

Staco E3 PPC

208-600V 50/60Hz
3.5 to 40kVA

USER'S MANUAL

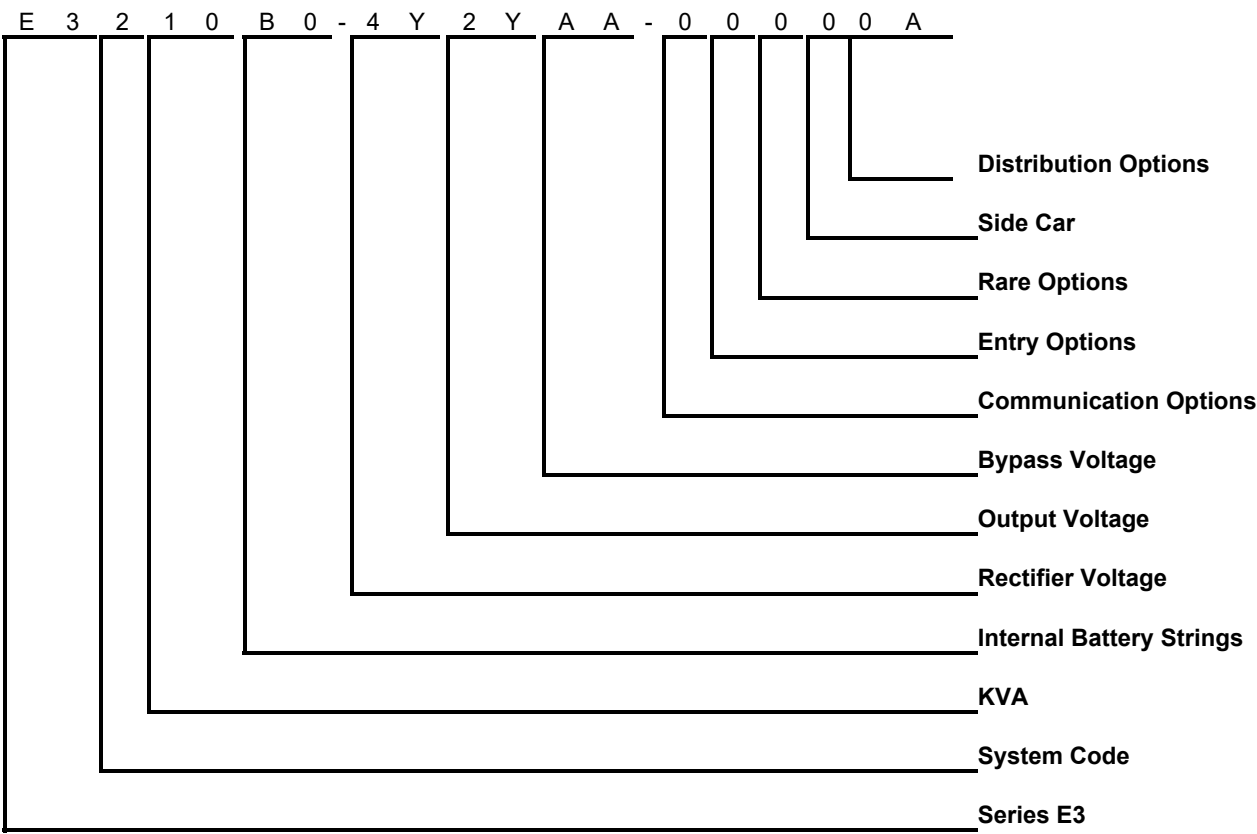
Staco Energy is highly specialized in the development and production of precision power conditioner (PPC). The PPC of this series are high quality products, carefully designed and manufactured to ensure optimum performance.

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Thank you for choosing our product.

Applicability



Safety Warnings



IMPORTANT SAFETY INSTRUCTIONS SAVE THESE INSTRUCTIONS

Important Instructions for Staco E3 Series Models 3.5 - 40kVA

This manual provides essential guidelines for the installation and maintenance of the Staco E3 series PPC. Please read all the instructions carefully before operating this PPC.

Retain this manual for future reference.

READ AND FOLLOW ALL SAFETY INSTRUCTIONS

- a. Do not use this unit outdoors.
- b. Avoid routing wiring across or near hot surfaces.
- c. Do not install the PPC near gas or electric heaters.
- d. Install this unit in a location that is secure and inaccessible to unauthorized personnel.
- e. Using accessory equipment not recommended by the manufacturer may result in unsafe conditions.
- f. This PPC is intended for specific use; do not use it for any other purpose

DANGER



This PPC contains LETHAL VOLTAGES. All repairs and service should be performed by AUTHORIZED TRAINED SERVICE PERSONNEL ONLY. There are NO USER SERVICEABLE PARTS inside the PPC.

WARNING



To reduce the risk of fire or electric shock, install this PPC in a temperature and humidity controlled, indoor environment, free of conductive contaminants. Do not operate near water or excessive humidity.

WARNING



Input and output over-current protection and disconnect switches must be provided by others.

High ground leakage current may be present; therefore, do not operate the unit without an appropriate protective ground.

Emergency Interventions

The following information is intended as general guidance.

First aid interventions

Adhere to company regulations and established procedures for any first aid interventions that may be necessary.

Firefighting measures

1. Do not use water to extinguish a fire; instead, utilize fire extinguishers that are appropriate for electrical and electronic equipment.
2. Some products may release toxic fumes when exposed to heat or fire. Always wear a respirator when combating a fire.

Symbols used in the Manual

This manual employs graphic symbols to indicate operations that may pose a danger to the reader:

	Danger / Risk of Electric Shock <i>This symbol signifies the potential for serious injury or significant damage to the unit if adequate precautions are not taken.</i>
	Warning <i>This symbol highlights important information that must be understood, and any stated precautions should be strictly followed.</i>
	Note

Protective Equipment

No maintenance operations shall be conducted on the unit without the appropriate Personal Protective Equipment (PPE) as outlined below. Personnel involved in the installation or maintenance of the unit must be properly attired.

The following signs illustrate the protective equipment that should be worn. Various items of PPE must be chosen and sized according to the specific hazards (especially electrical) presented by the unit.

	Accident prevention footwear		Protective eyewear
	Protective clothing		Helmet
	Work gloves		

GENERAL PRECAUTIONS

This manual provides comprehensive instructions for the installation, start-up, and operation of the PPC. Please read the manual thoroughly before proceeding with installation. For guidance on using the PPC, keep the manual readily accessible and consult it prior to performing any operations on the unit.

This PPC has been designed and manufactured in compliance with applicable standards for the product, ensuring normal use and all reasonably anticipated applications. Under no circumstances should it be used for purposes other than those specified or in ways not described in this manual. All interventions must be conducted according to the criteria and timeframes outlined in this manual.

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1. Layout (Base Unit)

1.1. Views

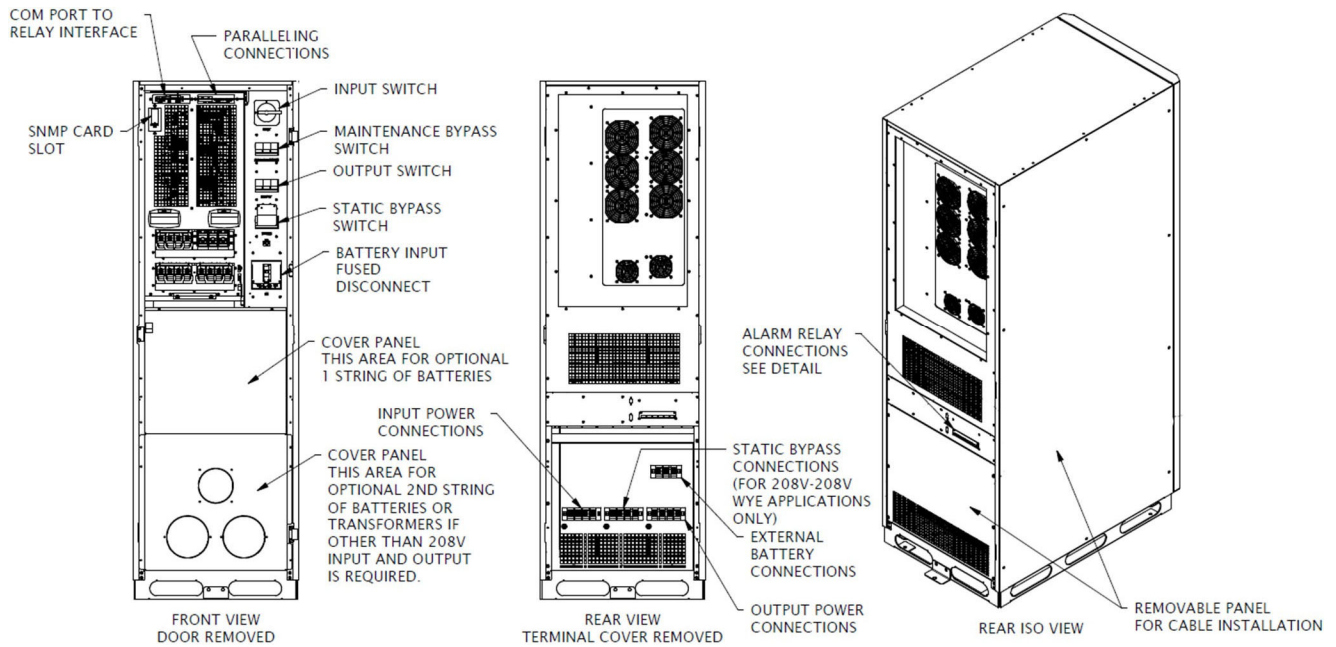


Figure 1 – Layout Views

2. Installation

- Check the Safety Instructions.
- Any incorrect connection or handling may cause damage to the PPC and/or the loads connected to it. Read these instructions carefully and follow the steps indicated.
- Installation of this PPC must be performed by a qualified electrician.
- It is recommended to provide a maintenance bypass switch or an electrical panel with individual protection for input and output. This setup allows for the isolation of the unit during preventive maintenance or repair.

Upon request, a maintenance bypass switch can be customized to meet your specific requirements.

2.1 Important Safety Instructions

WARNING



As this unit provides Class I protection against electric shocks, it is essential to install an earth conductor. Before connecting the power supply to the PPC input, ensure that the ground conductor is connected to the ground lug.

Before installing any power or control cables, ensure that all PPC switches are in the open position and that no power is available to the PPC.

The PPC features multiple electrical inputs and produces electrical output. Verify that all terminals are at a zero-voltage state before performing any work on the PPC.

Warning labels should be affixed to all primary power switches that are installed remotely from the unit to alert electrical maintenance personnel about the presence of a PPC in the circuit. The label should display the following or equivalent text:

WARNING



Before working on this circuit.

- **Isolate Uninterruptible Power System (PPC).**
- **Check for Hazardous Voltages.**



Risk of Voltage Backfeed

Once the mains power supply is powered up to the input of the PPC, there may be voltage at the output terminals. To have no voltage on the output terminals, Input Breaker, Bypass Input Breaker and Output Breaker must be in "Off" position.

