



***ELGAR***

**XWAVE**

**Operation Manual**



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AMETEK, Inc. is a leading global manufacturer of electronic instruments and electromechanical devices with annualized sales of \$2.5 billion. The Company has over 11,000 colleagues working at more than 80 manufacturing facilities and more than 80 sales and service centers in the United States and around the world.

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# Important Safety Instructions

Before applying power to the system, verify that your product is configured properly for your particular application.

	<b>Hazardous voltages may be present when covers are removed. Qualified personnel must use extreme caution when servicing this equipment. Circuit boards, test points, and output voltages also may be floating above (below) chassis ground.</b>
	<b>The equipment used contains ESD sensitive parts. When installing equipment, follow ESD Safety Procedures. Electrostatic discharges might cause damage to the equipment.</b>

Only *qualified personnel* who deal with attendant hazards in power supplies, are allowed to perform installation and servicing.

Ensure that the AC power line ground is connected properly to the Power Rack input connector or chassis. Similarly, other power ground lines including those to application and maintenance equipment *must* be grounded properly for both personnel and equipment safety.

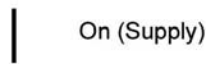
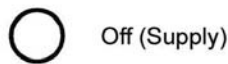
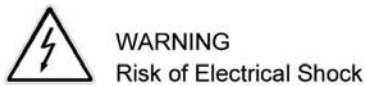
Always ensure that facility AC input power is de-energized prior to connecting or disconnecting any cable.

In normal operation, the operator does not have access to hazardous voltages within the chassis. However, depending on the user's application configuration, **HIGH VOLTAGES HAZARDOUS TO HUMAN SAFETY** may be normally generated on the output terminals. The customer/user must ensure that the output power lines are labeled properly as to the safety hazards and that any inadvertent contact with hazardous voltages is eliminated.

Guard against risks of electrical shock during open cover checks by not touching any portion of the electrical circuits. Even when power is off, capacitors may retain an electrical charge. Use safety glasses during open cover checks to avoid personal injury by any sudden component failure.

Neither AMETEK Programmable Power Inc., San Diego, California, USA, nor any of the subsidiary sales organizations can accept any responsibility for personnel, material or inconsequential injury, loss or damage that results from improper use of the equipment and accessories.

## SAFETY SYMBOLS



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**Product Family: XWAVE**

**Warranty Period: One Year**

### **WARRANTY TERMS**

AMETEK Programmable Power, Inc. ("AMETEK"), provides this written warranty covering the Product stated above, and if the Buyer discovers and notifies AMETEK in writing of any defect in material or workmanship within the applicable warranty period stated above, then AMETEK may, at its option: repair or replace the Product; or issue a credit note for the defective Product; or provide the Buyer with replacement parts for the Product.

The Buyer will, at its expense, return the defective Product or parts thereof to AMETEK in accordance with the return procedure specified below. AMETEK will, at its expense, deliver the repaired or replaced Product or parts to the Buyer. Any warranty of AMETEK will not apply if the Buyer is in default under the Purchase Order Agreement or where the Product or any part thereof:

- is damaged by misuse, accident, negligence or failure to maintain the same as specified or required by AMETEK;
- is damaged by modifications, alterations or attachments thereto which are not authorized by AMETEK;
- is installed or operated contrary to the instructions of AMETEK;
- is opened, modified or disassembled in any way without AMETEK's consent; or
- is used in combination with items, articles or materials not authorized by AMETEK.

The Buyer may not assert any claim that the Products are not in conformity with any warranty until the Buyer has made all payments to AMETEK provided for in the Purchase Order Agreement.

### **PRODUCT RETURN PROCEDURE**

1. Request a Return Material Authorization (RMA) number from the repair facility (**must be done in the country in which it was purchased**):
  - **In the USA**, contact the AMETEK Repair Department prior to the return of the product to AMETEK for repair:  
Telephone: 800-733-5427, ext. 2295 or ext. 2463 (toll free North America)  
858-450-0085, ext. 2295 or ext. 2463 (direct)
  - **Outside the United States**, contact the nearest Authorized Service Center (ASC). A full listing can be found either through your local distributor or our website, [www.programmablepower.com](http://www.programmablepower.com), by clicking Support and going to the Service Centers tab.
2. When requesting an RMA, have the following information ready:
  - Model number
  - Serial number
  - Description of the problem

**NOTE:** Unauthorized returns will not be accepted and will be returned at the shipper's expense.

**NOTE:** A returned product found upon inspection by AMETEK, to be in specification is subject to an evaluation fee and applicable freight charges.

