



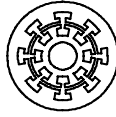
**MAINTENANCE AND OPERATING INSTRUCTIONS  
MODEL 39-004-2 MOTOR-GENERATOR  
"NOBRUSH" VOLTAGE REGULATED  
PERMANENT MAGNET FREQUENCY CONVERTER  
VERTICAL TYPE**

GEORATOR Corporation  
9617 Center Street  
Manassas, Virginia 20110  
USA  
800-523-9938, 703-368-2101, fax 703-368-1078  
[WWW.Georator.com](http://WWW.Georator.com)

**GEORATOR CORPORATION**  
Manassas, Virginia

**NOTE**

Some instructions are general in nature. Some particular models may vary in size and precise locations for components. However, we believe that the user will be able to make those adjustment mentally. If you are at all concerned, please feel free to contact Georator Corporation with any questions you may have.



**SPECIFICATION  
GEORATOR CORPORATION  
MANASSAS, VIRGINIA 20110**

Model No. 39-004-2  
Type 22-A Vertical Voltage Regulated Converter  
(Military with Drip Cover)

**1.0 INPUT:**

- 1.1 Motor: AC Induction, 10 H.P., 3 Phase, 60 Hz, 1,760 RPM (Nom.)
- 1.2 Input Voltages: 220/440VAC  $\pm 10\%$
- 1.3 Input Current: 30/15 Amps Approx.
- 1.4 Insulation: Class F – Fungus Proof Varnish

**2.0 OUTPUT:**

- 2.1 Generator: Permanent Magnet Excitation
- 2.2 Rating: 6.5 kVA, 80% to 100% PF, 3 Phase
- 2.3 Output Frequency: 420Hz @ N.L., 408Hz Min. @ F.L.
- 2.4 Output Voltage:
  - 2.4.1 No Load: AC Values before Regulation and Rectification:
    - (A) Power Winding: 146VAC  $\pm 1V$  L-N
    - (B) Control Winding: 57VAC  $\pm 1V$  L-L
  - 2.4.2 Full Load: 120/208VAC 4W Wye, or 120VAC 3W Delta; Re-Connectable
  - 2.4.3 Stability: Within  $\pm 1\%$ , for constant Load and constant Input Frequency.  
Less than 1% for Input Voltage Variation of  $\pm 10\%$
  - 2.4.4 Waveform: Total Harmonic Distortion (THD) less than 4%
  - 2.4.5 Regulation: Electronic Control;  $\pm 1.5\%$  from N.L. to F.L.
  - 2.4.6 Adjustment:  $\pm 5\%$
- 2.5 Output Current: 18 Amps (Wye Connection), or 31.3 Amps (Delta)
- 2.6 Insulation: Class F – Fungus Proof Varnish

**3.0 GENERAL SPECIFICATIONS:**

- 3.1 Construction: Common Vertical Shaft (Stainless Steel), Double Bearing, Contained in Aluminum Alloy Mot. Housing (Top), and Gen. Housing (Bottom) – Dripproof Protected (IP12, IC01) Per NEMA MG1 1.25.1
- 3.2 Duty: Continuous
- 3.3 Max. Amb. Temp.: 50 °C
- 3.4 Cooling: Self Circulated Air via rotor mounted internal Fan. NEMA IC01
- 3.5 Rotation: Reversible by electrical reconnection of Input
- 3.6 Dielectric Strength: Winding to Frame: 1500 V for 1 Min.
- 3.7 Vibration: Within 0.0015"
- 3.8 Bearings: Sealed Life Time Lubricated Ball Bearings with Grease per Mil-G-23827A
- 3.9 Finish:
  - 3.9.1 Primer: Modified Alkyd Resin
  - 3.9.2 Paint: Silver-Blue Enamel
- 3.10 Approx. Weight:
  - 3.10.1 Net: 315 Lbs.
  - 3.10.2 Shipping: 380 Lbs.

Rev.	Date	Revision Description
ENGINEER	M.T.E.	
APPROVED BY		4/12/2000

**GEORATOR CORPORATION**  
Manassas, Virginia

**MAINTENANCE AND OPERATING INSTRUCTIONS**  
**39-004-2 MOTOR-GENERATOR**  
**"NOBRUSH" VOLTAGE REGULATED**  
**PERMANENT MAGNET FREQUENCY CONVERTER**

**GENERAL**

The "NoBrush" vertical converter is a vertically mounted motor generator set used to convert 60 Hz frequency to 400 Hz frequency. The lower portion consists of the generator and the upper the motor.