The output terminals may have output voltage from the manual bypass. If the output power supply of the PPC has to be interrupted, open Maintenance Breaker.

2.2 Equipment Handling

2.2.1 Unpacking and Content Checking

Upon receiving the PPC, ensure that it has not sustained any damage during transport. If you notice any shipping damage, make all relevant claims to the carrier. Additionally, verify that the information on the nameplate, located inside the front door, matches the specifications in the purchase order; unpacking may be necessary for this.

To unpack the PPC, cut the bands on the cardboard container and lift it off, or use the appropriate tools if it is made of wood. Remove the corner pieces and the plastic sleeve. The PPC should be unpacked while still on the pallet.

Once the unit has been accepted, it is advisable to repack the PPC until it is ready for service to protect it from potential mechanical damage, dust, dirt, and other contaminants.

2.2.2 Storage

Storage of the PPC should be in a dry, ventilated place and protected against rain, water or chemical agents. It is advisable to maintain the PPC in the original package which has been designed to assure the maximum protection during transport and storage.

2.2.3 Transport

The PPC needs to be removed from the Pallet and moved to its permanent location. It is important to observe the rough weights indicated in the technical specs both with respect to the site itself and the means to be used to put it there (floor, hoist, lift, stairs, etc...).

2.2.4 Location



The PPC requires a minimum of 4 inches clearance in the back. Clearance above the PPC must be 18 inches minimum. Failure to adhere to these minimum clearances may result in overheating.

Adequate space must be provided in front of the PPC for service and maintenance (refer to Figure 2). Utilizing flexible conduits for power wiring may offer additional benefits.

Access to the sides of the PPC will be necessary only for repairs.

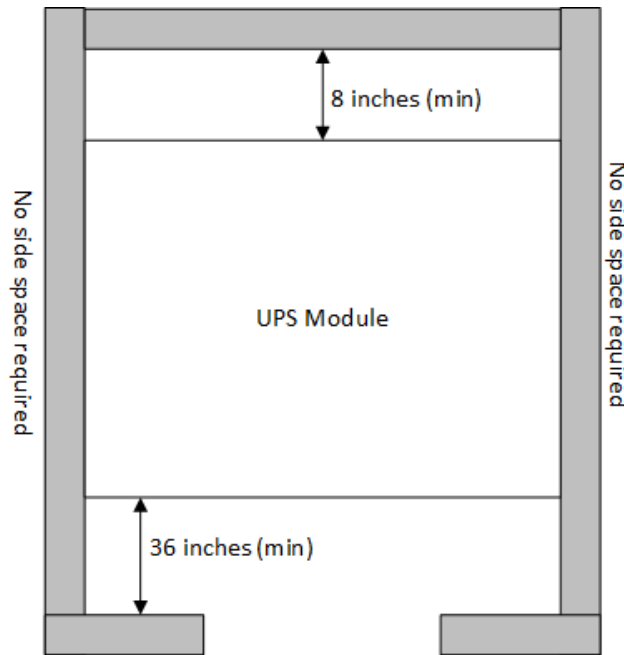


Figure 2 - Recommended spacing around unit.

2.3 Power Connections

2.3.1 Preparing PPC

All PPC models have terminals for power connection and connectors for communications located inside the rear and inside the front door of the unit. Follow the steps outlined below to access all connections:

- Unlock the front door lock with the provided key.
- Connectors for communication ports are located at the front top left side of the inner panel.
- Terminals for Dry Contact alarms are located in rear of unit.
- Remove the screws securing the terminal cover inside the cabinet and set it aside. This will expose the input and output terminals.
- Once the connection of the PPC is finished, replace the covers and close the front door.



Wire size should be in accordance with NEC and local code using the currents shown in **7.2 Rated Currents and Recommend Field Wiring Information**

Circuit protection in power distribution panels should have following characteristics:

- For input and bypass, type B earth leakage breakers and circuit breakers curve C.
- For the output, circuit breaker curve C.
- Their size will be compatible, as minimum, with the currents stated in **7.2 Rated Currents and Recommend Field Wiring Information**
-

If input, output or bypass peripherals were added to the PPC, like transformers or autotransformers, follow the installation instructions in the manuals for those units.

2.3.2 Connection to Mains Input



Connection to the ground:

This unit provides Class I protection against electric shocks; therefore, a ground conductor must be installed. Connect the ground conductor before connecting the power to the PPC input. See **6.2 Rated Currents and Recommend Field Wiring** Information for current ratings.

Connection to the Input:

Connect the power supply cables N-A-B-C to the input power terminals, following a clockwise rotation as indicated on the label of the unit and in this manual.

See **6.2 Rated Currents and Recommend Field Wiring** Information for current ratings.



If the order of the phases is not followed, the unit will not operate. In case of any discrepancies between the labeling and the instructions in this manual, always prioritize the label on the PPC.

2.3.3 Connection to the Bypass Input (Dual Inputs):

Independent Bypass Input

For PPC configurations where the bypass input is separate from the rectifier input, ensure that each input is properly connected according to the specifications outlined in the manual. This separation allows for enhanced flexibility and reliability in the power management of the system.



Connection to the ground:

This unit provides Class I protection against electric shocks; therefore, a ground conductor must be installed. Connect the conductor to the ground terminal before connecting the power to the PPC input. See **6.2 Rated Currents and Recommend Field Wiring** Information for current ratings.

Connection to the Bypass:

In some PPC configurations, there may be jumper wires between the input power terminals and the static bypass terminals. For an independent bypass configuration, it is essential to remove these jumpers.

Connect the bypass power supply cables N-A-B-C to the static bypass power, following a clockwise rotation indicated on the label of the unit and in this manual.



If the order of the phases is not followed, the unit will not operate. In case of any discrepancies between the labeling and the instructions in this manual, always prioritize the label on the PPC.

WARNING



Whenever a single PPC is supplied with dual inputs or when parallel-connected PPC units are used, special attention must be given to the neutral wiring. It is prohibited to create a configuration that could result in current flowing through ground conductors, except during an insulation fault.

For a dual input configuration, both the bypass input and the rectifier input must be supplied from sources that have a common Neutral to Ground Bond. Typically, this requires that they be fed from the same panel. If they must be supplied from distinct sources, the PPC installation must include an isolation transformer for each input, and these transformers must share a common ground bonding point for their neutrals.

2.3.4 Connection to the Output



Connection to the ground:

This unit provides Class I protection against electric shocks; therefore, a ground conductor must be installed. Connect the conductor to the ground terminal before connecting the power to the PPC input. See **6.2 Rated Currents and Recommend Field Wiring** Information for current ratings.

Connect the loads cables N-A-B-C to the output power terminals, following a clockwise rotation indicated on the label of the unit and in this manual.



If the order of the phases is not followed, the unit will not operate. In case of any discrepancies between the labeling and the instructions in this manual, always prioritize the label on the PPC. A user accessible disconnect device sized appropriately to **6.2 Rated Currents and Recommend Field Wiring** Information shall be installed from output of PPC to critical load.

2.3.5 Connection Main Protective Earth

Ensure that all loads connected to the PPC are only connected to the ground bonding terminal. Grounding the load(s) and/or the battery case(s) or cabinet(s) to this single point will help prevent ground loops, which can affect the quality of the power supplied. All terminals designated as ground are interconnected to the main grounding terminal and to the frame of the unit.

2.4Control Connections

2.4.1 Dry Contacts



The dry contact wiring operates at very low voltage levels. To maintain quality, these wires must be installed separately from other wires carrying line voltages, such as 208V or 480V lines.

The communication port to relays provides digital signals in the form of potential free form “A” contacts. Dry Contact Port.

Type	Pins	Description	Rating	Wire Size
Inputs	1 & 2	Inverter Inhibit Input	30 V (AC or DC); <2 A	#22 - #12 AWG
Outputs	3 & 4	On Bypass		
NA	5 & 6	Reserved		

When alarm is activated, the contact is Closed.

Table 1 - Alarms interface to Dry Contacts

2.4.2 COM port RS-232 & RS-485. Connector (J8).



The dry contact wiring operates at very low voltage levels. To maintain quality, these wires must be installed separately from other wires carrying line voltages, such as 208V or 480V lines.

The DB9 connector includes communication ports for the PPC to connect to RS-232 and RS-485. These ports cannot be used simultaneously, as they are mutually exclusive. Connector J8 can be utilized to connect the PPC with any machine or unit that has a standard bus.

2.4.2.1 RS-232

Physical structure of the RS-232

Pin-out

- Pin 2. RXD. Serial data reception.
- Pin 3. TXD. Serial data transmission.
- Pin 5. GND. Signal mass.

Communication protocol of the RS-232

The communication protocol used is of the "MASTER/SLAVE" type. In this setup, the computer or computer system (the "MASTER") requests specific data, and the PPC (the "SLAVE") responds immediately with the required information. Initially, the communication channel of the computer must be programmed with the same parameters as the communication channel of the PPC.

- Communication speed: 1200, 2400, 4800, 9600 or 19200 Baud.
- No. information bits: 8 Bits.
- No. stop bits: 1 or 2 stop bits.
- Parity: - Even, Odd or None.

2.4.2.2 RS-485

Physical structure of the RS-485

The unit utilizes only 2 wires (pins 4 and 9 of the female DB9 connector) to facilitate communication between the systems connected to the network. Communication is established through the sending and receiving of signals in a differential mode, which provides the system with excellent immunity to noise over long distances (approximately 800 meters).

Pin-out

- Pin 4. Output signal A (+) of the RS-485.
- Pin 9. Output signal B (–) of the RS-485.

Communication protocol of the RS-485

The communication protocol of the RS-485 channel is designed to enable the PPC to communicate with other computer systems that utilize the same protocol.

- Communication speed: 1200, 2400, 4800, 9600 or 19200 Baud.
- No. information bits: 8 Bits.
- No. stop bits: 1 or 2 stop bits.
- Parity: - Even, Odd or None.

2.4.3 Local EPO terminal

A local Emergency Power Off (EPO) button is mounted on the front panel next to the LCD. After an EPO event is triggered using this button, it must be pressed again to clear the EPO condition before the PPC can be restarted.

The EPO switch must be normally closed and latch open when pressed to open the circuit and activate the emergency shutdown. To restore the PPC to normal mode, return the switch or button (EPO) to its original position to close the circuit.

For operating instructions for the (EPO), see **3.2.3.1 Remote Emergency Power Off (REPO)** of this manual.

2.4.4 Alarm Relay Board

The Alarm Board is active (powered up) when the PPC output is ON. It operates based on the status of the PPC and features six connections, labeled J2 through J7.