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## **FCC NOTICE**

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

## **ABOUT THIS MANUAL**

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This manual has been written expressly for the Elgar XWAVE Series of power supplies. To ensure the safety of the equipment operator, universal graphic symbols have been used both on the unit itself and in this manual to warn the operator of potentially hazardous situations (see Safety Notice page).

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# SECTION 1 OVERVIEW

## 1.1 General Description

The XWAVE establishes a new standard of performance and value for AC power systems from 30KVA to 480KVA. Using advanced MOSFET based, switch mode power conversion technology, the XWAVE delivers high power density, efficiency and modular flexibility, all at a budget pleasing price. The XWAVE is ideally suited for many common AC power source applications including:

- Product design and acceptance testing to world-wide AC mains voltage and frequency standards
- Simulation of high frequency AC bus parameters for marine and aircraft equipment
- High power AC mains power conditioning for sensitive equipment
- Replacement of noisy and inefficient motor-generator (MG) sets

Standard models with single or three phase outputs, in a variety of single or dual output ranges, are offered. Consult with Ametek Programmable Power sales for custom output requirements.

The XWAVE series is a modular design utilizing 10KW power modules to provide incremental output levels from 30KVA to 480 KVA. Up to 90KVA can be provided in a single cabinet. Multiple cabinet systems are configured for outputs from 120KVA to 480KVA.

The XWAVE modular architecture, utilizing interchangeable components, facilitates low cost and quick repairs should the XWAVE require service, which can often be accomplished on-site. In addition, should requirements change in the future, depending on the specifics, this architecture facilitates field upgrades, further protecting your XWAVE investment.

All customer connections are located in the rear of the frequency converter on terminals provided.

## 1.2 Specifications

The following table provides the basic performance specifications of the XWAVE frequency converter:

CHARACTERISTIC	DESCRIPTION		
<b>OUTPUT</b>			
MODES	AC, 3 Phase or 1 Phase based on configuration ordered.		
POWER	30KVA to 480KVA full performance, 0.8 Lead or Lag. Some performance degradation occurs for lower PF load but output remains unconditionally stable.		
<b>VOLTAGE</b>			
VOLTAGE RANGE	0-132Vrms L-N / 0-228Vrms L-L. Adjustable using 10 turn amplitude pot and 10% trim for phase B,C. Other voltage range options available.		
LINE REGULATION	±0.1% for 10% input line change		
LOAD REGULATION			
Voltage Range	Frequency	No Load to Full Load	
Output 1: Low Range	50/60 Hz	0.5%	
	< 400 Hz	2.0%	
	< 1000 Hz	8.0%	
Output 2: High Range	50/60 Hz	4.0%	
	< 400 Hz	8.0%	
	< 1000 Hz	20.0%	
RESPONSE TIME	Corrects for 100% load change in < 150 µsec		
LOAD IMBALANCE	Maintains performance with 100% load imbalance		
NOISE	60dB at full load.		
DISTORTION			
Voltage Range	Frequency	< 30KHz	Full bandwidth
Output 1: Low Range	50/60 Hz	0.5%	1.5%
	< 400 Hz	1.0%	2.0%
	< 1000 Hz	1.5%	2.5%
Output 2: High Range	50/60 Hz	0.5%	1.5%
(Optional)	< 400 Hz	1.5%	2.5%
	< 1000 Hz	2.0%	3.0%
EXTERNAL INPUT DRIVE	2.5 Vrms into 10 kOhms for full scale voltage output		

CHARACTERISTIC	DESCRIPTION
<b>FREQUENCY</b>	
FREQUENCY RANGE	Standard: Switch selectable 50Hz, 60Hz, 400Hz, 800Hz Variable 45Hz to 1000Hz using 10 turn pot. Using External input: 10Hz – 1000Hz  Option 05: Switch selectable 50Hz, 60Hz, 400Hz Variable 45Hz to 500Hz using 10 turn pot.
FREQUENCY ACCURACY	± 0.1Hz
<b>CURRENT</b>	
MAX CURRENT	Depends on configuration
PEAK CURRENT	2.9:1 crest factor max, repetitive
OVERLOAD CURRENT	Up to 150% of rated output current for 7 seconds, after which time output will be turned off requiring manual restart.
SHUTDOWN	After a trip condition is detected, the unit is ramp “commanded” to 0 Volts from full output within 10 ms and clamped to dissipate energy for 1 second. Then output is gated to a high-impedance off condition.
<b>INPUT</b>	
INPUT VOLTAGE	Multi tap input transformer to accommodate various input voltage ranges. All input is 3 Phase WYE or DELTA depending on order configuration.
VOLTAGE TOLERANCE	± 10 % of rated input voltage.
FREQUENCY	47 – 66 Hz
POWER FACTOR	Passive PFC, input PF is 0.8 typical at 50% to 100% of full rated output.
INPUT SERVICE REQUIREMENT	125% of rated output power.
EFFICIENCY	85% at full power. Idle losses less than 1.5KW per 30KVA of rated output.
<b>MONITORS AND CONTROLS</b>	
START BUTTON	Engages system power up when held for 3 seconds.
STOP BUTTON	Shuts down system power
OUTPUT VOLTAGE	3 digit meter with 6 position selector switch to select phase A, B, C (Line to Neutral) or A-B, A-C or B-C (Line to Line). Accuracy: 2% of full scale. Resolution: 1 Vrms
OUTPUT CURRENT	3 digit meter with 3 position selector switch to select phase A, B or C output current. Accuracy: 3% of full scale Resolution: 1 Arms
METER RANGE	On models with optional voltage range (Output 2), a meter selection switch is provided to select meter range for Output 1 or Output 2.
OUTPUT FREQUENCY	3½ digit meter. Accuracy: 0.1 % of full scale Resolution: 1 Hz