The motor and generator, the control windings, and the control electronics are all packaged together in a single unit. The motor stator windings, the generator stator windings, and the control toroidal winding are mounted within the cast aluminum housing. The rotors for the motor and generator are mounted on a single common shaft with bearings at either end of the shaft. The electronic controls, consisting mainly of a single printed circuit board and heat sink, are mounted in an enclosure on the lower case of the motor-generator. An adjustment knob for setting the output voltage to a desired specific value (plus or minus 5% of rated regulated voltage at full load) is provided on the side of the control enclosure.

The drive motor is the induction type which means that it is very simple in construction and operation, and practically maintenance free. The rotor is the die cast aluminum squirrel cage type. The stator is wound for dual voltage input operation.

The Georator Corporation "NoBrush" alternator is probably the most reliable, rugged and trouble free generator built. The rotor consists of permanent magnets integrally cast in aluminum with the hub and pole pieces providing the field. Brushes, slip rings, etc. and their associated maintenance problems are eliminated. The stator is the armature.

The generator has internal protection against demagnetization from short circuit and will not be adversely affected by a short across its terminals for a short time duration.

**NOTE: DO NOT APPLY EITHER AC OR DC TO ANY OF THE  
WINDINGS OF THE GENERATOR**

A voltage applied to the generator leads may cause the rotor magnets to demagnetize or damage the stator.

A connection diagram will be found in the terminal box or on the connection diagram plate. Suitable overload protection should be provided, based on full load ampere rating shown on the

name plate. Protect wiring circuits with proper size fuses selected according to local code requirements.

## **DESCRIPTION OF REGULATION METHOD**

This regulated motor-generator utilizes the basic "NoBrush" generator with its permanent magnet rotor and normal stator windings. Supplementing these windings is a control toroidal winding, running from the bottom of the tooth slots to the back of the stator core. Through this toroidal winding is passed a direct current of sufficient magnitude to saturate the core to the degree required for attainment of a constant output voltage.

The output voltage is constantly sensed and any departure there from causes (via the control electronics) an increase or decrease in the direct current flowing through the toroidal winding. This, in turn, controls the amount of working flux passing through the stator core, which in turn determines the output voltage generated. The direct current necessary for energizing the toroidal winding is obtained from a separate control transformer feeding the regulator rectifier assembly. The power loss in the regulator circuitry is kept to a low figure.

Due to the design of the toroidal winding, the wave form of the machine is not impaired and approaches an ideal sine wave.

## **MAINTENANCE OF THE CONVERTER**

### Cleaning

It is most important that accumulations of oil, water, dirt, and dust are not permitted to cover the machine, enter it, or block ventilation. Remove any such accumulations from the machine and surrounding operating area.

Wipe the exterior of the machine to keep it clean. When necessary, use a suitable solvent to remove dirt accumulations from the machine surface.

Electrical machines should be protected from and kept free of acids, alkalines, chemical compounds and gas fumes that may cause insulation deterioration.

### Clean Windings

Accumulations of any foreign materials should be kept off the windings. Failure to keep the windings clean may result in short circuits, grounding of insulated surfaces, and in increased temperature rise.

The frequency of cleaning windings will have to be determined by operating conditions.

However, it is a good policy to clean the windings at least once a year. Greasy or oily deposits may be wiped off with a lint-free cloth dipped in a suitable solvent. Take care not to leave solvent deposits on the windings. Light accumulations of nonconductive dust may be removed by compressed air. Use a pressure range of 40 or 60 psi. Do not blow directly into the windings. When dirt and dust accumulations are heavy or of a highly conductive nature, it is best to use an especially built vacuum cleaner to clean the machine. Follow the cleaner instructions carefully.

### Solvents

When the parts of a motor and generator need cleaning, use a suitable petroleum solvent such as kerosene, petroleum spirits or Stoddard solvent. Care must be taken to utilize solvents in accordance with the solvent manufacturer's instructions. Protection in accordance with local laws regarding fire hazards must be provided. Gasoline containing lead compounds should not be used because of their toxic nature. Light petroleum solvents may be more effective but must be free of corrosive action and must be followed up with flushing oil.

### **BEARINGS**

Bearing life is estimated at more than 10,000 operating hours for normal operating conditions. Bearing replacement is required only when the bearings become noisy. This requires the disassembly of the unit.