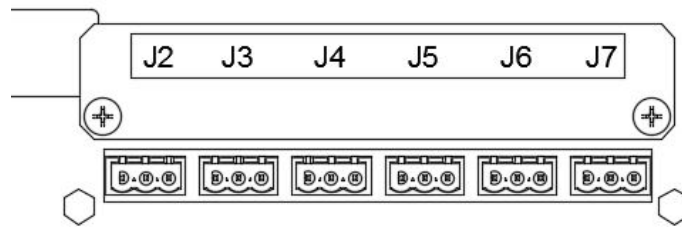


Figure 3 – Alarm Relay Board

Connection	Description	Terminal	Type	Rating	Wire Size	Torque
J1	Internal connection					
J2	Normal Operation	1	N. C.	30 V (AC or DC); <2 A	#22-#12 AWG	4.4 in-lbs.
		2	Com			
		3	N.O.			
J3	On Bypass	1	N. C.			
		2	Com			
		3	N.O.			
J4	On Battery (not used)	1	N. C.			
		2	Com			
		3	N.O.			
J5	Low Battery (not used)	1	N. C.			
		2	Com			
		3	N.O.			
J6	Over Temperature	1	N. C.			
		2	Com			
		3	N.O.			
J7	Alarm Present	1	N. C.			
		2	Com			
		3	N.O.			

N.C. – Normally Closed – shorted to Common (Com) when signal is not energized.

N.O. – Normally Open – shorted to Com when signal is activated.

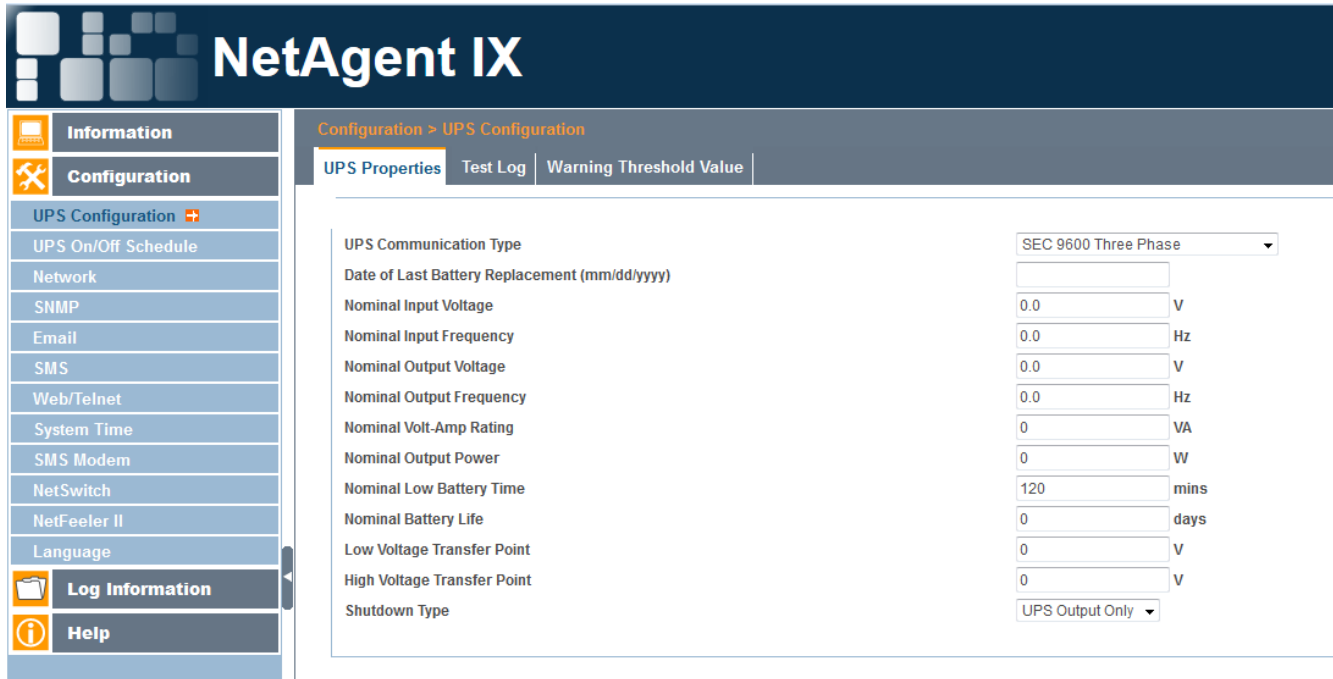
Table 2 – Alarm Relay Board

2.4.5 Optional Intellislot Communication Card

If the SNMP Card is installed, the following settings must be configured to ensure proper communication for the card.

SNMP Card Setting:

PPC Communication Type: SEC 9600 Three Phase



The screenshot displays the NetAgent IX web interface. The left sidebar contains a navigation menu with sections: Information, Configuration (selected), Log Information, and Help. Under Configuration, the following options are listed: UPS Configuration (selected), UPS On/Off Schedule, Network, SNMP, Email, SMS, Web/Telnet, System Time, SMS Modem, NetSwitch, NetFeeler II, and Language. The main content area is titled 'Configuration > UPS Configuration' and includes three tabs: 'UPS Properties' (selected), 'Test Log', and 'Warning Threshold Value'. The 'UPS Properties' tab contains a list of configuration parameters and their corresponding values or input fields:

Parameter	Value / Input	Unit / Option
UPS Communication Type	SEC 9600 Three Phase	(Dropdown)
Date of Last Battery Replacement (mm/dd/yyyy)		
Nominal Input Voltage	0.0	V
Nominal Input Frequency	0.0	Hz
Nominal Output Voltage	0.0	V
Nominal Output Frequency	0.0	Hz
Nominal Volt-Amp Rating	0	VA
Nominal Output Power	0	W
Nominal Low Battery Time	120	mins
Nominal Battery Life	0	days
Low Voltage Transfer Point	0	V
High Voltage Transfer Point	0	V
Shutdown Type	UPS Output Only	(Dropdown)

See Staco website (<http://www.stacoenergy.com/>) for the latest protocols.

3. Operation



It is critical that the following procedure be followed in the given sequence.

3.1 Start up

3.1.1 Before Start Up

- Verify that all the connections have been made correctly and are sufficiently tight, following the a clockwise phase rotation sequence.
- Check that the PPC switches are in “Off” position.
- Ensure that all the loads are turned off.

3.1.2 Start-Up Procedure

1. Close the mains circuit breaker to provide power to the input of the PPC.
2. Turn the Input Breaker to “I” (ON) position. The display of the Control Panel will be turned on automatically. **DO NOT** close any other switches at this time.
The PPC will verify for correct phase sequence. If Line Wiring Fault occurs, Disconnect the Input Breaker and the mains power. Swap any two phases of the input terminals of the PPC and repeat the start-up process.
3. Close the Output Breaker.
4. Start up the inverter through the keypad of the control panel.
 - a. Select “Control”,
 - b. Select “ON/OFF PPC”.
 - c. “Turn On PPC?” will appear. Select “YES”
5. After several seconds, the rectifier and inverter will start.
6. The system will supply voltage at the output terminals.
7. Close the Bypass Input Breaker.
The PPC will verify for correct phase sequence. If Line Wiring Fault occurs, Disconnect the Bypass Input Breaker and the mains power. Swap the same two phases of the input bypass terminals of the PPC and repeat the start-up process.
8. The system is now started up completely, and the PPC is protecting the critical load.

3.2 Shutdown

3.2.1 Inverter Disconnect

Open the Output Breaker of the PPC.

3.2.2 Complete Shutdown of PPC

1. Shutdown the loads.
2. Open any distribution breakers.
3. Shutdown the inverter.
 - a. Select "Control",
 - b. Select "ON/OFF PPC".
 - c. "Turn Off PPC?" will appear. Select "YES"
4. Open Output Breaker.
5. Set the Input Switch to "O" position.
6. To completely isolate PPC, remove power to the PPC input and the bypass. The system is now completely deactivated.

DANGER



After shutdown of the PPC, wait at least 5 minutes before performing any maintenance or service work to allow the electrolytic capacitors to discharge.

3.2.3 Emergency Power Off (EPO)

Emergency Power Off (EPO) will completely shut down unit or system of units:



When activated, the output voltage to the load is turned off.

3.2.3.1 Remote Emergency Power Off (REPO)

Remote shutdown function (REPO) is activated through the REPO terminal. A Normally Closed contact is opened, REPO will activate and completely shut down the module.

3.2.3.2 Local Emergency Power Off (EPO)

Local shutdown function (EPO) is activated from front panel mounted EPO button. When the button is depressed, EPO will activate and completely shut down the module.

3.3 Maintenance Bypass Transfer (Internal MB)

3.3.1 Transfer to Manual Bypass

Procedure for passing from normal operation to manual bypass:

1. Shutdown the inverter.
 - a. Select "Control",
 - b. Select "ON/OFF PPC".
 - c. "Turn Off PPC?" will appear. Select "YES"
 - d. Load is now on Static Bypass
2. Remove the screws holding the metal bracket blocking operation of the switch and remove the metal bracket.
3. Close Maintenance Breaker.
4. Open Output Breaker.
5. Open DC Breaker in PPC.
6. Turn Input Switch to "O" position.



The PPC supplies output voltage directly from the utility through the internal maintenance bypass.

7. The PPC is completely shut down.

3.3.2 Transfer to Normal Operation

Procedure for switching from internal maintenance bypass to normal operation:

1. Set the Input Switch to "I" position.
2. Close the Output Breaker.
3. Open the Maintenance Breaker and replace the metal bracket (BL) and screws. Load is on Static Bypass.



It is an important requirement for safety to replace the metal bracket (BL) to prevent accidental closure of Maintenance Breaker which can result in interruption of power to the load and possible damage to the PPC.

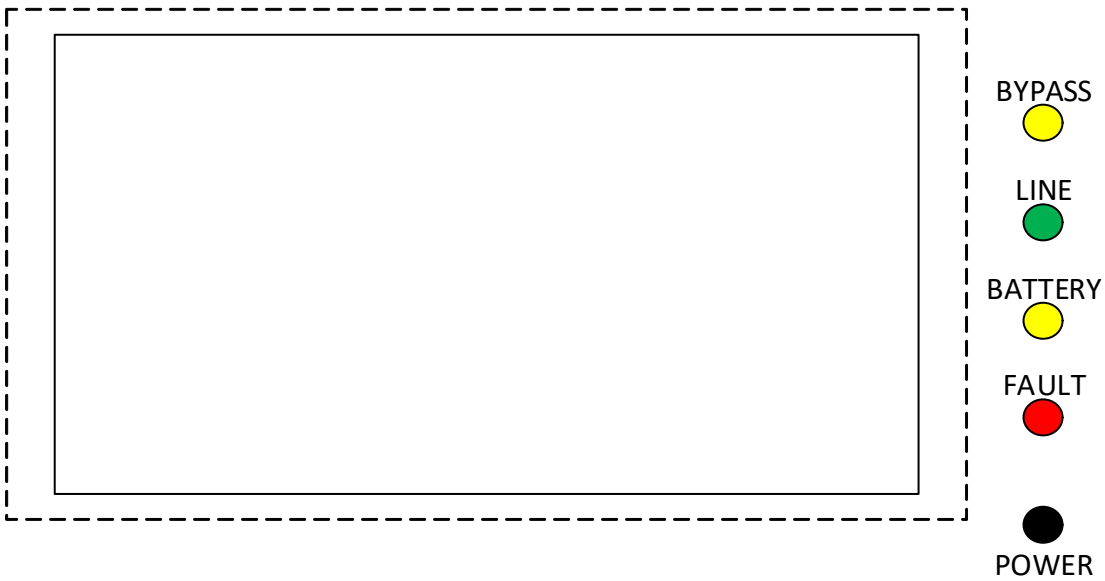
4. Start up the inverter.
 - a. Select "Control",
 - b. Select "ON/OFF PPC".
 - c. "Turn On PPC?" will appear. Select "YES"

The PPC System is now online and fully protecting the load.