<b>CHARACTERISTIC</b>	<b>DESCRIPTION</b>
AMPLITUDE CONTROL	Ten turn analog pot master amplitude controls all 3 phases. A balance adjust pot is provided at rear of control module with $\pm 10\%$ adjustment range for phase voltage balancing.
FREQUENCY SELECT	Rotary switch selects 50Hz, 60Hz, 400Hz, 800Hz, variable frequency or external input.
VARIABLE FREQUENCY	High resolution 10 turn analog pot. Varies frequency from 45 to 1000 Hz (Option -05: 45 to 500Hz)
<b>ENVIRONMENTAL</b>	
TEMPERATURE	Full power to 40°C, derated at 2% per degree C above 40°C to 55°C.
COOLING	230 CFM (.11m <sup>3</sup> /s per module, 4500 BTU/hr/module (1.32kW) rejected to the air (full output). Air enters front of unit through dust filter and exits in rear. Required clearance behind cabinet is 24.0 in (0.61m).
DIMENSIONS	HEIGHT 82.0 in (2.08m) WIDTH 22.0 in (0.56m) DEPTH 37.0 in (0.94m)
WEIGHT	Approximately 1850lb (840 kg) net (with 6 power modules (60KVA) and optional output voltage (output 2).
HUMIDITY	0 to 80% with wet bulb temperature not to exceed 27°C. The unit should be operated under conditions of relative humidity levels less than those which would produce internal condensation if the unit's temperature is lower than that of the intake air as read on a standard psychometric chart.

## SECTION 2 INSTALLATION

### 2.1 Introduction

Prior to unpacking it is essential that the packaging is inspected for transit damage. Upon unpacking, any obvious equipment damage must be reported immediately to the shipper/carrier. If possible, photographs of the damaged packaging and damaged equipment should be provided to support claims. Save all packing materials until inspection is complete. Verify that all items listed on the packing slips have been received. Visually inspect all exterior surfaces for broken knobs, connectors, or meters. Inspect for dented or damaged exterior surfaces. External damage may be an indication of internal damage. If any damage is evident, immediately contact the carrier that delivered the unit and submit a damage report. Failure to do so could invalidate future claims. Direct repair issues to AMETEK Customer Service at: 1-858-458-0223 (local) or 1-800-733-5427 (toll free in North America).

### 2.2 Location Considerations

The XWAVE frequency converter is designed for indoor use in a dust-free and adequately ventilated environment. Ensure [environmental specification](#) requirements are met.