### **CONVERTER DISASSEMBLY**

Disassemble converter for replacement of bearings. Use the following steps:

1. Remove 4 bolts, Item 2, from the top of the converter.
2. Remove 4 bolts, Item 5, from the motor flange.
3. Put a steel bar approximately 3/4" diameter through the eye bolts, and with a hoist slowly lift up motor housing, Item 7.
4. Screw into the end of the exposed shaft a 3/8-16 eye bolt and with a hoist slowly lift the shaft assembly, Item 1. The magnetic force will tend to hold the shaft assembly in place and it will be necessary to secure the generator housing, Item 1, to the work bench or floor.
5. Protect the generator rotor, Item 3, by wrapping it in heavy paper, and place it away from the iron or steel objects. If magnetic materials adhere to the rotor, this could cause partial demagnetization of the rotor. Iron and steel objects should be kept some distance from the rotor.

Removal of the shaft assembly will permit complete inspection of the generator and motor windings and removal of the bearings, Items 1, from the shaft assembly, using a proper size bearing puller. They should be removed in the same manner as when mounted; that is, from the shaft by force applied to the inner race only.

### **INSTALLATION OF THE BEARINGS**

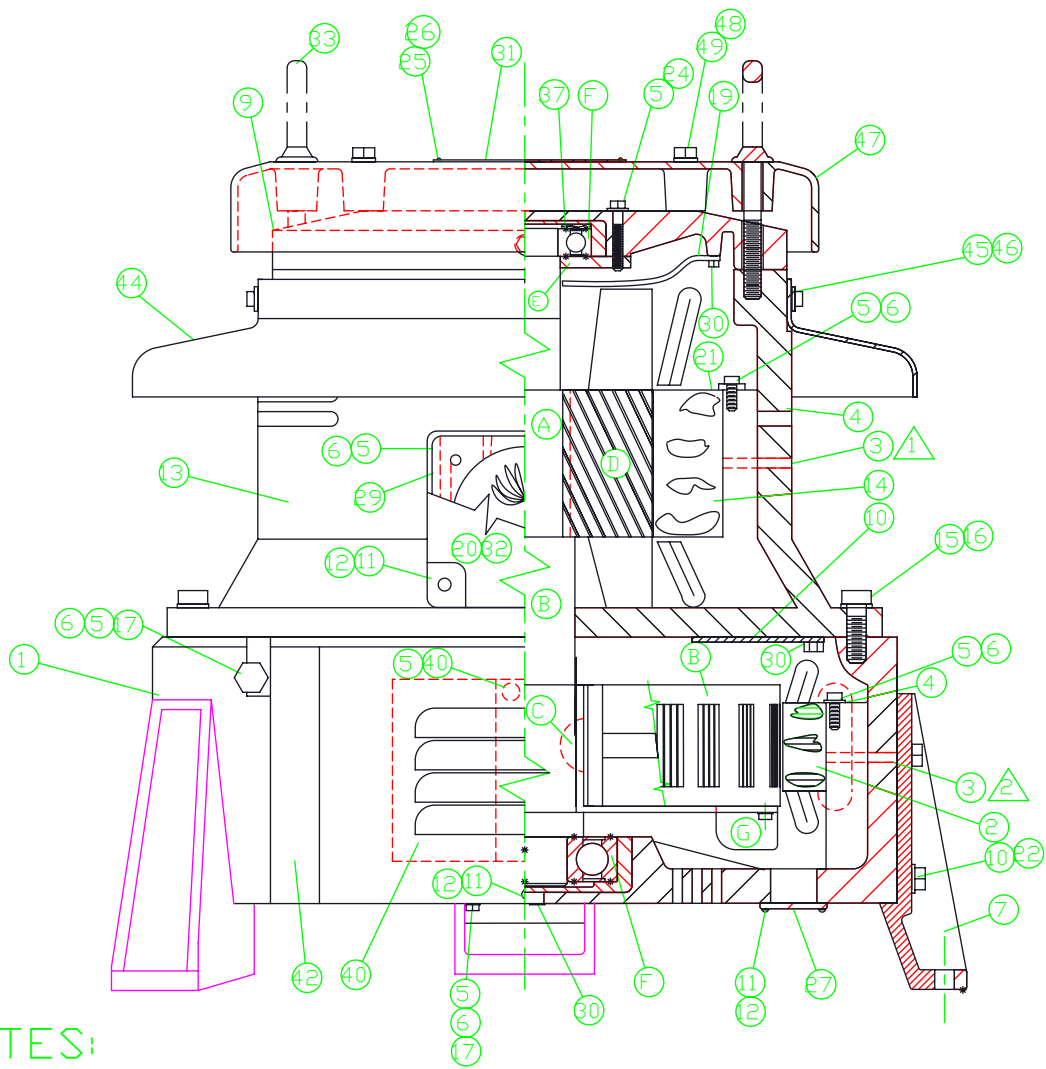
The shaft bearing seat and bearing housing must be carefully cleaned to remove all traces of metal chips, filings, etc. To drive the inner ring of a bearing on a cylindrical shaft seat, a piece of tubing, squared on the ends should be used that will bear evenly against the face of the inner ring. Pressure should not be applied to the inner ring through the ball assembly by pushing against the outer ring. The bearing should be driven to a firm seat on the shaft shoulder.