4. Control Panel and Display

4.1 Basic Functions of Keyboard

The LCD front screen has touch screen functions.



The four (4) LED on front panel will show the status of the PPC.

Mode LED	BYPASS	LINE	BATTERY	FAULT
UPS On				
Standby Mode				
Bypass Mode				
Line Mode				
Frequency Convertor				
ECO Mode				
Fault				

 - LED ILLUMINATED

 - LED IS OFF

4.2 Screen Description

After initialization, the LCD will display main screen. There are five sub-menus: CONTROL, MEASURE, SETTING, INFO AND DATA LOG. Touch any sub-menu icon to enter into the sub-screen.

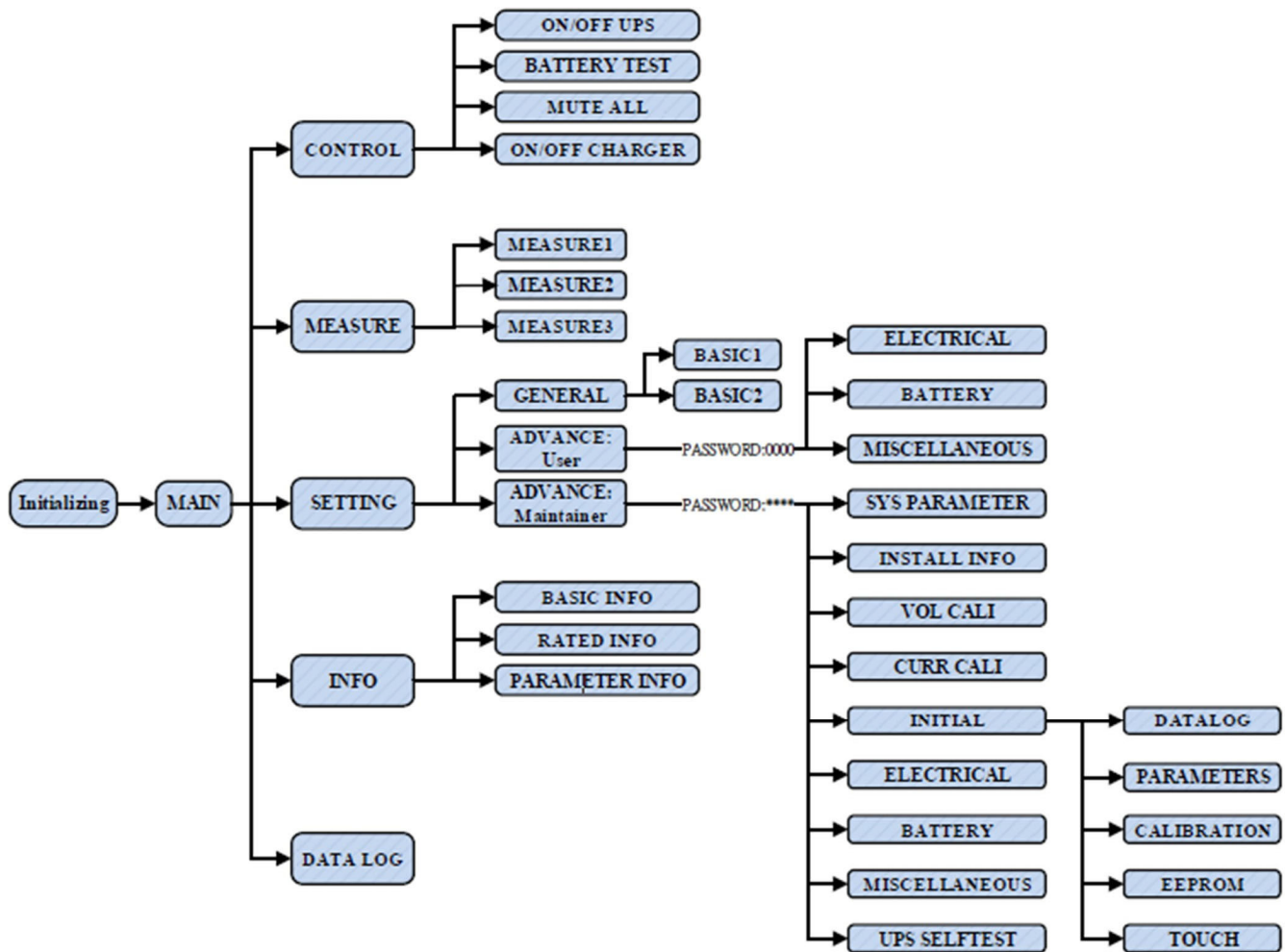
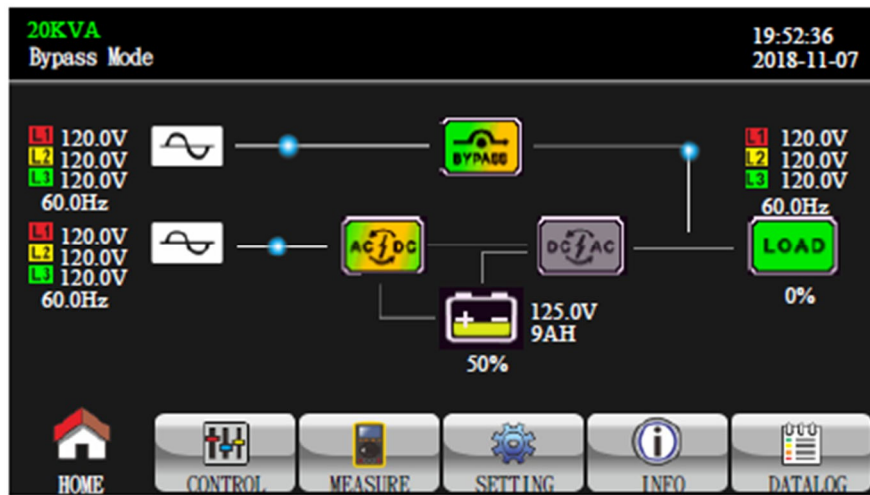


Figure 4 – HMI Menu tree

4.2.1 Main Screen



4.2.2 Control (CNTL) Menu

- Touch the icon  to enter control sub-menu.

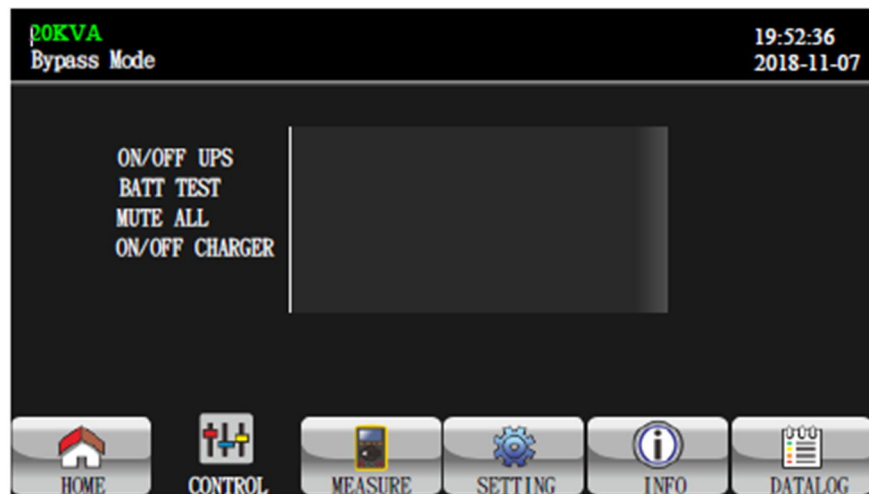


Figure 5 - Typical Control Screen

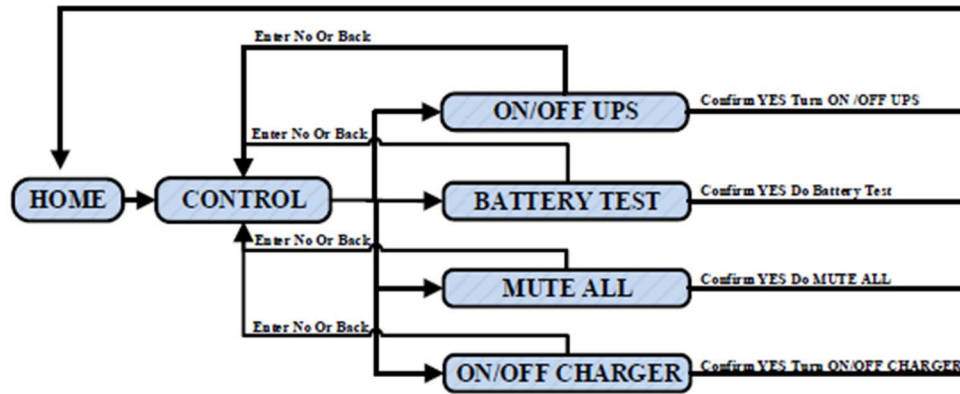
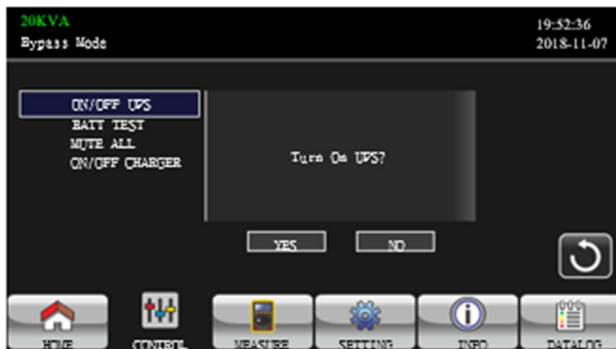


Figure 6 – Control Screen Menu tree

On/Off PPC

It will show “Turn on PPC?” when PPC is off. It will show “Turn off PPC?” when PPC is on.

Touch “YES” to turn ON or OFF the PPC. Then, the screen will return to the main screen. Touch “Back” to return to main screen immediately or “NO” to cancel this operation and back to main screen.



Turn ON PPC



Turn OFF PPC

Battery Test – Not used for PPC Systems

Audio mute

It will show “Mute all” if the audio is active. Touch “Yes” to activate mute. If “Mute all” is active, it will show icon  on the top left corner of the main screen. Touch “Back” to return to CONTROL screen immediately or “No” to cancel this operation and back to CONTROL screen. It will show “Cancel mute” if the PPC is mute already. Touch “Yes” to activate audio function or “No” keep mute. Touch “Back” to return to CONTROL screen.