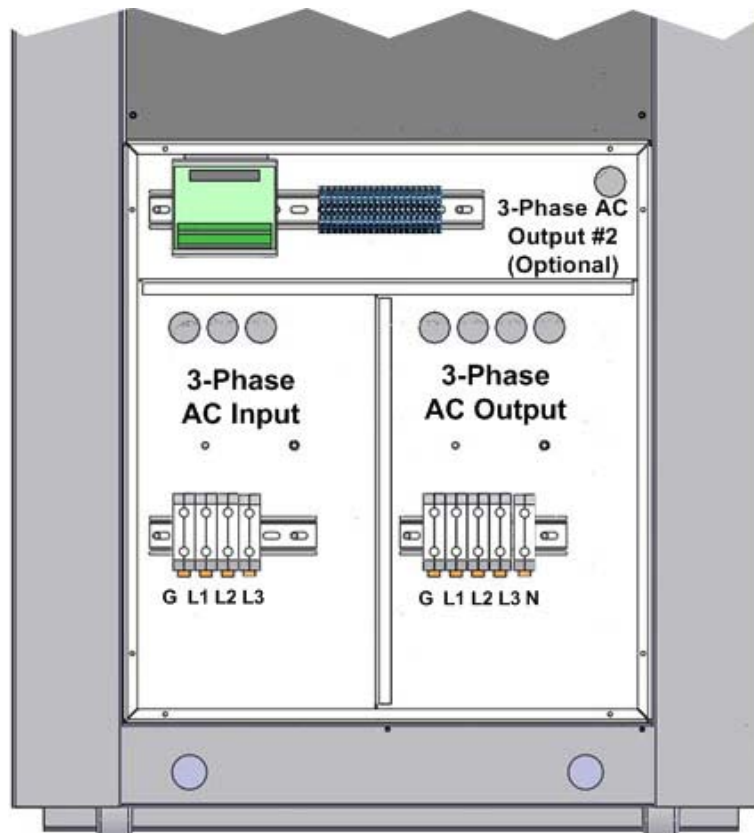
**CAUTION**

**The XWAVE chassis weighs well over 1200 lbs minimum and requires a location with a floor that is strong enough to support this weight. Check with your facilities supervisor to ensure adequate load bearing capability of the floor where the system will be installed.**

## 2.3 AC Input Connections

All input connections are made at the rear panel after removing the access panel from the junction box on the lower portion of the rear cabinet. This requires a Phillips screwdriver.

The AC input service connections are located on the left hand side of the junction box when facing the rear of the cabinet. A flat screwdriver is required to attach the input wires to the compression terminals. See Figure 2-1 for the location of the AC input connector.



**Figure 2-1. Connections Panel (in rear of cabinet at bottom)**



**Always connect Earth ground to the ground terminal of the AC input block to ensure the cabinet is properly safety grounded.**

**WARNING**

The input service and wire gauge used must be capable of supporting 125% of the rated output power of the XWAVE system used. Consult a qualified electrician familiar with local codes to ensure proper electrical input connections. A suitably rated AC disconnect switch or circuit breaker is strongly recommended to allow servicing of the XWAVE system.

## 2.4 AC Output Connections

All output connections are made at the rear panel after removing the access panel from the junction box on the lower portion of the rear cabinet (Figure 2-1). This requires an Allen wrench (Output 1) or Phillips screwdriver (Output 2).

The AC output connections for Output 1 are located on the right hand side of the junction box when facing the rear of the cabinet. An Allen wrench is required to attach the input wires to the compression terminals.

The AC output connections for Output 2 if present are located in the top section of the junction box when facing the rear of the cabinet. A flat screwdriver is required to attach the input wires to the compression terminals.



**WARNING**

**The output neutral of the XWAVE system is connected to the cabinet ground. See section 2.3 for chassis grounding.**



**CAUTION**

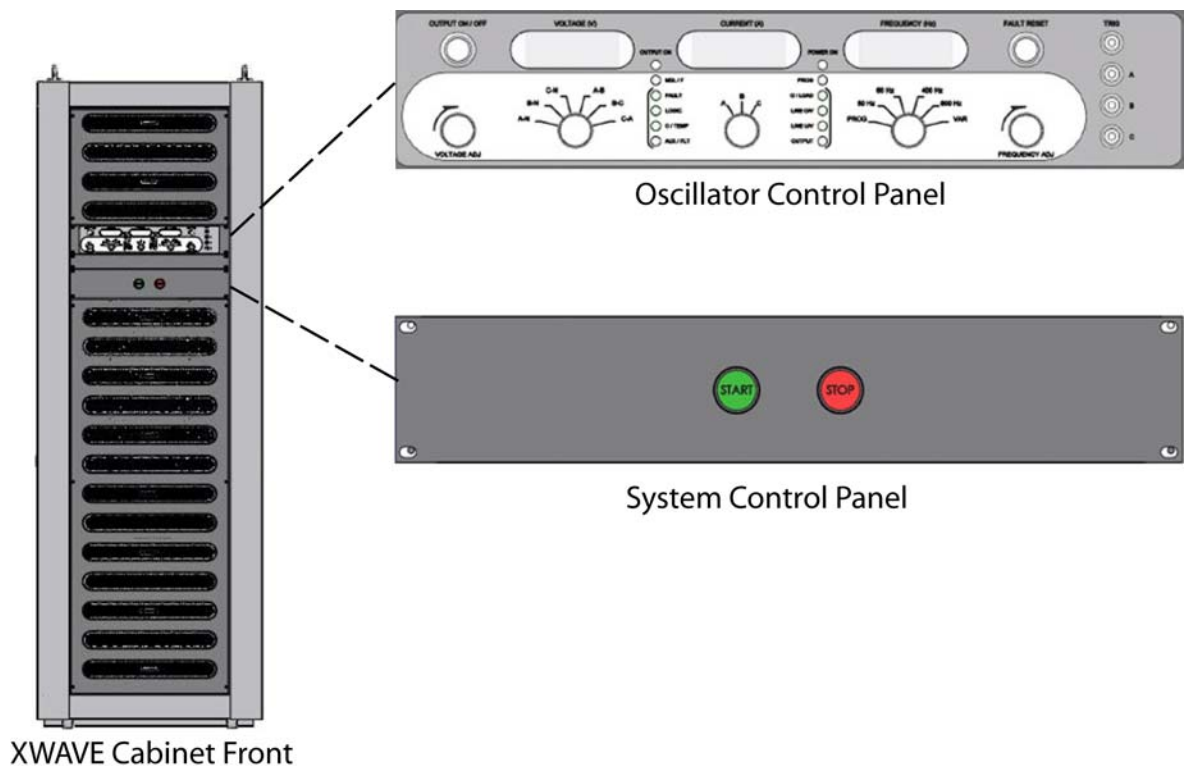
**DO NOT CONNECT BOTH OUTPUTS AT THE SAME TIME. At ALL times, only one load may be connected to the output on systems with dual output ranges. Connecting a load to both Output 1 and another load to Output 2 at the same time may damage the system and will void any warranty..**

