POWERSTAT® Variable Transformers to maintain constant output voltage.

Each of the three solid-state control units detects one line to neutral output voltages and continually compares it with output and accuracy settings selected by the user. If any line to neutral voltage is out of specifications, the control unit on that phase drives the POWERSTAT variable transformer on that phase, by means of a synchronous motor, to the required new position.

3.0. INSTALLATION

3.1. TRANSPORTING THE REGULATOR

Due to its weight and size, proper lifting procedures must be followed when transporting the unit and moving it into the location where it is to be installed.

The proper method for moving these units is to place a forklift under the base. A heavy frame is provided in this area to allow lifting the unit in this manner without damage. The 26 inch (559 mm) wide enclosures can also be lifted by removing the top cover and using the lifting eyes provided in the sides of the cabinet.

3.2. MECHANICAL INSTALLATION

The voltage regulator is designed for floor mounting. When mounting the unit, allow a minimum clearance of 4 inches (100 mm) behind the unit for proper ventilation. All internal components and wiring connections are accessible through the front panels. A 3 foot (1000 mm) area in front of the unit should be kept clear for installation and service.

3.3. ELECTRICAL INSTALLATION

All WHR Series voltage regulators are designed to be hard-wired to the input power and the load using copper wire. When these units increase low input voltage to give nominal output voltage, the input current is substantially higher than the output current. Maximum rated input and output currents for each unit are given in the enclosed rating charts. Select a wire size that is adequate to carry the maximum rated current as specified by local and national code requirements.

The front panel(s) of the voltage regulator must be removed to allow access to the input and load terminals. To remove a panel, use a flat blade screwdriver to release the ¼ turn fasteners, which hold the front panel in place, and lift the panel off the base. A full range of knockouts is provided in the base and the rear panel of the unit for wire entry and exit.

The location of the power connections varies depending on the options provided. On units with an input circuit breaker, input connections are made directly to the circuit breaker. On units without any options, the input

connections are located on the POWERSTAT variable transformer. The input power connections are labeled L1, L2, and L3 for the three hot lines. Load connections are labeled T1, T2, and T3 for the hot lines and are made to the POWERSTAT variable transformer on units without any options.

Because the circuit breaker of the WHR40069 is in a separate enclosure the input must be connected to L1, L2 and L3 of the circuit breaker cabinet and the output load must be connected to T1, T2, and T3 of the AVR (Automatic Voltage Regulator) cabinets. To complete the installation the output of the circuit breaker cabinet (T1, T2 and T3) must be connected to the input of the AVR cabinets (L1, L2, and L3). Refer to schematic supplied with the unit.

The input/output neutral is labeled NEUT. in each cabinet. The input neutrals must be connected.

The ground terminals are a ground stud on the cabinet wall, or a lug on the base, and must be connected to a suitable earth ground to reduce the chance of electrical shock.

4.0. START UP

Set the Output Voltage Range toggle switch on each control module to either the 380Y/220 or the 480Y/277-volt position to match your application. Use the 380Y/220-volt position for 400Y/230 and 415Y/240-volt systems. The Output Voltage Adjustment and the Sensitivity potentiometers are set at the factory for nominal output voltage and approximately 2% accuracy, and should not be readjusted until the voltage regulator is initially energized.

After all input and output connections are completed and checked, place the front panel(s) in position and tighten the fasteners.

Energize the regulator power source and, if provided, place the voltage regulator's circuit breaker in the "ON" position. The voltmeter should indicate the output voltage (approx. 400Y/230 or 460Y/ 266 volts), and the POWER pilot lamps and the CONTROL pilot lamps should be lit. This indicates the voltage regulator is operating properly.

5.0. OPERATION

5.1. CONTROL MODULE ASSEMBLY

5.1.1. General

The control modules contain the circuitry that sense the output voltage and determine if correction is needed. When correction is required this circuit sends a raise or lower signal to the motor driven variable transformers. To eliminate unauthorized tampering of the control module the items marked (◆) below are located behind the front panel.

5.1.2. Power Pilot Lamps (A1-LP1)

The POWER lamp on each control assembly lights when power is present for the motor on that phase. This indicates the voltage regulator is energized.

5.1.3. Control Pilot Lamps (A1-LP2)

The CONTROL lamp lights when the control assembly sense voltage for that phase is energized. The control sense voltage must be energized for automatic correction of voltage changes to occur.

5.1.4. Analog Voltmeters (A1-M1)

These meters show the output voltages. There is one meter for each phase. They sense line-to-neutral voltage, and display line-to-neutral voltage and the equivalent line to line voltage.

5.1.5. Output Voltage Range Toggle Switches (A1-S1)◆

With these switches in the OFF position, the control sense voltage for that phase is disconnected and the control pilot lamp is not illuminated. In this position automatic correction for voltage changes on that phase will not take place and any change in input voltage will be reflected in output voltage. The switches (one for each phase) should be placed in either the "380Y/220" or "480Y/277" position to energize the control assembly sense voltage and allow automatic correction of voltage changes.

5.1.6. Output Voltage Potentiometers ◆

These potentiometers set the line to neutral output voltages, one for each phase. The adjustment range is approximately $\pm 10\%$ of selected nominal output voltage.

5.1.7. Sensitivity Potentiometers ◆

These potentiometers adjust the voltage regulator's output accuracy and therefore set how much the output voltage will change before the unit will correct. There is a SENSITIVITY potentiometer for each sensed phase.

5.1.8. Fuses (A1-F1 to A1-F4) ◆

The four fuses located on the control module protect the motor and sense power lines. If the POWER or CONTROL lights are not lit, and all control settings are proper, check for a blown fuse.

5.2. SETTING OUTPUT VOLTAGE AND SENSITIVITY POTENTIOMETERS

Normally, the WHR Series voltage regulator should not be operated without the front panel(s) of the cabinet in place. However, during the initial operation of the regulator, the front panels can be removed to allow setting the OUTPUT VOLTAGE and SENSITIVITY potentiometers.

5.2.1. Energize Regulator

On units equipped with a manual bypass switch ensure it is in the regulator position. Energize the regulator power source and place the input circuit breaker, if so equipped, in the "ON" position. The pilot lamps should light, indicating that the voltage regulator is energized and that the control unit is on. If necessary, move the OUTPUT VOLTAGE RANGE switch on each phase to the desired nominal output voltage position. The voltmeters will indicate the output voltages.

5.2.2. Set Output

To adjust the output voltage on any phase, turn the OUTPUT VOLTAGE potentiometer clockwise to increase or counterclockwise to decrease the output voltage, as indicated on the voltmeter for that phase.

5.2.3. Set Sensitivity

The sensitivity must be adjusted if the voltage regulator hunts (any of the motor driven variable transformer sections of the regulator continually cycles back and forth) or if the regulator allows too great a change from the set voltage before correction occurs.

Turning the SENSITIVITY control clockwise increases the sensitivity to maximum (0.75% to 1-% output voltage accuracy). For maximum sensitivity, turn the SENSITIVITY control on one phase clockwise to the point where the POWERSTAT on that phase begins to hunt. Turn the control counterclockwise (CCW) until the hunting stops. Turn the control an additional 1/8 turn CCW. Repeat for the other two phases.