Mute All



Cancel Mute All

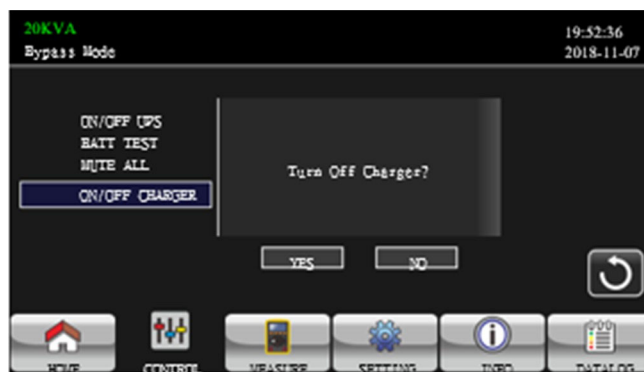
On/Off CHARGER

It will show “Turn on Charger?” when Charger is off.

It will show “Turn off Charger?” when Charger is on.

Touch “YES” to turn ON or OFF the Charger. Then, the screen will return to the main screen.

Touch “Back” to return to CONTROL screen immediately or “NO” to cancel this operation and back to CONTROL screen.



4.2.3 Measure (MEAS) Menu

This menu shows measurement values:

Page 1

LINE VOL	INVERTER VOL	BYPASS VOL	OUTPUT VOL	 1/3 
L1:120.0V	0.3V	120.0V	120.0V	
L2:120.0V	0.3V	120.0V	120.0V	
L3:120.0V	0.3V	120.0V	120.0V	
L12:207.8V	0.4V	207.8V	207.8V	
L23:207.8V	0.4V	207.8V	207.8V	
L13:207.8V	0.4V	207.8V	207.8V	
60.0Hz	0.0Hz	60.0Hz	60.0Hz	


HOME


CONTROL


MEASURE


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DATALOG

- LINE VOL: The real time value of L1, L2, and L3 phase voltage, input power in volt/amps (VA) and input frequency.
- INVERTER VOL: The real time value of L1, L2 and L3 inverter voltage and frequency.
- BYPASS VOL: The real time value of L1, L2 and L3 bypass voltage and frequency.
- OUTPUT VOL: The real time value of L1, L2 and L3 output voltage and frequency.

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20KVA

Bypass Mode

19:52:36

2018-11-07

OUTPUT W	OUTPUT VA
L1: 4W	46VA
L2: 5W	46VA
L3: 1W	46VA
OUTPUT W(%)	OUTPUT VA(%)
L1: 0%	0%
L2: 0%	0%
L3: 0%	0%
TOTAL W(%)	TOTAL VA(%)
0%	0%

BATT P VOL	125.0V
BATT N VOL	125.0V
BUS P VOL	231.3V
BUS N VOL	229.5V
CHARG CURR	3.9A
DISCHG CURR	0.0A

TEMP °C	TEMP L1	27
	TEMP L2	27
	TEMP L3	27

HOME

CONTROL

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DATALOG

- OUTPUTW: L1, L2 and L3 output power in watts.
- OUTPUT VA: L1, L2 and L3 output power in VA.
- OUTPUT W (%): L1, L2 and L3 output power watts in percentage.
- OUTPUT VA (%): L1, L2 and L3 output power VA in percentage.
- Total watts and VA: Total output load in watts and VA.
- BATT Voltage/Bus Voltage/Charging Current/Discharging Current: The real time value of DC related information.
- Temperature: Temperature of L1, L2 and L3 phases.

INPUT W		INPUT VA		INPUT CURR		INPUT PF	
L1:	4W		46VA	L1:	0.3A		0.08
L2:	4W		46VA	L2:	0.3A		0.08
L3:	4W		46VA	L3:	0.3A		0.08
INPUT W(%)		INPUT VA(%)		OUTPUT CURR		OUTPUT PF	
L1:	0%		0%	L1:	0.3A		0.08
L2:	0%		0%	L2:	0.3A		0.08
L3:	0%		0%	L3:	0.3A		0.08
TOTAL W(%)		TOTAL VA(%)					
0%		0%					

3/3

↑

↓

↺

HOME

CONTROL

MEASURE

SETTING

INFO

DATALOG

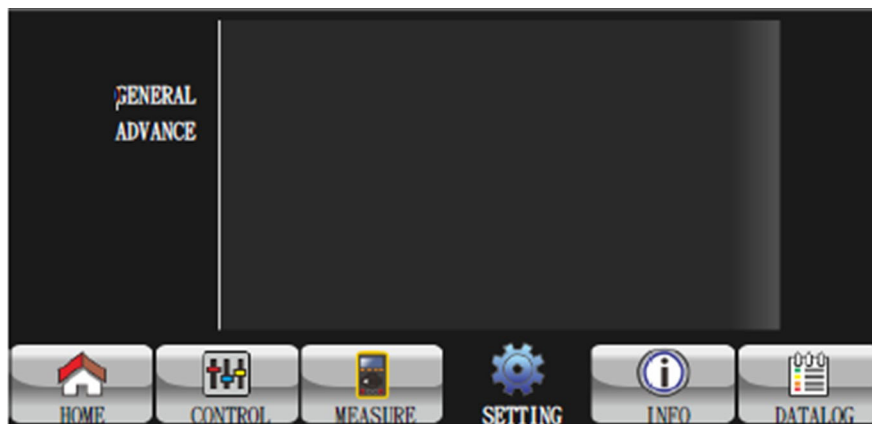
- Input current: The real-time value of input current L1/L2/L3 and L12/L23/L13.
- Output current: The real-time value of output current L1/L2/L3 and L12/L23/L13.

4.2.4 Setting Menu

This sub-menu is used to set the parameters of PPC. Touch the icon  to enter setting menu page.

There are 2 options: Basic and Advanced. Touch the icon  to return to the main screen. Touch the  icon to go back to the previous menu.

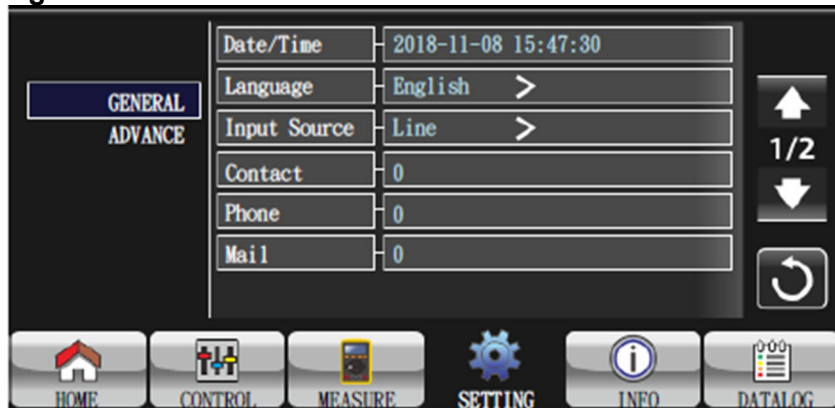
NOTE: Not all settings are available in every operation mode. If the setting is not available in the present mode, the LCD will keep its original setting parameter shown instead of changing the parameters.



- **GENERAL:** This section is used to set up basic information about the PPC. It is not related to any functional parameters.
- **ADVANCE:** Accessing the “ADVANCE” settings requires a password. There are two types of authority levels: User and Maintainer.

4.2.4.1 GENERAL

Page 1



- **Date/Time:** Set the date and time. The format is YYYY-MM-DD HH:MM:SS. The calendar day will be automatically changed when the year, month and date are set.
- **Language:** Set the LCD language. Only English is available.
- **Input Source:** Select the input source. There are two options: Line (utility) and generator. Line is default setting. This setting value will show on the main page. When “generator” is selected, the acceptable input frequency will be fixed at the range of 40~75Hz. This setting value will show on the status bar.
- **Service Contact:** Set the name of the contact person and the maximum length is 18 characters.
- **Service Phone:** Set the service phone number. Only 0~9, + and – are accepted. The maximum length is 14 characters.
- **Service Email:** Set the service email accounts up to two and the maximum length is 36 characters.

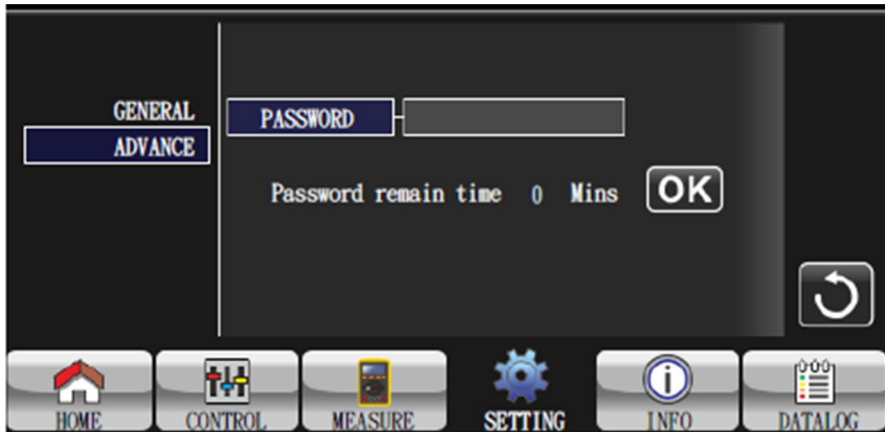
Page 2



- **Audio Alarm:** There are two events available to mute Alarm. You may choose “Enable” or “Disable” alarm when related events occur.
 - Enable: When selected, the alarm will be mute when related events occur.
 - Disable: When selected, PPC will alarm when related events occur.
- **All Mute:** When “enable” is selected, all the faults and warnings will be mute. It will show icon  on the top right corner of the main screen.
- **Mode Mute:** PPC status mode alarm enable/disable. If “Mode Mute” is activated, it will show icon  on the top right corner of the main screen.

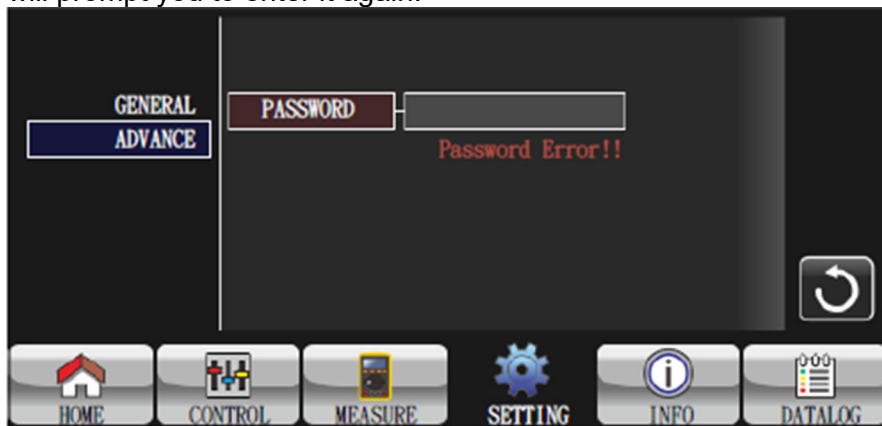
4.2.4.2 ADVANCE

A 4-digit password is required to access the “ADVANCE” page.