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# SECTION 3 OPERATION

## 3.1 Introduction

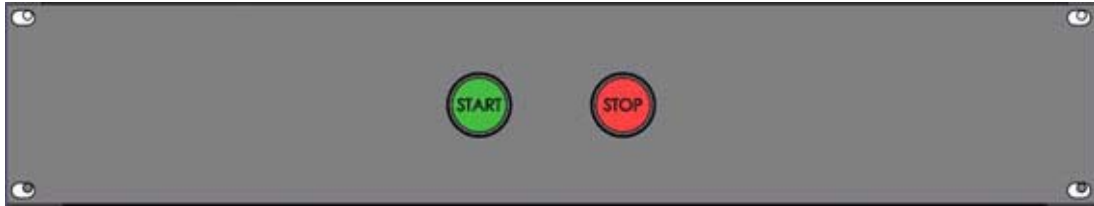
This section describes the XWAVE controls, indicators and connectors, and how to operate the system. Figure 3-1 shows the location of the control panels on the front of the cabinet. Figure 3-2 and Figure 3-3 show the panels in detail.



**Figure 3-1. XWAVE Control Panel Locations**

### 3.2 System Control Panel

The system control panel (Figure 3-2) is located directly below the oscillator control panel and contains the following operator controls.



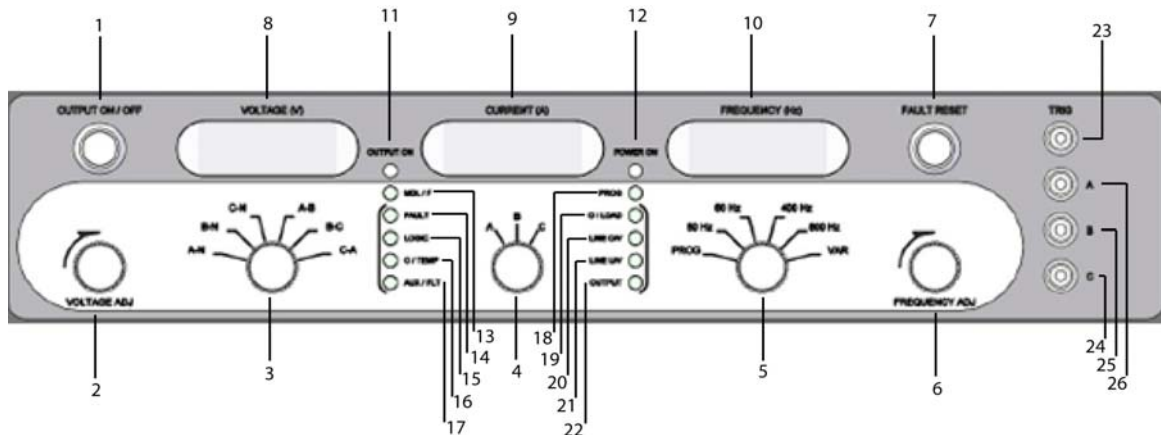
**Figure 3-2. System Control Panel (Meter Selection Switch Option not shown)**

Component	Description
START BUTTON	Engages system power up when held for 3 seconds.
STOP BUTTON	Shuts down system power
METER RANGE	On models with optional voltage range (Output 2), a meter selection switch is provided to select meter range for Output 1 or Output 2.



