S&C PureWave® UPS XT System

2.25 MW - 22.5 MW (2.5 MVA - 25 MVA)
5 kV - 25 kV

Operation

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Qualified Persons

⚠ WARNING

The equipment covered by this publication must be installed, operated, and maintained by qualified persons who are knowledgeable in the installation, operation, and maintenance of electric power distribution equipment and the associated hazards.

A qualified person is one who is trained and competent in:

- The skills and techniques necessary to distinguish exposed live parts from nonlive parts of electrical equipment
- The skills and techniques necessary to determine the proper approach distances corresponding to the voltage to which the qualified person will be exposed
- The proper use of the special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electrical equipment

These instructions are intended only for such qualified persons. They are not intended to be a substitute for adequate training and experience in safety procedures for this type of equipment. Failure to comply can result in personal injury or even death.

Read this Instruction Sheet

Read this instruction sheet thoroughly and carefully before operating your PureWave UPS XT System. Familiarize yourself with the Safety Information and Safety Precautions on pages 4 through 10.

Retain this Instruction Sheet

This instruction sheet is a permanent part of your PureWave UPS XT System. Refer to the battery manufacturer for instruction sheets for the batteries. Designate a location where you can easily retrieve all information and refer to it.

Proper Application

⚠ WARNING

The equipment in this publication must be selected for a specific application. The application must be within the ratings furnished for the selected equipment. Contact S&C Electric Company if more application information is needed. Failure to do so may result in personal injury or damage to the equipment.

Annual Inspections

After the Purewave UPS XT System is commissioned and the unit is online, inspection and maintenance should be scheduled for the power conversion system (PCS) on an annual basis to ensure the proper operation of the system. Schedules for maintenance should be reviewed by the customer based upon the given site conditions and, if required, the frequency of the recommended maintenance should increase to ensure the reliability of their PureWave UPS XT System.

Warranty

The warranty and/or obligations described in S&C's Price Sheet 150 "Standard Conditions of Sale – Immediate Purchasers in the United States" (or Price Sheet 153, "Standard Conditions of Sale – Immediate Purchasers Outside the United States") plus any special warranty provisions, as set forth in the applicable product-line specification bulletin, are exclusive. The remedies provided in the former for breach of these warranties shall constitute the immediate purchaser's or end user's exclusive remedy and a fulfillment of the seller's entire liability. In no event shall the seller's liability to the immediate purchaser or end user exceed the price of the specific product that gives rise to the immediate purchaser's or end user's claim. All other warranties, whether express or implied or arising by operation of law, course of dealing, usage of trade or otherwise, are excluded. The only warranties are those stated in Price Sheet 150 (or Price Sheet 153), and THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY EXPRESS WARRANTY OR OTHER OBLIGATION PROVIDED IN PRICE SHEET 150 (OR PRICE SHEET 153) IS GRANTED ONLY TO THE IMMEDIATE PURCHASER AND END USER, AS DEFINED THEREIN. OTHER THAN AN END USER, NO REMOTE PURCHASER MAY RELY ON ANY AFFIRMATION OF FACT OR PROMISE THAT RELATES TO THE GOODS DESCRIBED HEREIN, ANY DESCRIPTION THAT RELATES TO THE GOODS, OR ANY REMEDIAL PROMISE INCLUDED IN PRICE SHEET 150 (or PRICE SHEET 153.)

Warranty Qualifications

The seller's warranties are contingent upon the installation and adjustment of the S&C PureWave UPS XT System in accordance with S&C's applicable instruction sheets, data sheets, information bulletins, and/or data bulletins.

Understanding Safety-Alert Messages

Several types of safety-alert messages may appear throughout this instruction sheet and on labels attached to the containers and PCS enclosures. Familiarize yourself with these types of messages and the importance of these various signal words:

⚠ DANGER

"DANGER" identifies the most serious and immediate hazards that *will likely* result in serious personal injury or death if instructions, including recommended precautions, are not followed.

⚠ WARNING

"WARNING" identifies hazards or unsafe practices that *can* result in serious personal injury or death if instructions, including recommended precautions, are not followed.

⚠ CAUTION

"CAUTION" identifies hazards or unsafe practices that *can* result in minor personal injury if instructions, including recommended precautions, are not followed.