Care must be taken that the bearing is started true and not cocked; otherwise, it is possible to roughen or burr the ground surface of the shaft. A light film of oil on the shaft and in the housing bore will prove an aid to mounting.

Do not force the bearing onto a shaft by blows applied to the outer race, nor into a housing by pounding upon the inner race.

To reassemble the converter reverse the order of the disassembly taking care not to damage the generator and motor windings. Clean any metal chips or particles from the rotors before installation. Check to see that the generator rotor turns freely and does not rub the stator. The generator leads should not be shorted when checking for a free turning rotor.

There should be a minimum air gap of at least 0.017 inches all around. This can be checked with a non-magnetic feeler gauge of the proper thickness and about 1/8 inch wide, through the inspection slots, located on the bottom of the generator housing. After inspection, be sure the inspection slots are closed with cover, Item 6.



LIST OF MATERIAL			LIST OF MATERIAL		
ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	Housing, Gen.	22	9	Bolt
2	1	Stator Assy. Gen.	23	9	Bolt
3	2	Spirol Pin	24	4	Bolt
4	16	Retaining Washer	25	2	Screw
5	34	Lockwasher	26	2	Lockwasher
6	24	Bolt	27	4	Cover, Inspection Slot
7	3	Feet	28	1	T. Box & Cover
8	1	Shaft Assy.	29	1	Gasket, Terminal Box Pad
A	1	Shaft	30	1	Plug, Generator Housing
B	1	Rotor, Gen.	31	1	Emblem
C	2	Woodruff Key	32	1	Gasket, Terminal Box Cover
D	1	Rotor, Motor	33	2	Eye Bolt
E	1	Cover, Motor Bearing	34	1	Name Plate
F	2	Ball Bearing	35	4	Screw
G	1	Fan, Generator	36	2	Screw
9	1	End Bell	37	1	Spring Washer
10	13	Lockwasher	38	24	Screw
11	20	Lockwasher	39		
			40	1	Voltage Regulator
12	20	Screw	41	6	Bolt
13	1	Housing, Motor	42	1	Regulator Box And Cover
14	1	Stator Assy. Motor	*	1	Connection Diag. Plate 3 Phase Input
15	4	Lockwasher	43	1	Inductor, Mohawk Electro
16	4	Bolt	44	1	Shroud, Motor Housing
17	8	Flatwasher	45	4	Bolt
18	1	Baffle, Generator	46	4	Lockwasher
19	1	Baffle, Motor End Bell	47	1	Cover, End Bell
20			48	4	Screw
21	1	Baffle, Motor Stator	49	4	Lockwasher