**In case of any emergency, immediately press the STOP button on the System Control Panel.**

### 3.3 Oscillator Control Panel






**Figure 3-3. XWAVE Oscillator Control Panel**

Table 3-1 provides a description of each component labeled in Figure 3-3.

**Table 3-1. XWAVE Oscillator Control Panel Descriptions**

Label #	Control	Description
1	OUTPUT ON/OFF	Enables or disables voltage output. This is a momentary switch.
2	VOLTAGE ADJ	Ten turn analog potentiometer master amplitude controls all 3 phases on 3 phase systems or Phase A on single phase systems.
3	Voltage Phase Selector	Rotary knob selects phase for voltage measurement display
	A-N	Phase A L-N voltage measurement display
	B-N	Phase B L-N voltage measurement display
	C-N	Phase C L-N voltage measurement display
	A-B	Phase A-B L-L voltage measurement display
	B-C	Phase B-C L-L voltage measurement display
	C-A	Phase C-A L-L voltage measurement display
4	Current Phase Selector	Rotary knob selects phase for current measurement display
	A	Phase A current measurement display
	B	Phase B current measurement display
	C	Phase C current measurement display
5	Frequency Selector	Rotary knob selects output frequency.
	Frequency mode	Any time the frequency mode selector switch is changed, the system will generate a fault and a reset is required to regain operation. The following selections are available:
	PROG	Selects external oscillator input mode. A 2.5Vrms signal is required on each phase to produce full scale output voltage. Note that in this mode, there is no Frequency readout available. External input BNC's are located on the front panel of the controller (Figure 3-3, # 23-26).
	50 Hz	Sets output frequency to 50 Hz
	60 Hz	Sets output frequency to 60 Hz
	400 Hz	Sets output frequency to 400 Hz
	800 Hz	Sets output frequency to 800 Hz Not present on units with -05 option
	VAR	Selects variable frequency mode. The FREQUENCY ADJ knob is active only in this mode.
6	FREQUENCY ADJ	Active only when rotary Frequency Selector knob (Figure 3-3, # 5) is set to VAR. High resolution 10 turn analog pot. Varies frequency from 45 to 1000 Hz (Option -05: 45 to 500Hz)
7	FAULT RESET	This momentary push button is used to clear any fault and reset the system to an output Off state.

Label #	Indicator	Description
8	VOLTAGE (V)	Meter indicates measured L-N or L-L RMS voltage for selected phase(s).
9	CURRENT (A)	Meter indicates measured RMS current for selected phase.
10	FREQUENCY (Hz)	Meter indicates output frequency
11	OUTPUT ON (Blue)	LED lit indicates that the unit's output is on
12	POWER ON (Green)	LED lit indicates that the unit is powered on
13	MDL/F (Red)	LED lit indicates one or more power module faults.
14	FAULT (Red)	LED lit indicates system fault.
15	LOGIC (Red)	LED lit indicates a fatal module drive logic operation fault.  If lit, power down the system immediately and contact customer service.
16	O/TEMP (Red)	LED lit indicates over temperature condition on one or more power modules
17	AUX/FLT (Red)	LED lit indicates a remote on/off switch opened.
18	PROG (Red)	LED lit indicates frequency mode fault.
19	O/LOAD (Orange)	LED lit indicates a current overload condition
20	LINE OV (Red)	LED lit indicates an AC input voltage that is too high. System will shut down.  If lit, power down the system immediately and contact customer service.
21	LINE UV (Red)	LED lit indicates an AC input voltage that is too low. System will shut down  If lit, power down the system immediately and contact customer service.
22	OUTPUT (Red)	LED lit indicates output voltage is too high.
<b>Label #      BNC Connectors      Description</b>		
23	TRIG	(currently not implemented)
24	A	External input for phase A
25	B	External input for phase B
26	C	External input for phase C

NOTE: If any fault indicator is lit (Item #13-22), please disable the output, power down the system, and call customer service.

## 3.4 Operation

Please refer to Figure 3-2 and Figure 3-3 for the locations of the controls and indicators.

### 3.4.1 Turning On the System and Enabling the Output

1. On the System Control Panel (Figure 3-2) press and hold the START button until the main contactor engages. The green POWER ON LED (Figure 3-3, #12) should be lit.
2. If any fault indication LED is lit (Figure 3-3, #13-22), press FAULT RESET button (Figure 3-3, #7) to clear.
3. Choose the frequency:
  - For **fixed** frequency mode, turn the frequency selector (Figure 3-3, #5) to select the desired output frequency.
  - For **variable** frequency mode, turn the frequency selector (Figure 3-3, #5) to select VAR, and turn the FREQUENCY ADJ control (Figure 3-3, #6) to adjust to the desired frequency, indicated in the FREQUENCY (HZ) display (Figure 3-3, #10).
4. On the Oscillator Control Panel (Figure 3-3), before enabling the output, turn the VOLTAGE ADJ control (Figure 3-3, #2) completely counter clockwise to ensure the voltage is set to zero. Press the OUTPUT ON/OFF button (Figure 3-3, #1) until the green OUTPUT ON LED (Figure 3-3, #11) is lit (output enabled), then turn the VOLTAGE ADJ control to the required voltage, indicated in the VOLTAGE (V) display (Figure 3-3, #8).
5. Choose the voltage meter display selection knob and current meter display selection knob to monitor the desired output.