5.2.4. Close

Replace the front cover(s).

5.3. REMOTE SENSING

Normally, these voltage regulators sense and regulate each line to neutral voltage at the regulator's output terminals. In some cases better control can be obtained by regulating the voltage at another point, such as at the end of long lines between the regulator and the load. This is known as remote sensing.

If remote sensing is desired, move the wire connected to terminal 6 to terminal 7 and the wire connected to terminal 8 to terminal 9 on each control module terminal panel. This will disconnect the control module sense terminals from the output terminals of the regulator. Connect remote sensing wires for each corresponding line to neutral voltage (ex. 220 or 277 volts) to terminals 6 and 8 on the control modules.

Each line to neutral voltage that is sensed must be connected to the control module that controls that phase. If a control unit is not sensing the voltage it controls, the POWERSTAT connected to that control unit will drive to the end of its travel when it attempts to correct the voltage it is not controlling. This will result in incorrect output voltages.

6.0. OPTIONS

6.1. NON DESIGNATED OPTIONS

6.1.1. Auxiliary Power Modules (A2)

These modules are provided on units where a 120 volt AC source is required to operate internal circuitry. The output voltage of these modules is on terminals 1 and 2 of the terminal strip. If there is no output on these terminals check the two fuses mounted on the same bracket. The output of the auxiliary power modules are used to operate fans, trip or hold on circuit breakers, and on any other applications where 120 volts is required.

6.1.2. Fans (B2)

On larger units fans are provided to help efficiently remove heat generated in the cabinet. An auxiliary power module supplies the fan operating voltage. If the fans do not operate insure the auxiliary power module output voltage is present.

6.2. MODEL NUMBER SPECIFIED OPTIONS

6.2.1. Circuit Breaker (CB1)

An input circuit breaker provides short circuit and overload protection for the WHR Series Voltage Regulators. Industrial circuit breakers with high interrupting capacity are used. These breakers also serve as an on/off switch for the regulator and any load attached.

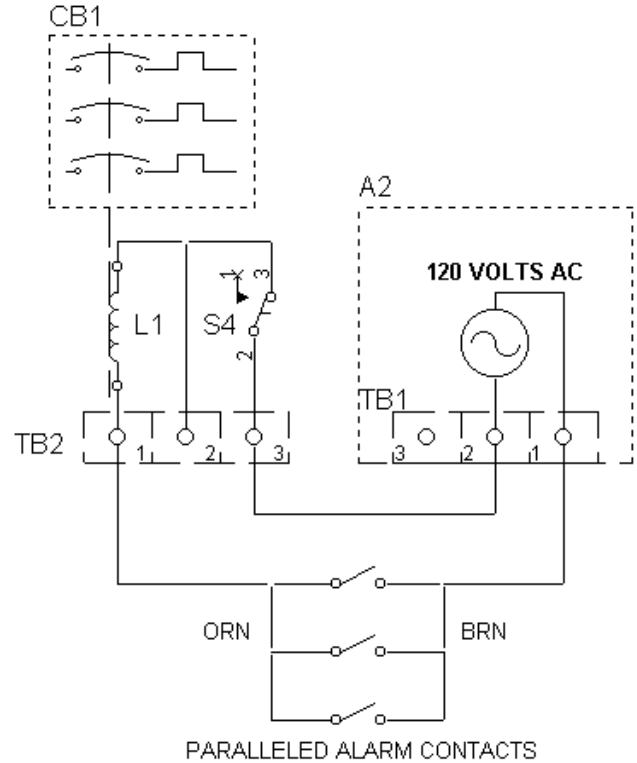
6.2.1.1. Shunt Trip (L1)

In unit where the model number designates the circuit breaker as "CS" the circuit breaker is equipped with a shunt trip. A shunt trip causes the breaker to open when voltage is applied to the shunt trip coil. The trip coil is rated 120 volt, AC and is de-energized when the breaker opens.

When alarm contact options and a circuit breaker trip option are ordered together, the unit is furnished with 120 volt AC, auxiliary power module (A2) and the alarm circuit contacts are wired to trip the input breaker. The Shunt Trip Connections Diagram shows the typical connections.

If you do not want the alarm contacts to trip the input breaker, the unit can easily be re-configured to not trip the breaker and to perform other control functions. The 120 volts supplied by the auxiliary power module to trip the shunt coil can be replaced by an external source if desired, but do not disconnect any other devices from this source. A momentary push button switch (S4) is provided to disable any alarm contacts from activating the trip coil. This allows turn on of the system so alarm options can reset. Hold switch in while turning on the circuit breaker.

Shunt Trip Connections Diagram



6.2.2. Ammeters (M1)

An analog ammeter displays load current for each phase. Each meter indicates the load current within 2% of the meters full range.

6.2.3. Phase Loss, Phase Reversal Alarm Contacts (A3)

Provided for three phase units only, this option senses the three phase voltage and operates a relay (form "C" normally open / normally closed contact) when any phase voltage is lost, or if the voltage sequence of the power is reversed.

If an input circuit breaker with a shunt trip is ordered, the system is configured to automatically trip the breaker when there is a phase reversal. The system might not trip the breaker when there is a phase loss because power to operate the shunt trip may not be available.

Alarm circuit contacts provided with the Frequency Trip Meter, Input Voltage Range Alarm and Phase Loss - Phase Reversal options are rated 5 amps 240 volts AC.

7.0. MAINTENANCE

To ensure maximum life of the equipment, the following should be part of an **annual** maintenance program.

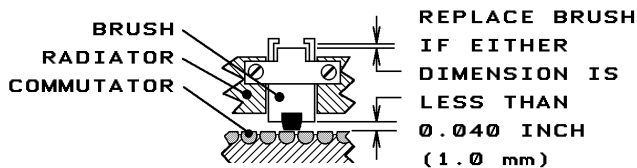
Warning

De-energize unit before performing maintenance. Voltages are present inside this unit which can cause injury. Therefore, only personnel qualified to service electrical equipment should perform maintenance on this unit.

7.1. Vacuum the voltage regulator inside and out to remove accumulated dirt, which could lead to overheating or insulation failure.

7.2. Tighten all electrical connections, particularly all power wiring to, and in, the unit.

7.3. Inspect all variable transformer brushes and commutators for signs of wear or pitting. Replace as required. See diagram below.



Do not attempt to clean a commutator with an abrasive such as sandpaper or a file. This will ruin the soft precious metal plating on the commutator and will shorten the life of the unit. It is normal for commutators to become black due to carbon brush tracking. If a commutator is to be cleaned, use denatured alcohol and a soft cloth.

7.4. Inspect the variable transformer drive belts, sprockets, gears, cams, etc. for signs of slippage or wear and adjust as required.

7.5. Check the variable transformer radiator(s) (the die cast part that holds the brush assembly) for signs of slippage, and see if all brushes driven by the same motor are aligned with each other. The alignment of the radiator and brushes depends on the setscrews that hold the variable transformer center tube(s) to the shaft and the setscrews that hold the radiator to the center tube. Adjust and tighten as needed.