\* NOT SHOWN

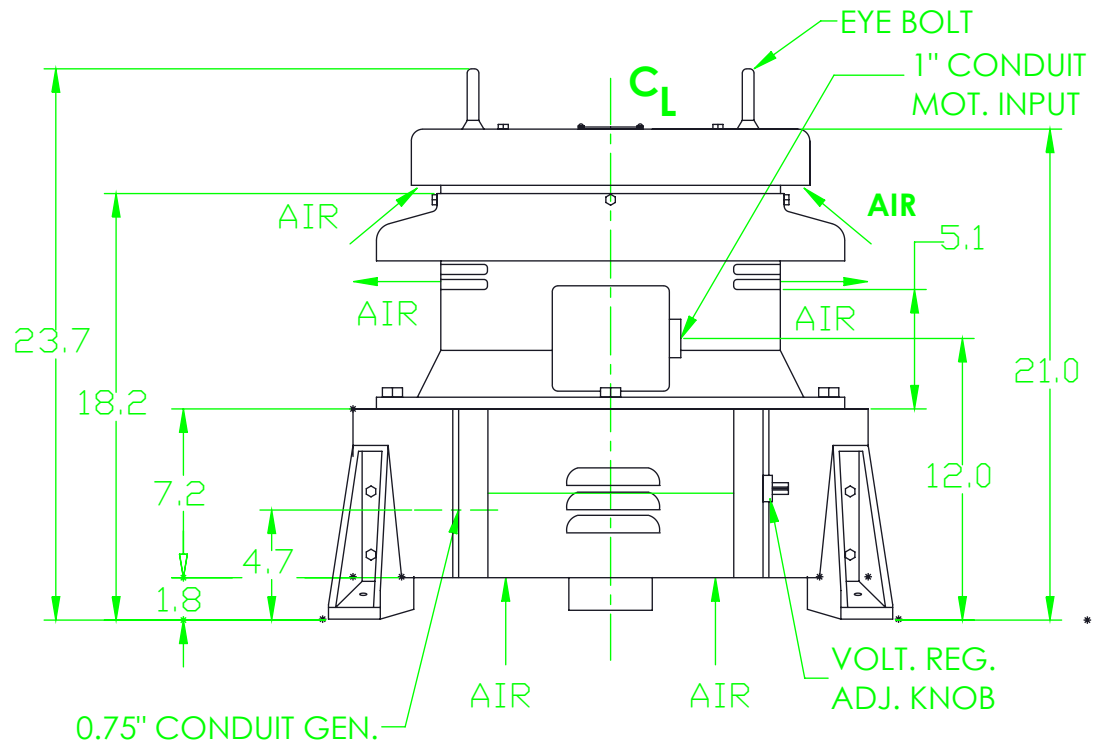
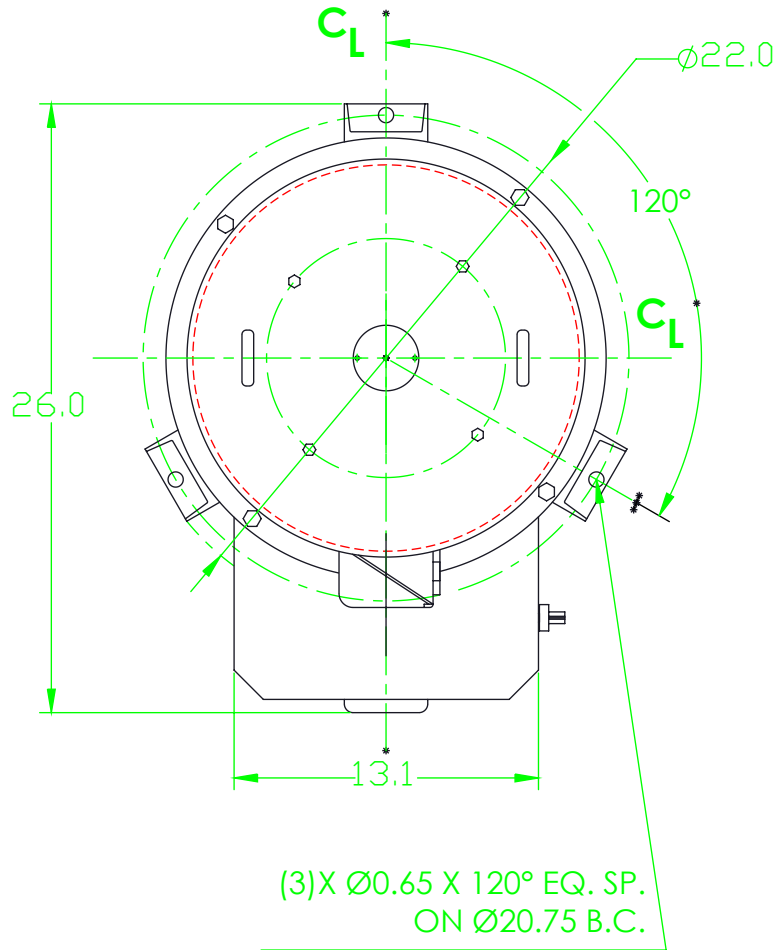
**NOTES:**