### 3.4.2 Shutting Off the System

- 1) On the Oscillator Control Panel, press the OUTPUT ON/OFF button to disable the output.
- 2) On the System Control Panel, press the STOP button to turn off the Frequency Converter.

### 3.4.3 Turning on the External Analog Input

1. If the output is already on (Oscillator Control Panel's green OUTPUT ON LED is lit), press the OUTPUT ON/OFF button (Figure 3-3, #1) to disable the output.
2. On the System Control Panel, press the STOP button to turn off the Frequency Converter.
3. Connect the external analog signal to the Frequency Converter through the front BNC connectors (Figure 3-3, #24-26). (The 'TRIG' BNC connector is for future use and not connected at this time).
4. From the System Control Panel, press the START button to turn on the Frequency Converter.

5. On the Oscillator Control Panel, turn the frequency selector to PROG, then press the OUTPUT ON/OFF button to enable the output.

The frequency meter will be blank and the Frequency Converter will function like an amplifier. The waveform, frequency and magnitude are determined by the external signal.



**Never exceed the specified frequency range when using the external input or damage to the system may result.**

**CAUTION**

#### 3.4.4 Shutting Down

- 1) On the Oscillator Control Panel, press the OUTPUT ON/OFF button to disable the output.
- 2) On the System Control Panel, press the STOP button to turn off the frequency converter.

## SECTION 4 CALIBRATION



The calibration procedure should only be performed by qualified technicians. Failure to set the adjustments properly can cause damage to the power converter or reduced performance.

### 4.1 Calculating Output Current Capabilities

The following current levels are measured at the output of the power converter before any matching transformers. Current capabilities at the output terminals will change (depending on the transformer ratio) when matching transformers are used.

Modules per phase	Current capabilities per phase
1	83A
2	166A
3	249A
4	332A
5	415A
6	498A

Press the reset button. Check to make sure there are no fault lights illuminated. If there are, call customer service to troubleshoot the cause before proceeding.

### 4.2 Meter Zero Adjustments

Remove the front panel bezels that cover the digital voltage and current meters to gain access to the meter adjustments. Adjust both meters' zero offset control so that the meters read 0 with the unit gated on and the output voltage knob fully counter clockwise (CCW). The Voltage Offset pot is the one closest to the bottom of the "Voltage" bezel, and the Current Offset pot is located towards the top of the "Current" bezel.

Voltage Offset-R35  
Current Offset-R10

#### 4.2.1 Variable Frequency Adjustments

1. Turn the Frequency selector to VAR. Turn the variable frequency knob fully CCW and adjust R272 until the Frequency meter reads 45Hz.
2. Turn the variable frequency fully clockwise (CW) and adjust R271 for 1000Hz for standard models or 500Hz for models with the -05 option.
3. Re-adjust R272 for 45Hz (Variable frequency fully CCW)

#### 4.2.2 DC Offset Adjust

The offset pots R9, R54 and R87 are located on top of the logic module just behind the front panel.

1. Gate the converter on and ensure the output voltage knob is fully CCW. Connect a DVM from the Phase A output terminal to neutral. Adjust R9 for a zero VDC offset reading. (Spec. 0 +/-5mv.)
2. Repeat for Phase B by adjusting R54 and measuring the Phase B output terminal to neutral. (Spec. 0 +/-5mv.)
3. Repeat for Phase C by adjusting R87 and measuring the Phase C output terminal to neutral. (Spec. 0 +/-5mv.)

#### 4.2.3 Output Voltage Adjustments

1. Turn the gain pot fully CCW, and reset the converter. With no load applied, press the OUTPUT ON/OFF button to enable the output. Ensure that only green LED's are illuminated at this point. If the yellow MDL/F light is illuminated, power off the system and call customer service for repair, before continuing.
2. Connect the DVM (set for AC voltage measurement) to the Phase A output terminal and neutral. Turn the Voltage Phase Selector (Figure 3-3, #3) to A-N. Bring up the gain pot until the output voltage measured on the DVM is 120.0 VAC.
3. Press the "Output On/Off" button once to gate the unit off. Don't move the position of the gain knob.