7.6. Lubrication of the WHR Series voltage regulator is not required since it has been lubricated at the factory for its lifetime.

8.0. TROUBLESHOOTING

WHR Series voltage regulators will provide long, reliable service with little attention. Unless the unit is overloaded, there is little likelihood of component failure.

Warning

Voltages are present inside this unit which can cause injury. Therefore, only personnel qualified to service electrical equipment should perform trouble-shooting procedures on this unit.

If the regulator fails to operate correctly, the following checks will help locate and correct the problem. Refer to the schematic, rating chart and replacement parts list for further information.

8.1. Check the load connected to the voltage regulator to be sure the unit's output current rating is not being exceeded.

8.2. See if the POWER pilot lamps are on. If a lamp is not on, there is no power to the voltage regulator, or fuses F1 & F2 (POWER LIGHT MOTOR) on that control module are blown, or the lamp has burned out. Check the POWER LIGHT MOTOR fuses (F1 and F2). Check the power input to the unit, to be sure the voltage is within the range specified for the selected output voltage.

8.3. Check the output voltmeters. If a meter shows zero output voltage, check the input line, control module fuses F3 and F4 (CONTROL fuses), remote sense wiring if applicable, and input connections. If so equipped, check position of input circuit breaker and manual bypass switch.

8.4. Check the CONTROL pilot lamps. If one is not lit, check it's VOLTAGE RANGE switch to be sure it is on and check for blown CONTROL fuses (F3 and F4). If applicable, check the remote sense wiring.

8.5. If the motor hunts (cycles continuously), readjust the SENSITIVITY control.

8.6. If a motor drives a POWERSTAT variable transformer to one end of its travel, and the voltage decreases when it should increase or increases when it should decrease, check to see if the input and output power connections to the voltage regulator are reversed. If applicable, check the remote sense wiring.

8.7. If the unit has been reworked or repaired, check to see if the leads driving the motor have been reversed. A1-TB1-2 and A1-TB1-3 provide the motor power to lower and raise the motor with A1-TB1-1 being the common for both AC voltages.

8.8. If the motor continues to hum or buzz after the OUTPUT VOLTAGE RANGE switch is turned off, the solid-state switch controlling the motor may be defective. De-energize the input line to the voltage regulator, and replace the control board.

8.9. If the motor has driven to one end or does not drive at all, check to ensure the motor drive is functioning correctly. Refer to the unit's schematic diagram to complete the following steps:

De-energize the input line to the voltage regulator; place the OUTPUT VOLTAGE RANGE switch in the center (off) position, and remove POWER LIGHT-MOTOR fuses F1 and F2 on each control module.

Apply 115 volts AC between terminals A1-TB1-1 and A1-TB1-2 on the control module, or to the corresponding terminals at the motor board terminal strip (TB1). These nine junction terminal strips are connected point-for-point. The motor should turn the variable transformer counter clockwise (viewed from top) so as to lower the output voltage until it reaches the end of its travel, where the limit switch will prevent further rotation in that direction.

Apply 115 volts between terminals A1-TB1-1 and A1-TB1-3 should run the motor in the opposite direction until a limit switch stops the motor at the end of travel.

If the motor operates successfully in this test the problem may be with the control board.

8.10. Inspect the POWERSTAT Variable Transformer brush(s) and commutator(s) for signs of wear or damage. The brush assemblies on the variable transformer section will not need replacement under normal conditions. When excessive brush wear or commutator damage occurs, it is usually the result of an overload. If either condition exists, the POWERSTAT Variable Transformer section or the brush must be replaced or repaired. Check the load to be sure the output current rating of the voltage regulator is not being exceeded.

Do not attempt to clean a commutator with an abrasive such as sandpaper or a file. This will ruin the soft precious metal plating on the commutator surface and will shorten the life of the unit. It is normal for commutators to become black due to carbon brush tracking. If a commutator is to be cleaned, use denatured alcohol and a soft cloth.

8.11. Check the variable transformer radiator(s) (the die cast part that holds the brush assembly) for signs of slippage, and see if all brushes driven by the same motor are aligned with each other. The alignment of the radiator and brushes depends on the setscrews that hold the variable transformer center tube(s) to the shaft and the setscrews that hold the radiator to the center tube. Adjust and tighten as needed.

9.0. RATING

9.1. POWER RATINGS

The following ratings apply to the WHR40069.

INPUT:

VOLTAGE: 380Y/220 X 480Y/277
 FREQUENCY: 50/60 Hz X 60 Hz
 CONNECTION: 3 Phase, 4 Wire, Wye
 RANGE: -30% to +15% of Selected Output
 MAX AMPS 1620 AMPS

OUTPUT:

VOLTAGE: 380Y/220 X 480Y/277
 MAX. KVA: 800 X 1010
 MAX. AMPS: 1215
 CONNECTION: 3 Phase, 3 or 4 Wire

9.2. GENERAL SPECIFICATIONS

Electrical:

Output Accuracy	Adjustable from 1% to 3%
Response Time	0.025 seconds at 60 Hz, 0.030 seconds at 50 Hz
Load Capacity	100% rated continuous 200% rated 60 seconds 400% rated 3 seconds 600% rated 1 second 800% rated 0.5 second 1000% to 2500% 1/2 cycle inrush
Load Power Factor	0 lagging to 0 leading
Load Crest Factor	6 Max (I peak / I RMS)
Efficiency	99% typical, at full load
Heat Generated	BTU (typical) = 35 x rated kVA
Harmonic Distortion	Less than 1% added
Surge Withstand Capability	6000 volts per IEEE C62.41, location category B
Impedance	1% (typical) without transient suppression option 2% (typical) with transient suppression option
Transverse-Mode Noise Attenuation	40 dB (typical) with transient suppression option

Environmental:

Service Conditions	Units are housed in NEMA 1 ventilated enclosures, intended for indoor use under usual service conditions.								
Temperature									
Operating	Average ambient temperature for any 24 hour period not to exceed 30°C (86°F), and maximum temperature not to exceed 40°C (104°F). Average ambient temperature for any 24 hour period may be increased to 40°C (104°F), and the maximum temperature may be increased to 50°C (122°F), if the load is decreased to 90% of standard rating. Minimum temperature is 0°C (32°F).								
Storage	-40°C to +70°C (-40°F to +158°F)								
Humidity (Operating and Storage)									
Units without tropicalization	10 to 75% average relative humidity for any 7 day period, and maximum relative humidity not to exceed 95% non-condensing.								
Units with tropicalization	10 to 95% average relative humidity and maximum relative humidity not to exceed 95% non-condensing.								
Altitude									
Operating	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Maximum Altitude</th> <th style="width: 50%;">Derating</th> </tr> </thead> <tbody> <tr> <td>6,600 Ft.(2,000 meters)</td> <td>No de-rating</td> </tr> <tr> <td>10,000 Ft.(3,000 meters)</td> <td>load to 95%, ambient 30°C (86°F)</td> </tr> <tr> <td>15,000 Ft.(4,500 meters)</td> <td>load to 90%, ambient 20°C (68°F)</td> </tr> </tbody> </table>	Maximum Altitude	Derating	6,600 Ft.(2,000 meters)	No de-rating	10,000 Ft.(3,000 meters)	load to 95%, ambient 30°C (86°F)	15,000 Ft.(4,500 meters)	load to 90%, ambient 20°C (68°F)
Maximum Altitude	Derating								
6,600 Ft.(2,000 meters)	No de-rating								
10,000 Ft.(3,000 meters)	load to 95%, ambient 30°C (86°F)								
15,000 Ft.(4,500 meters)	load to 90%, ambient 20°C (68°F)								
Storage	50,000 Ft.(15,000 meters)max								