- 1/4" (.250) DRILL X .09 DP. INTO MOTOR FOR 1/4" SPIROL PIN, ITEM 3
- 1/4" (.250) DRILL X .09 DP. INTO MOTOR FOR 1/4" SPIROL PIN, ITEM 3
- 3.) VIBRATION WITHIN 0.0015
- 4.) MINIMUM AIR GAP 0.017
- 5.) FOR ASSEMBLY OF REGULATOR COMPONENTS, SEE DWG. B22-345-1

A	DRAWN ON CAD	5-06-08	FM
REV.	DESCRIPTION	DATE	BY


UNSPECIFIED TOLERANCES FRACTIONAL ±1/8 DECIMAL 2 PLACE ±0.030 3 PLACE ±.010 ANGULAR ± 0°30'	USED ON:	<b>Georator Corporation</b> 9617 Center Street Manassas, VA 20110-5521, USA Telephone (703)-368-2101 FAX (703) 368-1078	
PLOT @: FIT	DIMENSIONS ARE IN INCHES. DO NOT SCALE DRAWING	NAME	ASSEMBLY DWG.
This drawing and any print thereof is the property of Georator Corporation and is subject to return on request by this company. The information shown is confidential and the recipient by accepting this drawing agrees not to use any information contained thereon in any manner which will be detrimental to Georator Corporation.	DATE	3-6-01	VERTICAL CONVERTER B.I.R., TYPE 20-A, MIL. D.P.
	DRAWN	B.S.O.	MATERIAL
	FILE:	22-614.dwg	SEE PARTS LIST
	APP'D.	FINISH	DWG. NO.
	SCALE NONE	SHEET 1 OF 1	C 22-614
			REV. A

REV	DESCRIPTION	APP'VD	DATE
A	REDRAWN	MTE	3/01
B	TITLE- VOLTAGE REGULATED WAS B.I.R.	B.S.□	04/02/02



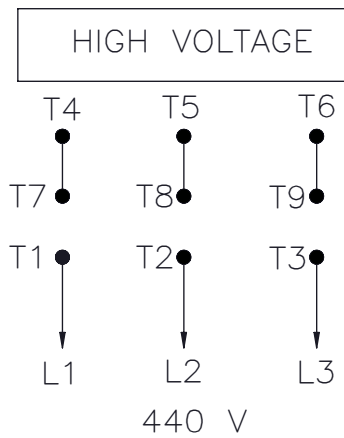
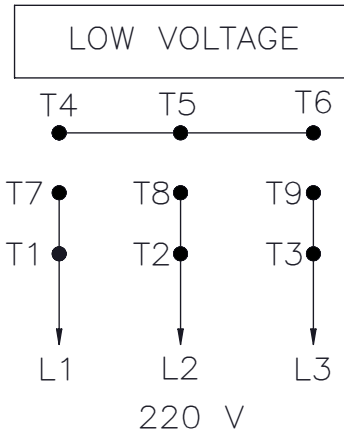
NOTES:

- 1.) APPR. WEIGHT: 330 LBS.  
MODEL NO. 39-004-2

UNSPECIFIED TOLERANCES FRACTIONAL N/A DECIMAL .X ±0.1 ANGULAR ±0°30' .XX ±0.03 .XXX ±0.010	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. NEXT ASSY XXXXXXXXXX	 <b>GEORATOR Corporation</b> 9617 Center Street Manassas, VA 20110-5521, USA Telephone (703)-368-2101 FAX (703) 368-1078	
		OUTLINE DRAWING TYPE 22-A VERTICAL VOLTAGE REGULATED, DRIP PROOF	
This drawing and any part thereof is the property of GEORATOR CORPORATION, and is subject to return on request by this company. The information shown is confidential and the recipient by accepting this drawing agrees not to use any information contained thereon in any manner which will be detrimental to GEORATOR CORPORATION.	PLOT @ FIT	DO NOT SCALE DRAWING	MATERIAL
	DATE	02/07/01	FINISH
	DRAWN	B.S.□	DWG. NO.
	FILE	23-1301.DWG	SHEET 1 OF 1
SCALE	NONE	REV.	B