#### 4.2.4 Phase Balance Adjustments

1. With the unit gated off, move the DVM to the phase B output terminal to neutral. With the Voltage Phase Selector still set for A-N, gate the unit back on. Verify the front panel voltmeter reads 120VAC from A-N.
2. Set the Voltage Phase Selector to B-N and adjust the "Phase B ADJ" pot R287 (located on the logic front panel) for a 120VAC reading on the DVM. Ensure the front panel meter reading is 120VAC +/-1V.
3. With the unit gated off, move the DVM to the Phase C output terminal to neutral;

turn the Voltage Phase Selector to A-N and gate the unit back on. Verify the front panel Voltmeter reads 120VAC from A-N.

4. Turn the Voltage Phase Selector to C-N and adjust the "Phase C ADJ" pot R283 (located On the logic front panel) for a 120VAC reading on the DVM. Ensure the front Panel meter reading is 120VAC +/-1V.

#### 4.2.5 Output Overvoltage Adjust

On units configured in parallel, drive the output to 133 VAC L-N and adjust R208 to trip the converter on Over-voltage. On units configured in series, adjust R208 to trip at 266VAC L-N.

#### 4.2.6 Current Meter Calibration

Connect a load from phase A output to neutral and set the frequency select to 60 Hz. Monitor the output current with a clamp-on ammeter and drive the output to 90% of the rated current for phase A (reference step 5.10 for rated current per phase). Adjust the current meter adjust (located under the front panel current bezel) R22 to agree with the clamp-on ammeter.

#### 4.2.7 Current Limit & Adjustments

1. Set R128 fully CW. Adjust the Phase A current limit level by connecting a DVM From TP27 to ground and adjusting R134 (located on the top of the logic module just behind the front panel) for 3. OVDC. Repeat for Phases B and C by moving DVM to TP28 and adjusting R147 for 3.OVDC (phase B), and TP29 and adjusting R158 to 3.0 VDC (Phase C).
2. Load Phase A to 100% current at 50% voltage, and increase the output voltage until the output current reaches 150% over the maximum rating. Adjust R134 until the OUTPUT O/L just starts to blink.
3. Repeat step 2 for Phase B and adjust R147.
4. Repeat step 2 for Phase C and adjust R158.

#### 4.2.8 110% Current Trip Adjustment

Drive Phase A to 110% of the rated output current and adjust R128 CCW until the overload light starts to blink.



# SECTION 5 MAINTENANCE

## 5.1 PLANNED MAINTENANCE ROUTINES

Schedule regular maintenance by the number of hours run or semiannually and annually, whichever comes first.

### 5.1.1 500 Running Hours or 6 Months

Inspect all ventilation ports and confirm they are free from dust build up.

Approximate labor time required: 20 minutes

### 5.1.2 1,000 Running Hours or Annual

1. Perform the 500 Hours/6-Months check.
2. With power off, inspect the soft start and dump resistors for signs of over-heating.
3. Connect an oscillator to the input BNC connector. Power up the system and inject signals to confirm the over-current and over-voltage trips perform correctly.
4. In the power supply and capacitor bank section:
  - Check the mounting torque on all bus bar-to-electrolytic capacitor mounting screws. Use a torque wrench to tighten these screws to 20 in- lbs.
  - Visually inspect all high-current joints for any signs of overheating, such as discoloration of connection points or melting of insulation.
  - Retorque all high-current joints for all current connections that carry less than 100 amps to 15 ft-lbs. Torque joints that carry more than 100 amps to 30 ft-lbs.
  - Visually inspect the small, rubber vent plug in the top of each electrolytic capacitor. If this plug shows any signs of leakage, rupture or distortion, the capacitor should be replaced. These high-energy capacitors may fail in a violent and hazardous manner if vent plug symptoms are ignored.
  - Use an air nozzle and brush to clean the fin surfaces of the heat sink.
  - Use compressed air and a brush to clean the power supply cooling fan (s). Do not use solvents.
  - Check the tightness of all other connection points.

## 5. In the power modules:

- Use compressed air and a brush to clean the four heat sink assemblies.
- Use compressed air and a brush to clean the power supply cooling fan (s). Do not use solvents.
- Check and retorque the FET mounting bolts, as repeated thermal hot/cold cycles can cause them to loosen. Use a calibrated torque wrench to tighten these bolts to 20 in-lbs.
- Perform an ohmmeter check on all module fuses (20 x 15 amp and 20 x ¼ amp).

Approximate labor time required: 8 hours.

## 5.2 Spare Parts

PART NUMBER	DESCRIPTION	RECOMMENDED QTY
DP-DSM-10-0006	POWER MODULE 10 KVA	1