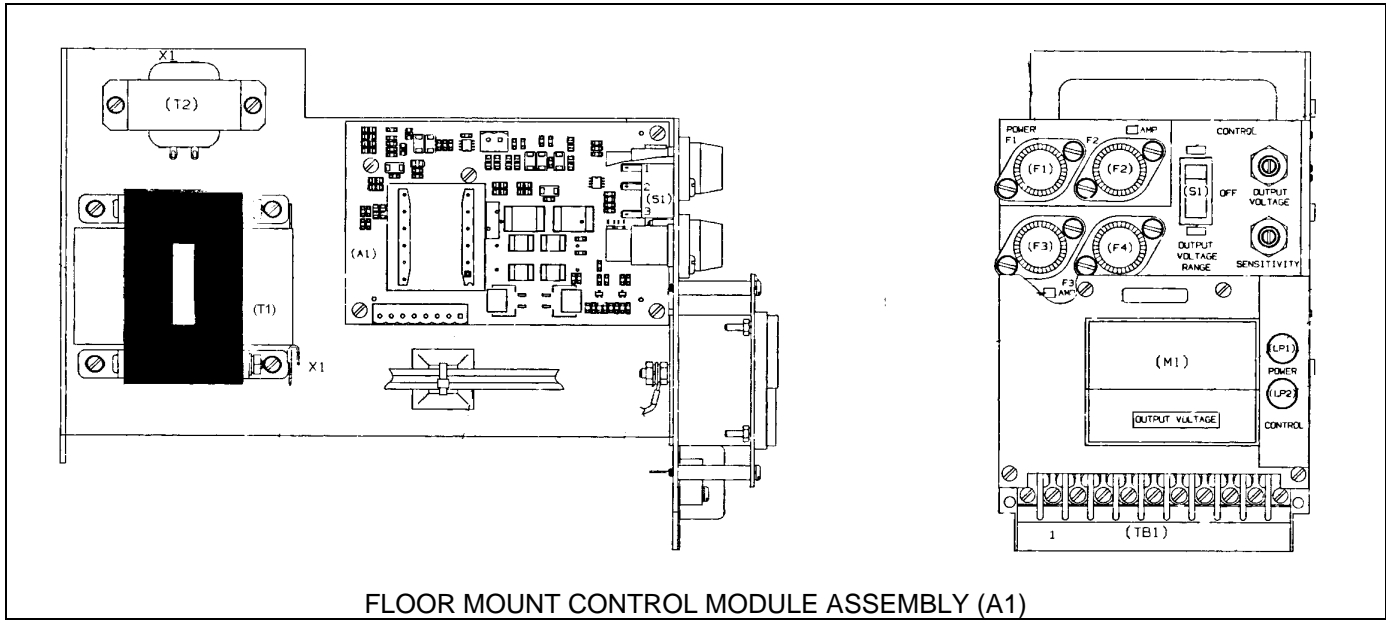
10.0. REPLACEMENT PARTS

10.1. ORDERING

Because this manual covers a full series of units it is impractical to provide a full list of replacement parts. To order a part not listed in this manual, provide the unit model number, serial number, and date code. Reference the part by schematic reference symbol, description and part number if available.

10.2. CONTROL MODULE ASSEMBLY

The same control modules are used throughout this standard WHR Series STABILINE[®] Automatic Voltage Regulators and are shown below. **Tropicalized units** have a similar control module but some of the parts are specially treated and therefore have a **different part number**.



FLOOR MOUNT CONTROL MODULE ASSEMBLY (A1)

Reference Symbol	Part Description	Standard Part Number	Tropicalized Part Number
A1	CONTROL MODULE	213244-004	213244-008
A1-A1	CONTROL BOARD	227412-001	227412-001-SM
A1-F1,F2,F3,F4	FUSE, 600V	213274-001	
A1-LP1,LP2	LIGHT, INDICATOR, GREEN	227571-001	
A1-M1	VOLTMETER	212917-005	
A1-S1	SWITCH, ROCKER SPDT ON/OFF/ON	227572-001	
A1-T1	TRANSFORMER, POWER	227602-001	
A1-T2	TRANSFORMER, SENSE	227587-001	

10.3. POWER COMPONENTS

The following parts are special to the WHR40069

Reference Symbol	Part Description	Part Number
T1	POWERSTAT, VARIABLE TRANSFORMER	228734-001
T2	CHOKE, PARALLELING	005587-000
T4	TRANSFORMER, BUCK-BOOST	228740-001