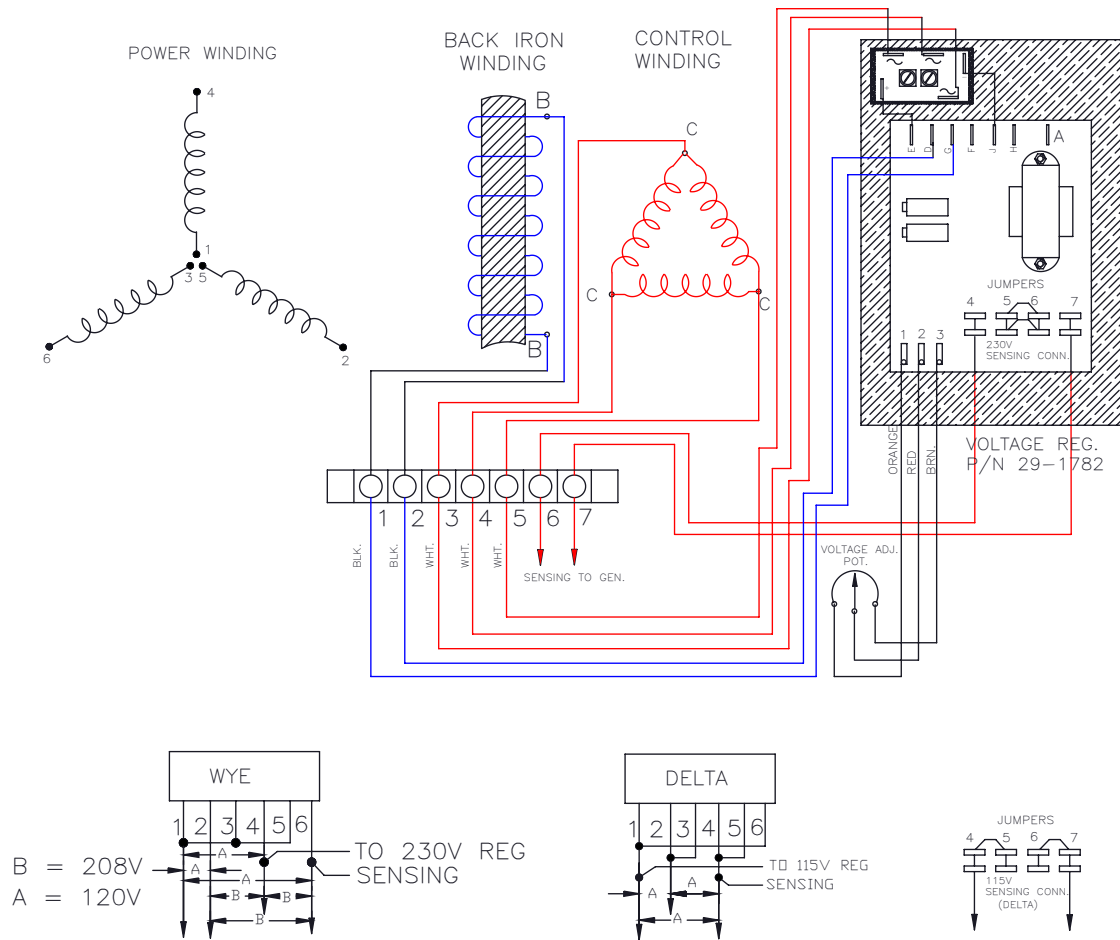
# INPUT

10 HP, 3 PH, 60 Hz



# OUTPUT

6.5kVA, 3 PH., 400Hz (NOM.)



REV	DESCRIPTION	DATE	BY
A	V. REG. WAS 29-890 OR 29-652		
B	ADDED CHOKE 29-1213	10-7-93	
C	CHANGE V. REG. TO 29-1782	9-15-05	MH

UNSPECIFIED TOLERANCES	FRACTIONAL +1/32
DECIMAL	2 PLACE +0.00
3 PLACE	-+0.00
ANGULAR	+1/2°
<b>PLOT @ .XXXXXX</b>	
This drawing and any part thereof is the property of Georator Corporation and is subject to return on request by this company. The recipient shall be confidential and the recipient by accepting this drawing agrees not to use any information contained thereon in any manner which will be detrimental to Georator Corporation.	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
DO NOT SCALE DRAWING
DATE 1-28-91
DRAWN J.R.
FILE# 25-791-2.dwg
APP'D.
SCALE NONE

<b>Georator Corporation</b>	
9617 Center Street Manassas, VA 22110-5521, USA Telephone (703)-368-2101 FAX (703) 368-1078	
NAME	WIRING DIAGRAM MODEL NO. 39-004-2
MATERIAL	
FINISH	JWG. NO.
SHEET 1 OF 1	A 25-791-2
	REV. C