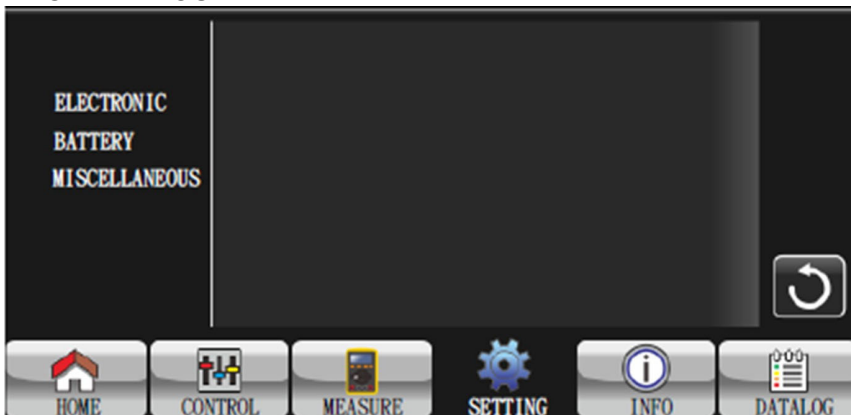


To access the “Advance→User” Setting menu page, the default password is “0000”.

If the entered password is correct, the page will navigate to the settings screen. If the password is incorrect, it will prompt you to enter it again.



There are three sub-menus under “Advance→User” setting: ELECTRONIC, BATTERY and MISCELLANEOUS.



ELECTRICAL

Page 1



- Output Voltage: Select the output rated voltage.
 - There are two options, 120V and 127V. 120Vac is the default setting.
- Output Frequency: Select output rated frequency.
 - **50Hz:** The output frequency is set for 50Hz.
 - **60Hz:** The output frequency is set for 60Hz.
- CVCF Mode (Constant Voltage and Constant Frequency function)
 - **Enable:** CVCF function is enabled. The output frequency will be fixed at 50Hz or 60Hz according to setting of “OP Freq.”. The input frequency could be from 40Hz to 70Hz.
 - **Disable:** CVCF function is disabled. The output frequency will synchronize with the bypass frequency within 45~55 Hz for 50Hz system or within 55~65 Hz for 60Hz system. Disable is the default setting.
- Bypass Forbid:
 - **Allow:** Bypass is permitted. When selected, the PPC will operate in Bypass mode according to the “Byp.at off” setting. This is the default configuration.
 - **Forbid:** Bypass is not permitted. When selected, the PPC cannot operate in Bypass mode under any circumstances.



- Bypass at PPC off: Select the bypass status when manually turning OFF the PPC. This setting is only available when “Bypass forbid.” is set to “Disable”.
 - **Enable**: Bypass enabled. When selected, bypass mode is activated.
 - **Disable**: Bypass disabled. When selected, no output through bypass when manually turning off the PPC.
- Bypass Voltage Range: Set the bypass voltage range.
 - **L**: Low voltage point for bypass. The setting range is 96V ~ 110V. 96V is default setting.
 - **H**: High voltage point for bypass. The setting range is 130V ~ 146V. 146V is default setting.
- Bypass FRE Range: Set the bypass frequency range.
 - The acceptable bypass frequency range from 46Hz to 54Hz when PPC is 50Hz system and from 56Hz to 64Hz when PPC is 60Hz system.
- ECO mode: Enable/Disable ECO mode. Default setting is “Disable”.
- ECO Voltage Range: Set the ECO voltage range.
 - **L**: Low voltage point for ECO mode. The setting range is from “Rated output voltage –5V” to “Rated output voltage -11V”. “Rated output voltage –5V” is default setting.
 - **H**: High voltage point for ECO mode. The setting range is from “Rated output voltage + 5V” to “Rated output voltage + 11V”. “Rated output voltage + 5V” is default setting.
- ECO FRE Range: Set the ECO frequency range. The setting range is from 46Hz to 54Hz when the PPC is 50Hz system and from 56Hz to 64Hz when the PPC is 60Hz system.

BATTERY – Not Applicable for PPC systems

MISCELLANEOUS



Auto Restart: Not Applicable for PPC systems

Shutdown Delay Min: The PPC will shut down after the specified number of minutes. The countdown will begin after confirming the pop-up screen.

Restore Delay Min: The PPC will automatically restart after the specified number of minutes following a shutdown.

New Password: Set up a new password to access the “ADVANCE → User” menu.

4.2.5 Information Screen

Touch the icon  to enter the information page. Touch the icon  or  to browse information.

Touch the icon  to return to the main screen. Touch the icon  to go back to the previous menu.

Basic Information



- MCU Version: COM: #; LCD: #.
- DSP Version: INV: #; PFC: #.
- Serial NO.: The Serial Number of PPC.
- Manufacturer: The information about manufacturer.
- Service Contact: The contact's name is set in “Basic Setting”.
- Service Phone: The listed numbers are set in “Basic Setting”.
- Service Mail: The service Email account is set in “Basic Setting”.

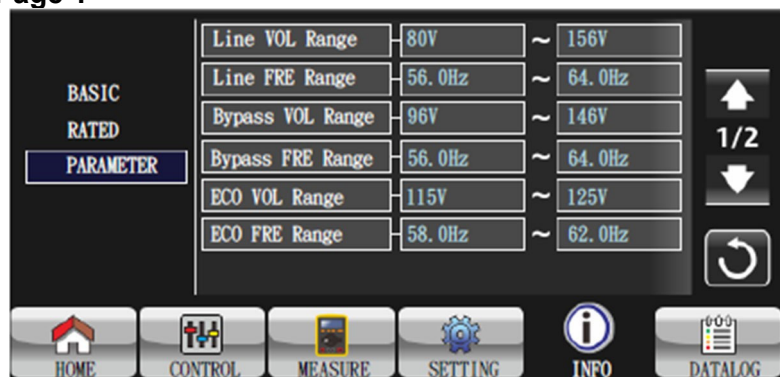
Rated Information



- Output Voltage: It shows output rated voltage Phase to Neutral.
- Output FRE: It shows output rated frequency.
- CVCF Mode: Enable/Disable CVCF mode. (Constant Voltage/Constant Frequency)
- Bypass Inhibit: Enable/disable bypass function. (Typically for Frequency Converter)
- Bypass PPC Off: Enable/disable auto bypass function when PPC is off.
- Auto Restart: Enable/disable auto-restart function.
- ECO Mode: Enable/disable ECO function.

Parameter Information

Page 1



- Line Voltage Range: The acceptable line input voltage range (Phase/Neutral).
- Line FRE Range: The acceptable line input frequency range.
- Bypass Voltage Range: The acceptable input voltage range for bypass mode (Phase/Neutral).
- Bypass FRE Range: The acceptable input frequency range for bypass mode.
- ECO Voltage Range: The acceptable input voltage range for ECO mode (Phase/Neutral).
- ECO FRE Range: The acceptable input frequency range for ECO mode.

Page 2 – Not Applicable for PPC systems

4.2.6 Data Log Screen

Touch the icon  to enter the date log page. Data log is used to record the warning and fault information of the PPC. The record contains date & time, code, type and description.

Touch the icon  or  to page up or down if there are more than one page in the date log.

Touch the icon  to return to the main screen.

Press the icon  to go back to the main menu.

Please refer to **Appendix A – Fault Codes** and **Appendix B – Warning Codes** for warning and fault code list.

Date Time	CODE	TYPE	Description
2018/11/8 17:02:30	01	Mode	Bypass Mode
2018/11/8 17:02:30	02	Mode	Standby Mode





 HOME
  CONTROL
  MEASURE
  SETTING
  INFO
  DATALOG

4.2.7 Audible Alarm

Description	Buzzer Status	Can Be Muted
PPC status		
Bypass mode	Beeping once every 2 minutes	Yes
Battery mode	Not Applicable for PPC systems	
Fault mode	Beeping continuously	

Warning		
Overload	Beeping twice every second	No
Others	Beeping once every second	

Fault		
All	Beeping continuously	Yes

5. Maintenance

5.1 Basic Maintenance Guide



The Uninterruptible Power Supply (PPC) is built to endure even the harshest operating conditions, providing reliable electronic power. However, to ensure its optimal performance, regular maintenance is essential. Some components, such as the batteries, fans, and sometimes the electrolytic capacitors, have a finite lifespan and should be checked and replaced periodically as needed.

To maximize the PPC's longevity and reliability, we recommend establishing a preventive maintenance program. This program should be carried out by qualified personnel who are authorized by the manufacturer to perform the necessary checks and replacements.

Our Technical Support Team is available to assist you with tailored preventive maintenance options to meet your specific needs.

5.1.1 Periodic maintenance (to be carried out by trained personnel and with doors closed)

The following operations should be performed periodically (e.g., once a month or more frequently in particularly challenging environmental conditions):

- Ensure that the air intake slots (located on the front door and at the back of the cabinet) and the output grilles on the top of the cabinet are clean.

5.1.2 Maintenance inside the PPC (factory authorized personnel only)

DANGER



Maintenance inside the PPC may only be performed by trained personnel. The PPC is designed to supply power to the load when disconnected from the mains power supply. High voltage remains present inside the PPC, even after the mains power supply has been disconnected.

After disconnecting both the input utility, trained service personnel must wait at least ten minutes for the capacitors to discharge before working inside the PPC.

5.2 Recommended Replacement Intervals

The E3 Staco PPC has a long design life. Due to the characteristics of the part, not the design of the PPC, certain components used in the design have a limited life, even with proper maintenance.



Service and Maintenance work must be performed only by factory authorized personnel.

Staco recommends these limited-life components be periodically inspected and replaced before the expected expiration of their life cycle. The recommended replacement schedule is an estimate only. The life of these parts depends on site conditions such as ambient temperature, load profile, cleanliness of environment and other factors. See Section **0 6.1 Technical Specifications**

Staco Recommends a Factory Authorized Preventative Maintenance review is schedule at least once a year.