NOTICE

"NOTICE" identifies important procedures or requirements that *can* result in product or property damage if instructions are not followed.

Following Safety Instructions

NOTICE

Read this instruction sheet thoroughly and carefully before operating your PureWave UPS XT System.

If you do not understand any portion of this instruction sheet and need assistance, contact your nearest S&C Sales Office or S&C Authorized Distributor. Their telephone numbers are listed on S&C's website, **sandc.com,** or call S&C Headquarters at (773) 338-1000.

Replacement Instructions and Labels

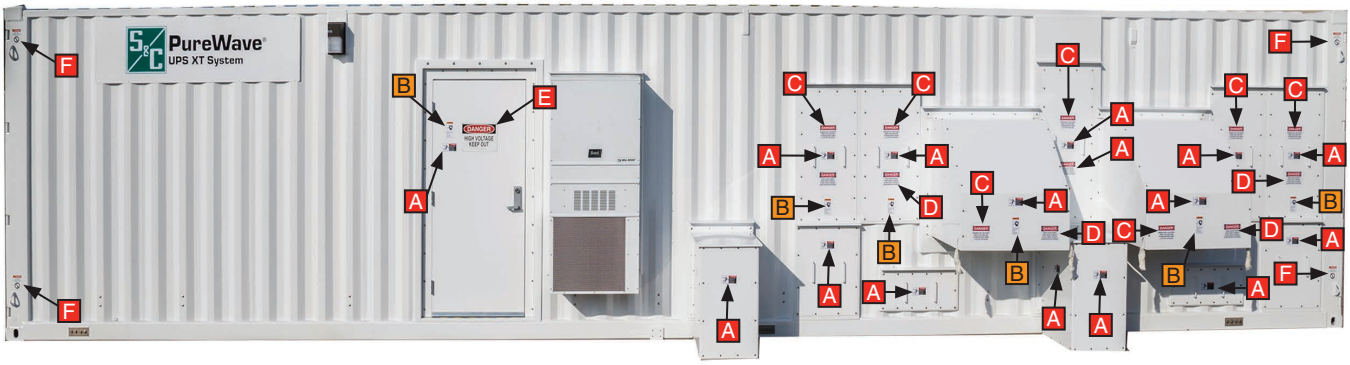
If you need additional copies of this instruction sheet, contact your nearest S&C Sales Office, S&C Authorized Distributor, or S&C Headquarters.

It is important to replace any missing, damaged, or faded labels on the equipment immediately. Replacement labels are available by contacting your nearest S&C Sales Office, S&C Authorized Distributor, or S&C Headquarters.

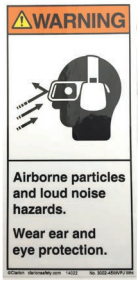
Location of Safety Labels

Front of Container★

Rear of Container★



A B C D E F



★ Containers are used for outdoor PureWave UPS XT System PCS and battery installations.

Right side of Container ★

Left side of Container★

★ Containers are used for outdoor PureWave UPS XT System PCS and battery installations.

Reorder Information for Safety Information

Location	Safety Alert Message	Description	Part Number
A	⚠ DANGER	Hazardous voltage…	6703-031
B	⚠ WARNING	Airborne particles and loud noise hazards…	6703-032
C	⚠ DANGER	Dangerous arc-flash…	6703-035
D	⚠ DANGER	Shock hazard 800 Vdc…	6703-036
E	⚠ DANGER	High voltage…	CMMISC000081
F	⚠ DANGER	Do not use for lifting…	GP0010-269

Location of Safety Labels

PCS Enclosure

G

H

J

K

L

Battery Monitoring System Cover

NOTICE

Refer to the battery manufacturer manual for battery and battery cabinet safety label information.

Reorder Information for Safety Information

Location	Safety Alert Message	Description	Part Number
G	⚠ DANGER	Arc flash and shock hazard…	6703-030★
H	⚠ WARNING	Moving parts can crush and cut…	6703-033
J	⚠ DANGER	Arc flash and shock hazard… (horizontal label)	6703-076★
K	⚠ WARNING	Pressurized Plenum – Do not open door…	PE-70383-3
L	⚠ WARNING	Hazardous voltage – This unit is to be serviced…	6703-052★

★ Labels are also placed on the back of the PCS enclosures.