10.4. REPLACEMENT BRUSH ASSEMBLY

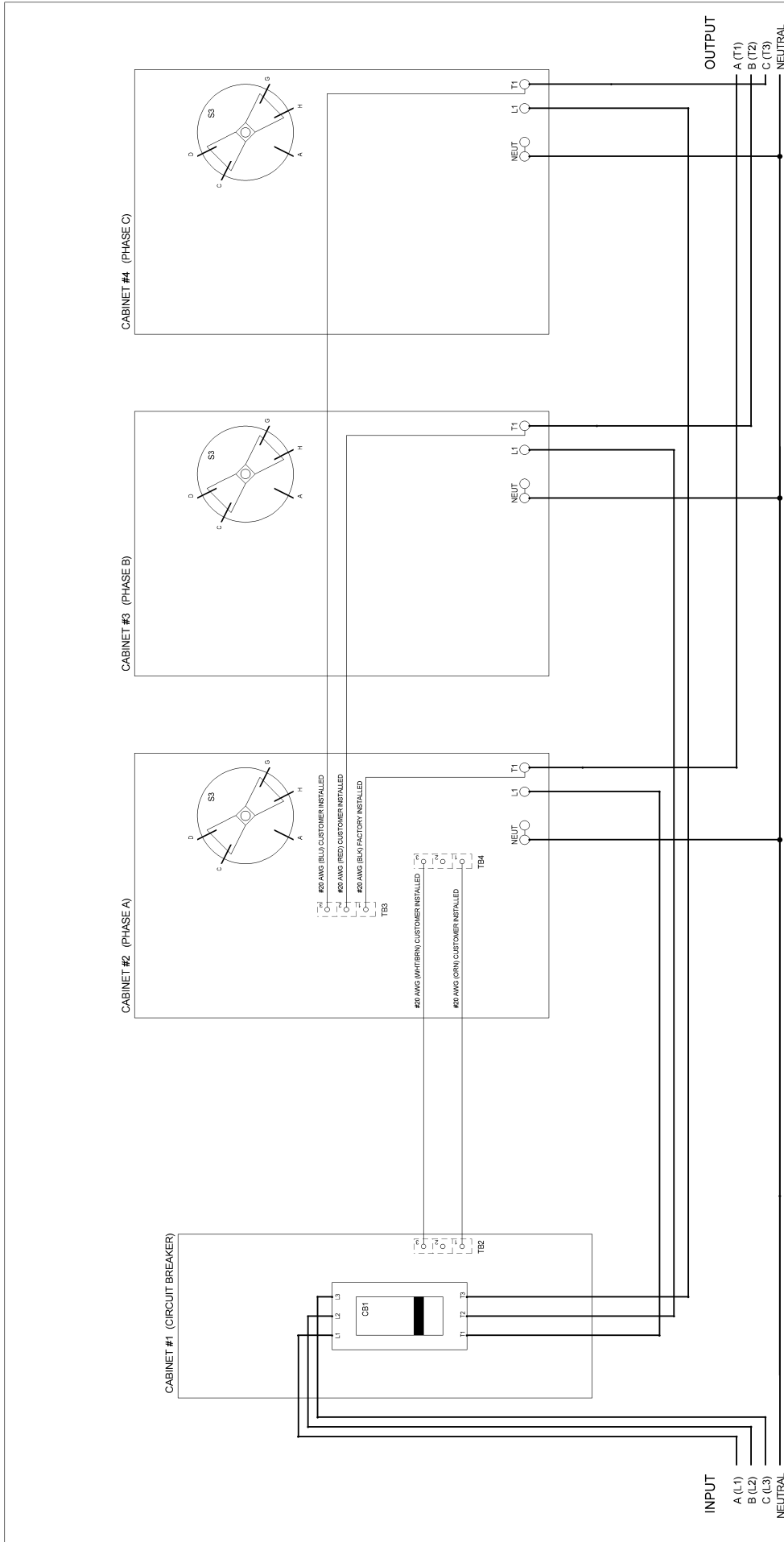
Each POWERSTAT[®] Variable Transformer contains a durable brush assembly. These assemblies are designed to reduce the need for attention or replacement, however, because these are moving parts that rely on contact friction to operate properly, an annual inspection is suggested. Refer to the maintenance section of this manual for details.

Model Number	Part Description	Part Number
WHR40069	REPLACEMENT BRUSH ASSEMBLY	017702-014

10.5. AUX POWER MODULE

There are two standard power modules used throughout this standard WHR Series STABILINE[®] Automatic Voltage Regulators. One is used for Line to Line connections and the other for Line to Neutral connection.

Reference Symbol	Part Description	Line-Line	Line-Neut.
		Part Number	Part Number
A2	CONTROL POWER MODULE	217487-003	217487-002
A2-F1,F2	FUSE	213274-001	104364-003
A2-T1	TRANSFORMER, POWER	227608-001	227602-001



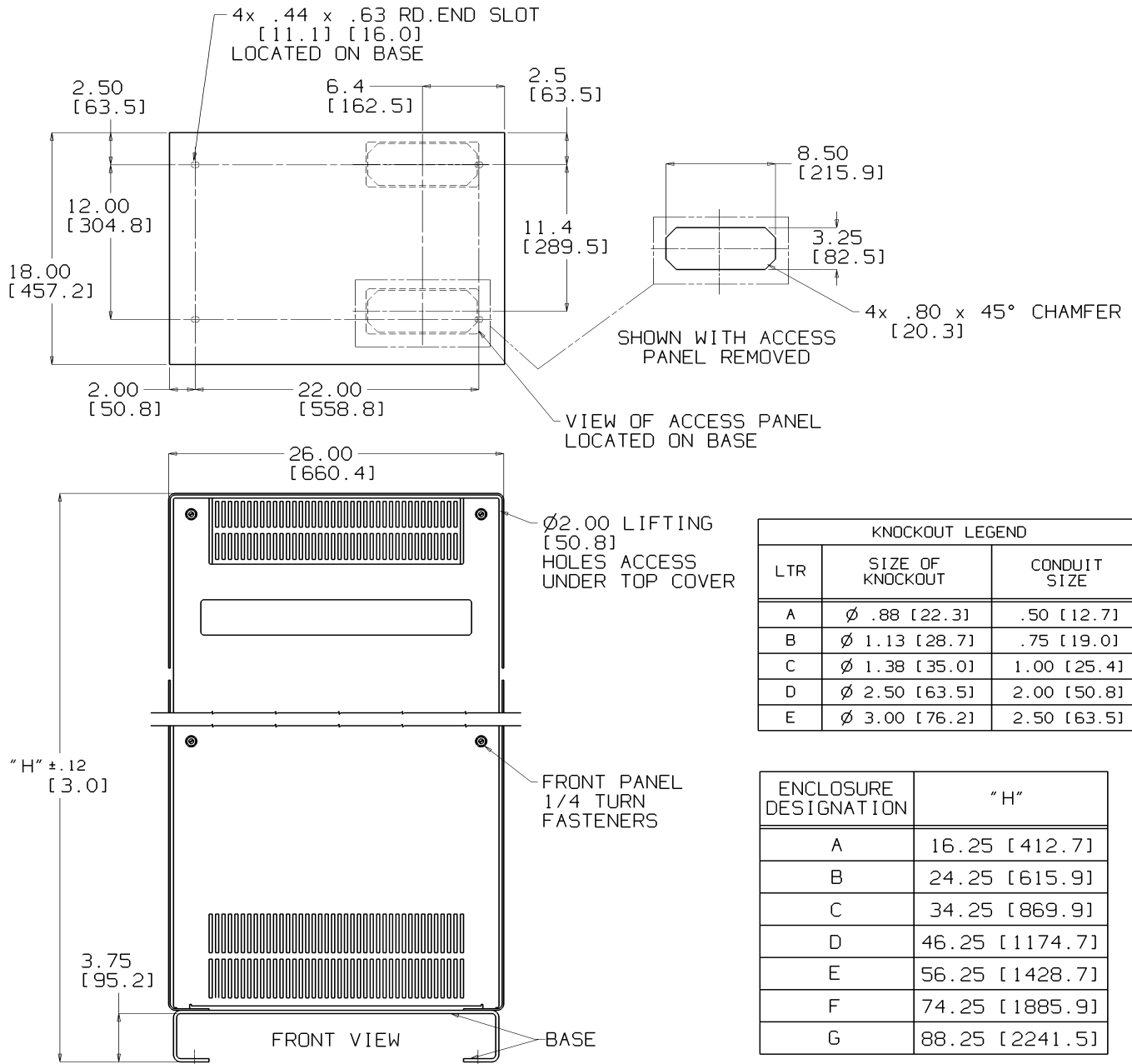
NOTE: Input and output power wires should be sized to adequately carry the maximum rated current as specified by local and national code requirements.