Component	Recommend Replace in:
Fans	4-6 years
AC Filter Capacitors	4-6 years
DC Filter Capacitors	4-6 years

Table 3 - Recommended Replacement Intervals

See Staco's website for warranty details:

<http://www.stacoenergy.com/support/literature-download-center.html>

6. Specifications

6.1 Technical Specifications

Input	
Voltage	See 6.2.1 Input , Three Phase, 3 or 4 wire plus ground
Range	+20% / -17% (full load)
Frequency	50 ¹ /60Hz +/- 5.0 Hz (Auto-Detect)
Power Factor	0.99 at 100% load
Reflected Current Distortion (THD)	Less than 2% (100% load)
Input Current	See 6.2.1 Input
Output	
Voltage	See 6.2.2 Output , Three Phase, 3 or 4 wire plus ground
Static Voltage Regulation	+/- 1%
Frequency (inverter synchronous)	46Hz ~ 54 Hz @ 50Hz system; 56Hz ~ 64 Hz @ 60Hz system
Frequency Slew Rate	± 1 Hz per second (inverter synchronized to static bypass)
Free Running Frequency	50 ¹ /60Hz +/- 0.01Hz
Voltage Distortion (THD)	≤ 2 % @ 100% Linear Load; ≤ 4 % @ 100% Non-linear Load (PF≥0.8)
Inverter Overload ²	100%~110%: 60 min; 110%~130%: 1 min; >130%:1 sec;
Bypass Overload ²	<130%: Continuous, >130%:1min
Max Bypass Input Voltage Range	88 – 146VLL
Bypass Input Frequency Tracking Range	+/- 4Hz
Output Current	See 6.2.2 Output
Heat Rejection (BTU/Hr) @ 100% load	See 6.3 BTU/hr. & Weight
Environmental	
Altitude	< 2000 meters Derate load capability above 1,000 meters 1% per 100 meters
Operating Temperature	0 ~ 40°C (32°-104°F)
Audible Noise (dBA)	<75
General	
Dimensions (HxWxD)	72.44 in (1840mm) x 23.13 in (588mm) x 36.50 in (927mm)
Weight	See 6.3 BTU/hr. & Weight
Standards	UL listed to 1778, CUL to CSA C22.2, NEMA PE-1, ASME, ASA-C-39.1-1984, FCC Part 15 Subpart J Class B, NEC, OSHA, IEEE587, ANSI C 62.41-1980, ISO9000, 14000

Notes:

1. See Staco Representative for versions that allow 50Hz operations.
2. Overload is based on the kVA, kW and current for each phase. If any phase goes past rated kVA, kW or current on any phase, the overload alarm will activate.

6.2 Rated Currents and Recommend Field Wiring Information

6.2.1 Input

Rectifier Input				
Unit	Vac	Max Amps	Configuration	RECOMMENDED CABLES ^{1,2,3}
3.5kVA	208/120Y	13	WYE (3W+N+E)	14AWG
	208Δ	14	DELTA (3W+E)	14AWG
	220/127Y	13	WYE (3W+N+E)	14AWG
	230/133Y	12	WYE (3W+N+E)	14AWG
	240Δ	12	DELTA (3W+E)	14AWG
	480/277Y	6	WYE (3W+N+E)	14AWG
	480Δ	6	DELTA (3W+E)	14AWG
	575/332Y	5	WYE (3W+N+E)	14AWG
	600/347Y	5	WYE (3W+N+E)	14AWG
	600Δ	5	DELTA (3W+E)	14AWG
5.0kVA	208/120Y	19	WYE (3W+N+E)	12AWG
	208Δ	20	DELTA (3W+E)	12AWG
	220/127Y	18	WYE (3W+N+E)	12AWG
	230/133Y	17	WYE (3W+N+E)	12AWG
	240Δ	17	DELTA (3W+E)	12AWG
	480/277Y	8	WYE (3W+N+E)	14AWG
	480Δ	8	DELTA (3W+E)	14AWG
	575/332Y	7	WYE (3W+N+E)	14AWG
	600/347Y	7	WYE (3W+N+E)	14AWG
	600Δ	7	DELTA (3W+E)	14AWG
7.5kVA	208/120Y	29	WYE (3W+N+E)	8AWG
	208Δ	29	DELTA (3W+E)	8AWG
	220/127Y	27	WYE (3W+N+E)	10AWG
	230/133Y	26	WYE (3W+N+E)	10AWG
	240Δ	25	DELTA (3W+E)	10AWG
	480/277Y	13	WYE (3W+N+E)	14AWG
	480Δ	13	DELTA (3W+E)	14AWG
	575/332Y	11	WYE (3W+N+E)	14AWG
	600/347Y	10	WYE (3W+N+E)	14AWG
	600Δ	10	DELTA (3W+E)	14AWG
10kVA	208/120Y	39	WYE (3W+N+E)	8AWG
	208Δ	40	DELTA (3W+E)	8AWG
	220/127Y	37	WYE (3W+N+E)	8AWG
	230/133Y	36	WYE (3W+N+E)	8AWG
	240Δ	35	DELTA (3W+E)	8AWG
	480/277Y	17	WYE (3W+N+E)	12AWG
	480Δ	17	DELTA (3W+E)	12AWG
	575/332Y	14	WYE (3W+N+E)	14AWG
	600/347Y	14	WYE (3W+N+E)	14AWG
	600Δ	14	DELTA (3W+E)	14AWG

Rectifier Input				
Unit	Vac	Max Amps	Configuration	RECOMMENDED CABLES ^{1,2,3}
15kVA	208/120Y	59	WYE (3W+N+E)	4AWG
	208Δ	60	DELTA (3W+E)	4AWG
	220/127Y	55	WYE (3W+N+E)	4AWG
	230/133Y	54	WYE (3W+N+E)	4AWG
	240Δ	52	DELTA (3W+E)	6AWG
	480/277Y	26	WYE (3W+N+E)	10AWG
	480Δ	26	DELTA (3W+E)	10AWG
	575/332Y	22	WYE (3W+N+E)	10AWG
	600/347Y	21	WYE (3W+N+E)	10AWG
	600Δ	21	DELTA (3W+E)	10AWG
20kVA	208/120Y	78	WYE (3W+N+E)	3AWG
	208Δ	80	DELTA (3W+E)	3AWG
	220/127Y	74	WYE (3W+N+E)	3AWG
	230/133Y	72	WYE (3W+N+E)	3AWG
	240Δ	69	DELTA (3W+E)	3AWG
	480/277Y	34	WYE (3W+N+E)	8AWG
	480Δ	35	DELTA (3W+E)	8AWG
	575/332Y	29	WYE (3W+N+E)	8AWG
	600/347Y	27	WYE (3W+N+E)	10AWG
	600Δ	28	DELTA (3W+E)	10AWG
30kVA	208/120Y	117	WYE (3W+N+E)	1/0
	208Δ	120	DELTA (3W+E)	1/0
	220/127Y	111	WYE (3W+N+E)	1/0
	230/133Y	107	WYE (3W+N+E)	1/0
	240Δ	104	DELTA (3W+E)	1AWG
	480/277Y	52	WYE (3W+N+E)	6AWG
	480Δ	52	DELTA (3W+E)	6AWG
	575/332Y	43	WYE (3W+N+E)	6AWG
	600/347Y	41	WYE (3W+N+E)	6AWG
	600Δ	42	DELTA (3W+E)	6AWG
40kVA	208/120Y	156	WYE (3W+N+E)	3/0
	208Δ	160	DELTA (3W+E)	3/0
	220/127Y	147	WYE (3W+N+E)	3/0
	230/133Y	143	WYE (3W+N+E)	3/0
	240Δ	139	DELTA (3W+E)	2/0
	480/277Y	69	WYE (3W+N+E)	3AWG
	480Δ	69	DELTA (3W+E)	3AWG
	575/332Y	57	WYE (3W+N+E)	4AWG
	600/347Y	55	WYE (3W+N+E)	4AWG
	600Δ	55	DELTA (3W+E)	4AWG

1: Based on 75°C copper wire.

2: Recommended cable sized based on THW cables at 30°C ambient (NEC Table 310.16). If different cables are used or installed at higher ambient, the cable size needs to be reviewed.

3. Input Current is based on rated input kW.

6.2.2 Output

Output				
Unit	Vac	Amps	Configuration	RECOMMENDED CABLES ^{1,2,3}
3.5kVA	208/120Y	10	WYE (3W+N+E)	14AWG
	208Δ	10	DELTA (3W+E)	14AWG
	220/127Y	9	WYE (3W+N+E)	14AWG
	230/133Y	9	WYE (3W+N+E)	14AWG
	240Δ	9	DELTA (3W+E)	14AWG
	480/277Y	4	WYE (3W+N+E)	14AWG
	480Δ	4	DELTA (3W+E)	14AWG
	575/332Y	4	WYE (3W+N+E)	14AWG
	600/347Y	3	WYE (3W+N+E)	14AWG
	600Δ	4	DELTA (3W+E)	14AWG
5.0kVA	208/120Y	14	WYE (3W+N+E)	14AWG
	208Δ	14	DELTA (3W+E)	14AWG
	220/127Y	13	WYE (3W+N+E)	14AWG
	230/133Y	13	WYE (3W+N+E)	14AWG
	240Δ	12	DELTA (3W+E)	14AWG
	480/277Y	6	WYE (3W+N+E)	14AWG
	480Δ	6	DELTA (3W+E)	14AWG
	575/332Y	5	WYE (3W+N+E)	14AWG
	600/347Y	5	WYE (3W+N+E)	14AWG
	600Δ	5	DELTA (3W+E)	14AWG
7.5kVA	208/120Y	21	WYE (3W+N+E)	10AWG
	208Δ	21	DELTA (3W+E)	10AWG
	220/127Y	20	WYE (3W+N+E)	12AWG
	230/133Y	19	WYE (3W+N+E)	12AWG
	240Δ	19	DELTA (3W+E)	12AWG
	480/277Y	9	WYE (3W+N+E)	14AWG
	480Δ	9	DELTA (3W+E)	14AWG
	575/332Y	8	WYE (3W+N+E)	14AWG
	600/347Y	7	WYE (3W+N+E)	14AWG
	600Δ	7	DELTA (3W+E)	14AWG
10kVA	208/120Y	28	WYE (3W+N+E)	10AWG
	208Δ	29	DELTA (3W+E)	8AWG
	220/127Y	26	WYE (3W+N+E)	10AWG
	230/133Y	26	WYE (3W+N+E)	10AWG
	240Δ	25	DELTA (3W+E)	10AWG
	480/277Y	12	WYE (3W+N+E)	14AWG
	480Δ	12	DELTA (3W+E)	14AWG
	575/332Y	10	WYE (3W+N+E)	14AWG
	600/347Y	10	WYE (3W+N+E)	14AWG
	600Δ	10	DELTA (3W+E)	14AWG

Output				
Unit	Vac	Amps	Configuration	RECOMMENDED CABLES ^{1,2,3}
15kVA	208/120Y	42	WYE (3W+N+E)	6AWG
	208Δ	43	DELTA (3W+E)	6AWG
	220/127Y	39	WYE (3W+N+E)	8AWG
	230/133Y	38	WYE (3W+N+E)	8AWG
	240Δ	37	DELTA (3W+E)	8AWG
	480/277Y	18	WYE (3W+N+E)	12AWG
	480Δ	19	DELTA (3W+E)	12AWG
	575/332Y	15	WYE (3W+N+E)	14AWG
	600/347Y	15	WYE (3W+N+E)	14AWG
	600Δ	15	DELTA (3W+E)	14AWG
20kVA	208/120Y	56	WYE (3W+N+E)	4AWG
	208Δ	57	DELTA (3W+E)	4AWG
	220/127Y	53	WYE (3W+N+E)	4AWG
	230/133Y	51	WYE (3W+N+E)	6AWG
	240Δ	49	DELTA (3W+E)	6AWG
	480/277Y	24	WYE (3W+N+E)	10AWG
	480Δ	25	DELTA (3W+E)	10AWG
	575/332Y	20	WYE (3W+N+E)	10AWG
	600/347Y	20	WYE (3W+N+E)	12AWG
	600Δ	20	DELTA (3W+E)	12AWG
30kVA	208/120Y	83	WYE (3W+N+E)	2AWG
	208Δ	85	DELTA (3W+E)	2AWG
	220/127Y	79	WYE (3W+N+E)	3AWG
	230/133Y	77	WYE (3W+N+E)	3AWG
	240Δ	74	DELTA (3W+E)	3AWG
	480/277Y	37	WYE (3W+N+E)	8AWG
	480Δ	37	DELTA (3W+E)	8AWG
	575/332Y	31	WYE (3W+N+E)	8AWG
	600/347Y	29	WYE (3W+N+E)	8AWG
	600Δ	30	DELTA (3W+E)	8AWG
40kVA	208/120Y	111	WYE (3W+N+E)	1/0
	208Δ	114	DELTA (3W+E)	1/0
	220/127Y	105	WYE (3W+N+E)	1/0
	230/133Y	102	WYE (3W+N+E)	1AWG
	240Δ	99	DELTA (3W+E)	1AWG
	480/277Y	49	WYE (3W+N+E)	6AWG
	480Δ	49	DELTA (3W+E)	6AWG
	575/332Y	41	WYE (3W+N+E)	6AWG
	600/347Y	39	WYE (3W+N+E)	8AWG
	600Δ	40	DELTA (3W+E)	8AWG

1: Based on 75°C copper wire.