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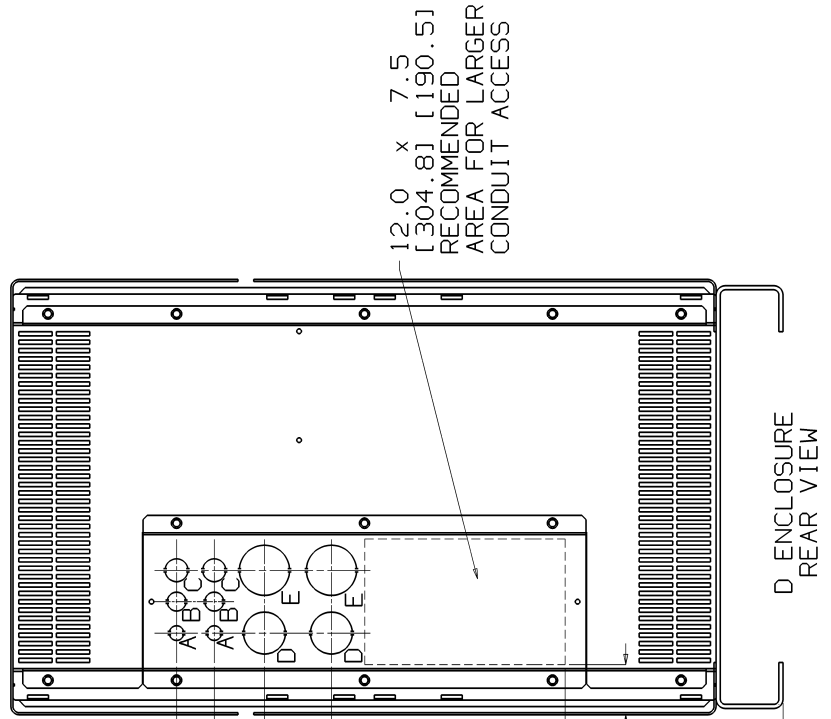
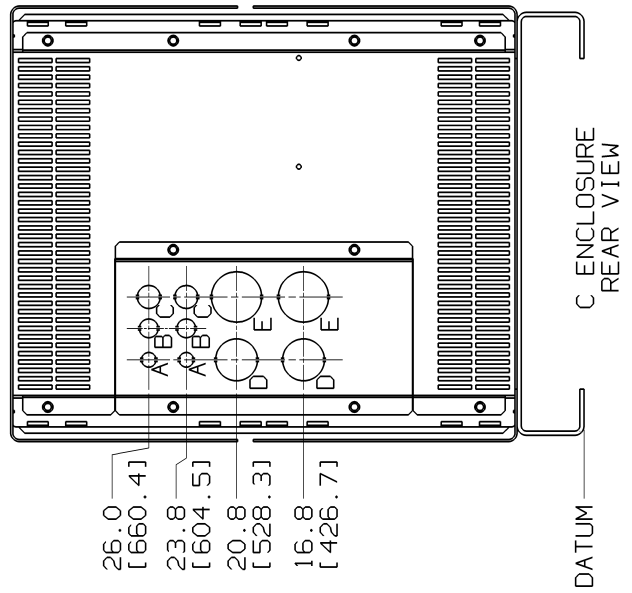
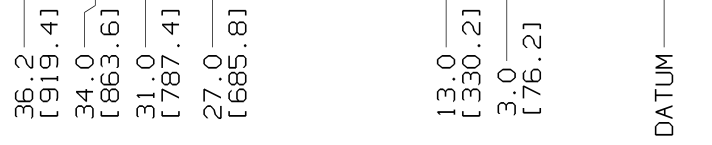
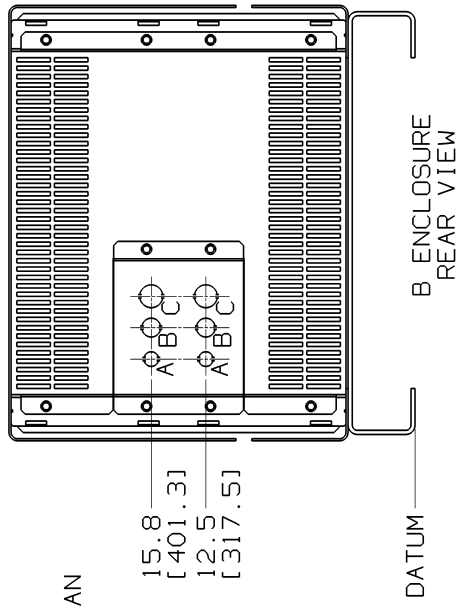
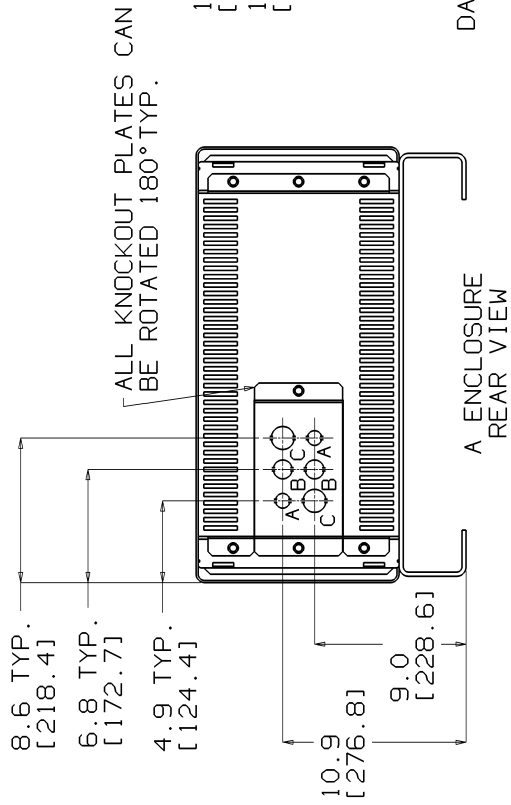
12.0. FLOOR MOUNT DIMENSIONS

Enclosures A through G

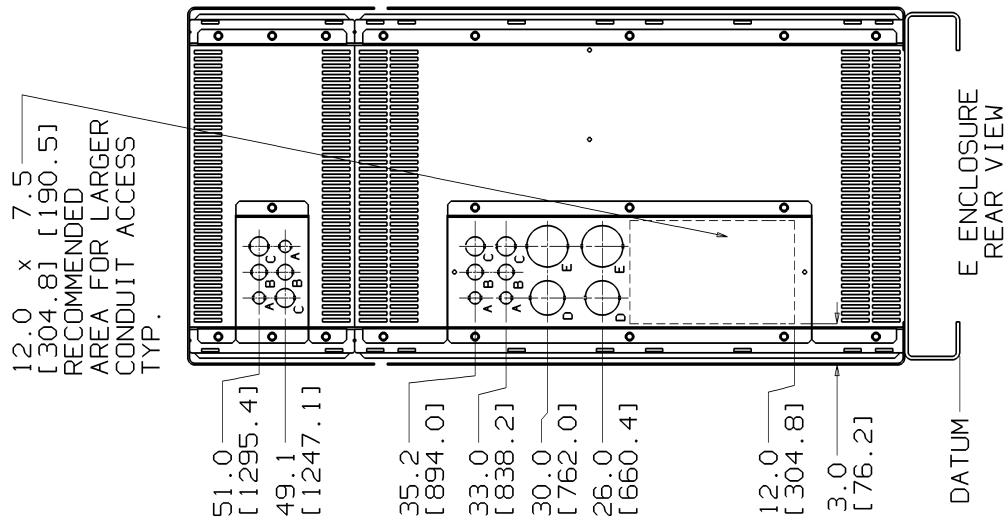
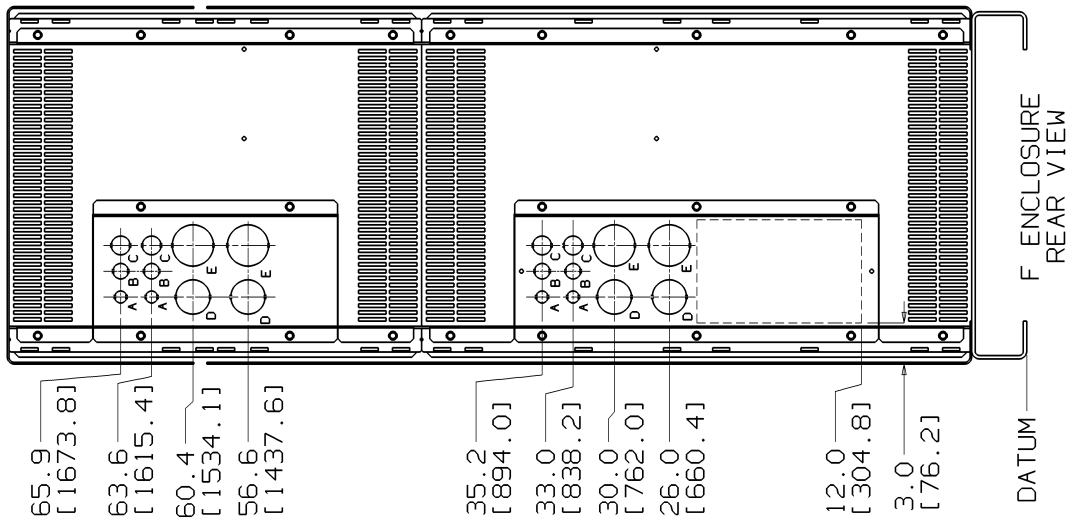
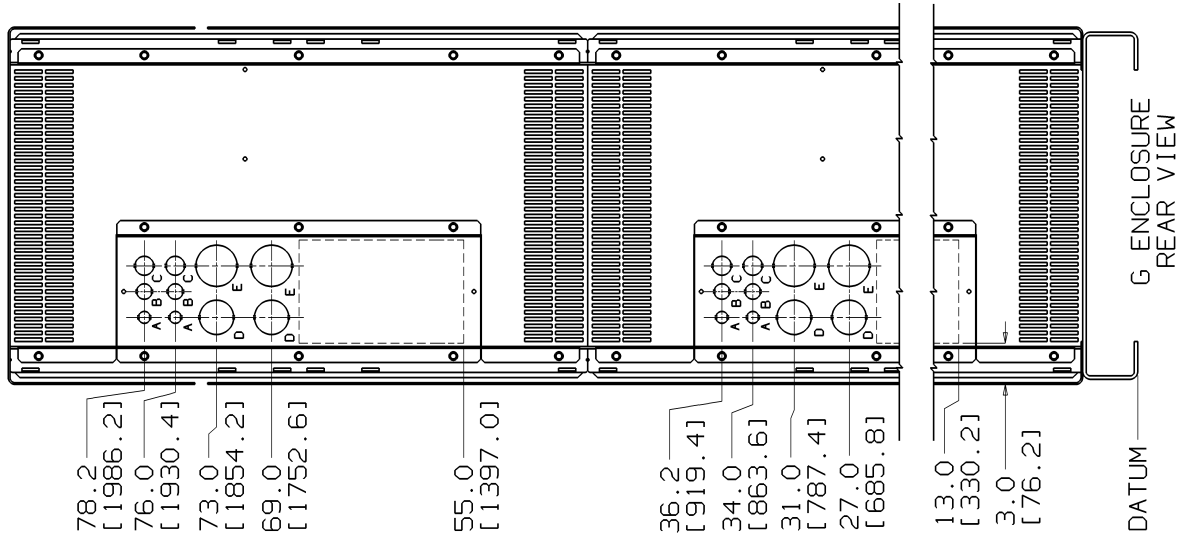
Note: All dimensions are inches [millimeters]



Enclosures A through G continues
 Note: All dimensions are inches [millimeters]

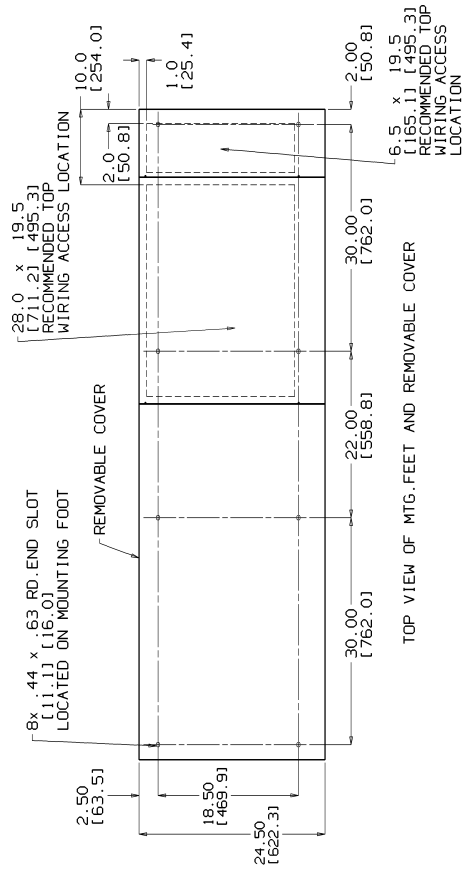
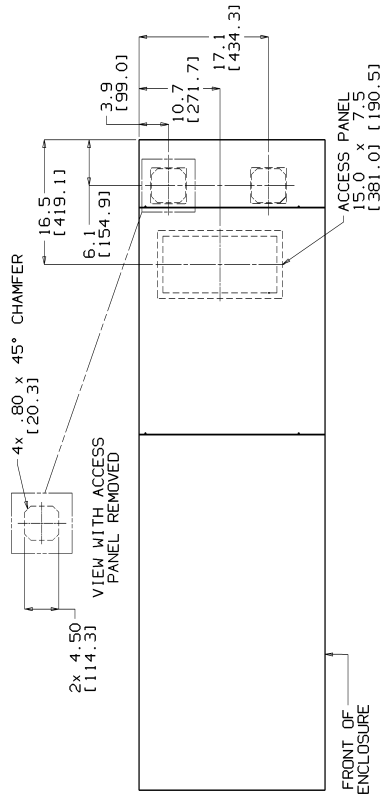


Enclosures A through G continues
 Note: All dimensions are inches [millimeters]