2: Recommended cable sized based on THW cables at 30°C ambient (NEC Table 310.16). If different cables are used or installed at higher ambient, the cable size needs to be reviewed.

3. Output current is based on rated output kVA.

6.2.3 Bypass Input (Dual Input configuration)

Bypass Input (Dual Input)				
Unit	Vac	Amps	Configuration	RECOMMENDED CABLES ^{1,2,3}
3.5kVA	208/120Y	10	WYE (3W+N+E)	14AWG
	208Δ	10	DELTA (3W+E)	14AWG
	220/127Y	9	WYE (3W+N+E)	14AWG
	230/133Y	9	WYE (3W+N+E)	14AWG
	240Δ	9	DELTA (3W+E)	14AWG
	480/277Y	4	WYE (3W+N+E)	14AWG
	480Δ	4	DELTA (3W+E)	14AWG
	575/332Y	4	WYE (3W+N+E)	14AWG
	600/347Y	3	WYE (3W+N+E)	14AWG
	600Δ	4	DELTA (3W+E)	14AWG
5.0kVA	208/120Y	14	WYE (3W+N+E)	14AWG
	208Δ	14	DELTA (3W+E)	14AWG
	220/127Y	13	WYE (3W+N+E)	14AWG
	230/133Y	13	WYE (3W+N+E)	14AWG
	240Δ	12	DELTA (3W+E)	14AWG
	480/277Y	6	WYE (3W+N+E)	14AWG
	480Δ	6	DELTA (3W+E)	14AWG
	575/332Y	5	WYE (3W+N+E)	14AWG
	600/347Y	5	WYE (3W+N+E)	14AWG
	600Δ	5	DELTA (3W+E)	14AWG
7.5kVA	208/120Y	21	WYE (3W+N+E)	10AWG
	208Δ	21	DELTA (3W+E)	10AWG
	220/127Y	20	WYE (3W+N+E)	12AWG
	230/133Y	19	WYE (3W+N+E)	12AWG
	240Δ	19	DELTA (3W+E)	12AWG
	480/277Y	9	WYE (3W+N+E)	14AWG
	480Δ	9	DELTA (3W+E)	14AWG
	575/332Y	8	WYE (3W+N+E)	14AWG
	600/347Y	7	WYE (3W+N+E)	14AWG
	600Δ	7	DELTA (3W+E)	14AWG
10kVA	208/120Y	28	WYE (3W+N+E)	10AWG
	208Δ	29	DELTA (3W+E)	8AWG
	220/127Y	26	WYE (3W+N+E)	10AWG
	230/133Y	26	WYE (3W+N+E)	10AWG
	240Δ	25	DELTA (3W+E)	10AWG
	480/277Y	12	WYE (3W+N+E)	14AWG
	480Δ	12	DELTA (3W+E)	14AWG
	575/332Y	10	WYE (3W+N+E)	14AWG
	600/347Y	10	WYE (3W+N+E)	14AWG
	600Δ	10	DELTA (3W+E)	14AWG

Bypass Input (Dual Input)				
Unit	Vac	Amps	Configuration	RECOMMENDED CABLES ^{1,2,3}
15kVA	208/120Y	42	WYE (3W+N+E)	6AWG
	208Δ	43	DELTA (3W+E)	6AWG
	220/127Y	39	WYE (3W+N+E)	8AWG
	230/133Y	38	WYE (3W+N+E)	8AWG
	240Δ	37	DELTA (3W+E)	8AWG
	480/277Y	18	WYE (3W+N+E)	12AWG
	480Δ	19	DELTA (3W+E)	12AWG
	575/332Y	15	WYE (3W+N+E)	14AWG
	600/347Y	15	WYE (3W+N+E)	14AWG
	600Δ	15	DELTA (3W+E)	14AWG
20kVA	208/120Y	56	WYE (3W+N+E)	4AWG
	208Δ	57	DELTA (3W+E)	4AWG
	220/127Y	53	WYE (3W+N+E)	4AWG
	230/133Y	51	WYE (3W+N+E)	6AWG
	240Δ	49	DELTA (3W+E)	6AWG
	480/277Y	24	WYE (3W+N+E)	10AWG
	480Δ	25	DELTA (3W+E)	10AWG
	575/332Y	20	WYE (3W+N+E)	10AWG
	600/347Y	20	WYE (3W+N+E)	12AWG
	600Δ	20	DELTA (3W+E)	12AWG
30kVA	208/120Y	83	WYE (3W+N+E)	2AWG
	208Δ	85	DELTA (3W+E)	2AWG
	220/127Y	79	WYE (3W+N+E)	3AWG
	230/133Y	77	WYE (3W+N+E)	3AWG
	240Δ	74	DELTA (3W+E)	3AWG
	480/277Y	37	WYE (3W+N+E)	8AWG
	480Δ	37	DELTA (3W+E)	8AWG
	575/332Y	31	WYE (3W+N+E)	8AWG
	600/347Y	29	WYE (3W+N+E)	8AWG
	600Δ	30	DELTA (3W+E)	8AWG
40kVA	208/120Y	111	WYE (3W+N+E)	1/0
	208Δ	114	DELTA (3W+E)	1/0
	220/127Y	105	WYE (3W+N+E)	1/0
	230/133Y	102	WYE (3W+N+E)	1AWG
	240Δ	99	DELTA (3W+E)	1AWG
	480/277Y	49	WYE (3W+N+E)	6AWG
	480Δ	49	DELTA (3W+E)	6AWG
	575/332Y	41	WYE (3W+N+E)	6AWG
	600/347Y	39	WYE (3W+N+E)	8AWG
	600Δ	40	DELTA (3W+E)	8AWG

1: Based on 75°C copper wire.

2: Recommended cable sized based on THW cables at 30°C ambient (NEC Table 310.16). If different cables are used or installed at higher ambient, the cable size needs to be reviewed.

3. Input Current is based on rated input kW.

6.3 BTU/hr. & Weight

UNIT	INPUT TRANSFORMER	OUTPUT TRANSFORMER	MAXIMUM WEIGHT	BTU/hr
3.5kVA	No	No	628	1100
	No	Yes	908	1400
	Yes	No	908	1400
	Yes	Yes	1188	1800
5kVA	No	No	628	1500
	No	Yes	908	1900
	Yes	No	908	1900
	Yes	Yes	1188	2400
7.5kVA	No	No	628	2300
	No	Yes	908	3000
	Yes	No	908	3000
	Yes	Yes	1188	3700
10kVA	No	No	628	3900
	No	Yes	908	4900
	Yes	No	908	4900
	Yes	Yes	1188	5900
15kVA	No	No	628	5800
	No	Yes	908	7300
	Yes	No	908	7300
	Yes	Yes	1188	8800
20kVA	No	No	628	7700
	No	Yes	908	9700
	Yes	No	908	9700
	Yes	Yes	1258	11700
30kVA	No	No	628	11600
	No	Yes	1028	14500
	Yes	No	1058	14500
	Yes	Yes	1458	17500
40kVA	No	No	628	15400
	No	Yes	1028	19300
	Yes	No	1108	19300
	Yes	Yes	1508	23300

Notes:

1. All Weights are in pounds.

Appendix A – Fault Codes

Fault code	Fault event
01	Bus start failure
02	Bus over
03	Bus under
04	Bus unbalance
06	Converter over current
11	Inverter soft start failure
12	High inverter voltage
14	Inverter Phase A output (line to neutral) short circuited
15	Inverter Phase B output (line to neutral) short circuited
16	Inverter Phase C output (line to neutral) short circuited
17	Inverter Phases A-B output (line to line) short circuited
18	Inverter Phases B-C output (line to line) short circuited
19	Inverter Phases C-A output (line to line) short circuited
1A	Phase A negative power fault
1B	Phase B negative power fault
1C	Phase A negative power fault
21	Battery SCR short circuited
23	Inverter relay open Circuited
24	Inverter relay short circuited
25	Line wiring fault
31	Parallel communication failure
36	Parallel output current unbalance
41	Over temperature
42	DSP communication failure
43	Overload

Fault code	Fault event
47	MCU communication failure
48	Two DSP firmware versions are incompatible in parallel system.
49	Input and output phase are incompatible
60	Bypass phase short circuited
61	Bypass SCR short circuited
62	Bypass SCR open circuited
63	Voltage waveform abnormal in A phase
64	Voltage waveform abnormal in B phase
65	Voltage waveform abnormal in C phase
66	Inverter current sample abnormal
67	Bypass O/P short circuited
68	Bypass O/P line to line short circuited
69	Inverter SCR short circuited
6C	BUS voltage drops too fast
6D	Current sampling error value
6E	SPS power error
6F	Battery polarity reverse
71	PFC IGBT over current in A phase
72	PFC IGBT over current in B phase
73	PFC IGBT over current in C phase
74	INV IGBT over current in A phase
75	INV IGBT over current in B phase
76	INV IGBT over current in C phase
77	LCD & MCU communication failure

Appendix B – Warning Codes

Warning code	Warning event
01	Battery unconnected
02	IP Neutral loss
04	IP phase abnormal
05	Bypass phase abnormal
07	Over charge
08	Low battery
09	Overload
0A	Fan failure
0B	EPO enable
0D	Over temperature
0E	Charger failure

Warning code	Warning event
21	Line situations are different in parallel system
22	Bypass situations are different in parallel system
33	Locked in bypass after overload 3 times in 30 minutes
34	Converter current unbalanced
3A	Cover of maintain switch is open
3C	Utility extremely unbalanced
3D	Bypass is unstable
3E	Battery voltage too high
3F	Battery voltage unbalanced
40	Charger short circuited

E3 Series System

3.5 – 40kVA/kW

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