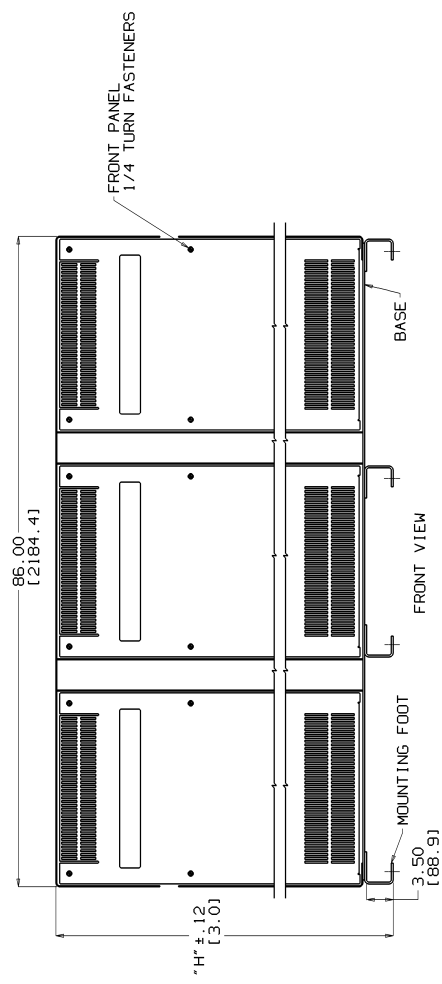
Enclosures EEE through GGG

Note: All dimensions are inches [millimeters]



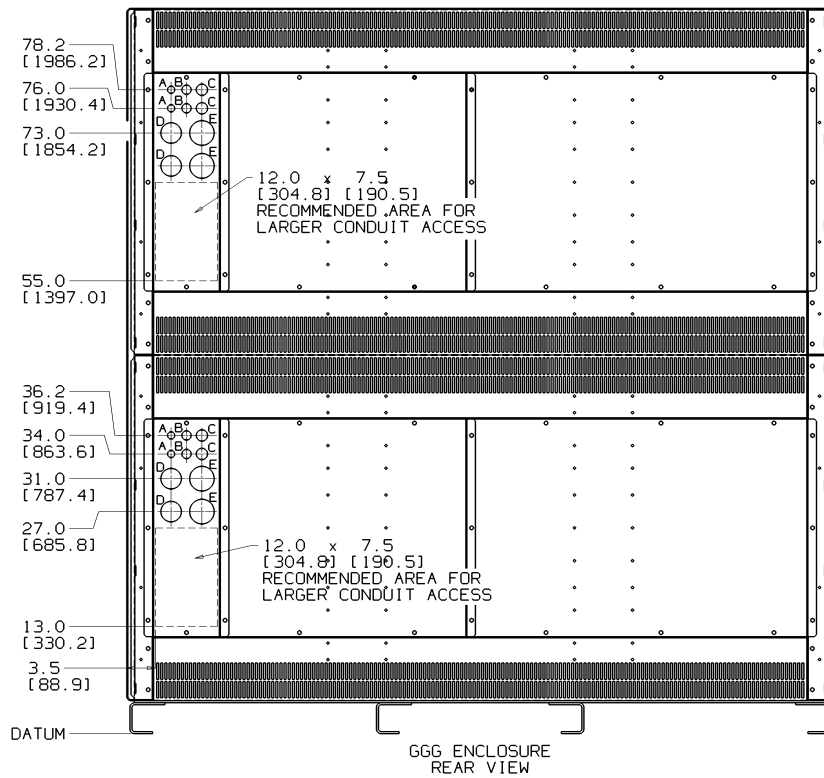
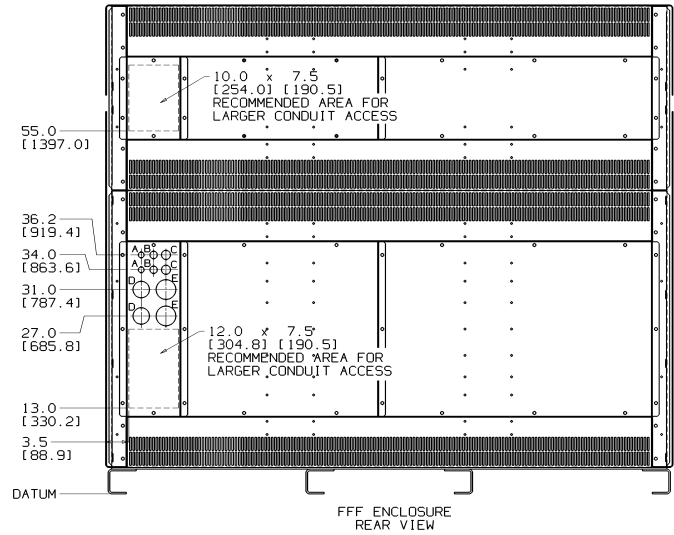
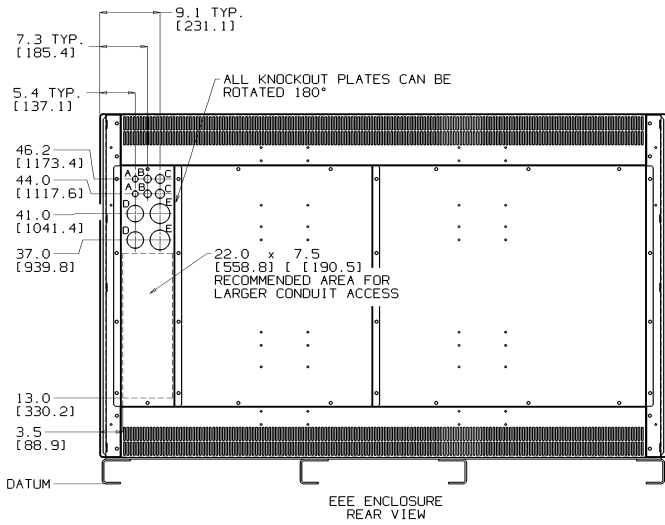
KNOCKOUT LEGEND		
LTR	SIZE OF KNOCKOUT	CONDUIT SIZE
A	Ø .88 [22.3]	.50 [12.7]
B	Ø 1.13 [28.7]	.75 [19.0]
C	Ø 1.38 [35.0]	1.00 [25.4]
D	Ø 2.50 [63.5]	2.00 [50.8]
E	Ø 3.00 [76.2]	2.50 [63.5]

ENCLOSURE DESIGNATION	"H"
EEE	56.25 [1428.7]
FFF	74.25 [1885.9]
GGG	88.25 [2241.5]



Enclosures EEE through GGG continues

Note: All dimensions are inches [millimeters]



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LUXTROL [®]	Lighting Controls
5-WAY [®]	Binding Posts
SUPERCON [®]	Electrical Connectors

Voltage Control Components are available worldwide through an extensive Authorized Stocking Distributor network. These Distributors offer literature, technical assistance and a wide range of models off-the-shelf for fastest possible delivery and service.

Power Quality Solutions

STABILINE [®]	Automatic Voltage Regulators
STABILINE [®]	Transient Voltage Surge Suppressors
STABILINE [®]	Uninterruptible Power Supplies
STABILINE [®]	Power Conditioners

STABILINE Power Quality Solutions are available worldwide through an extensive Authorized Distributor and Reseller network, which offer literature, technical assistance and a select range of models off-the-shelf for fastest possible delivery and service.

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