⚠ DANGER

The S&C PureWave UPS XT System operates at high ac and dc voltages. Failure to observe the precautions below will result in serious personal injury or death.

Some of these precautions may differ from your company's operating procedures and rules. Where a discrepancy exists, follow your company's operating procedures and rules.

1. **QUALIFIED PERSONS.** Access to an Purewave® UPS XT System must be restricted only to qualified persons. See "Qualified Persons" on page 2.
2. **SAFETY PROCEDURES.** Always follow safe operating procedures and rules.
3. **PERSONAL PROTECTIVE EQUIPMENT.** Always use suitable protective equipment, such as rubber gloves, rubber mats, hard hats, safety glasses, and flash clothing, in accordance with safe operating procedures and rules.
4. **SAFETY LABELS.** Do not remove or obscure any of the "DANGER," "WARNING," "CAUTION," or "*NOTICE*" labels.
5. **HAZARDOUS VOLTAGE, DC.** Lethal dc voltage is present inside the PureWave UPS XT System even when utility voltage is disconnected. Hazardous voltages should also be expected in all interconnecting components and lines.
6. **INSULATED HANDLING TOOLS OR OPERATING TOOLS** are required when working on or around any energized equipment. Use tools rated for the energy present. Tool inventories are recommended to ensure all tools that enter the system enclosure are removed before energizing the system.
7. **FAST MOVING PARTS.** Operating mechanism and base contains fast-moving parts that can severely injure fingers. Do not remove or disassembly operating mechanisms or breakers, or remove access panels on the equipment unless authorized by S&C Electric Company.
8. **HAZARDOUS MATERIALS.** Lithium polymer batteries require special handling. Consult the MSDS supplied by the battery supplier for additional safety instructions and procedures for handling the batteries.
9. **ENERGIZED COMPONENTS.** Always consider all parts live until de-energized, tested, and grounded.
10. **GROUNDING.**
    - The Purewave® UPS XT System base must be connected to a suitable earth ground or to a suitable building ground for testing before energizing the PureWave UPS XT System and at all times when energized.
    - The system neutral is resistively grounded inside the PCS.
11. **MAINTAINING PROPER CLEARANCE.** Always maintain proper clearance from energized components.
12. **ACCESS CONTROL.** High-voltage compartment doors must be securely closed and latched, with padlocks in place at all times unless work is being performed inside the enclosure/control cabinet. Normal operation can be accomplished without entering the enclosure. If doors to the electrical controllers or panels to the system enclosure must be opened, refer to Instruction Sheet 653-501 for procedures to guard against electric shock. Lockout/tagout procedures in accordance with 29 CFR 1910.147 are recommended.
13. **SECURITY.** High-voltage compartment doors must be securely closed and latched, with padlocks in place at all times unless work is being performed inside the enclosure.

Container

For outdoor installations, a container is used to house the PCS and batteries. The PCS is located in the inverter room, and the batteries are located in the battery room. Ratings and configurations can change depending on system sizing. See Figure 1 for an illustration example of a container with a 2.25-MW PCS and batteries.

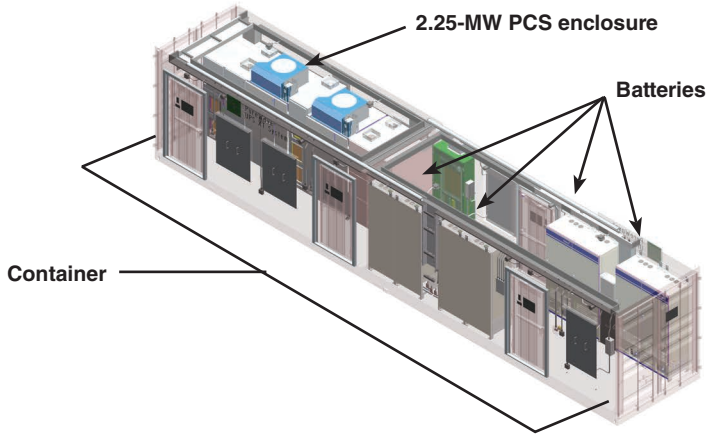


Figure 1. Location of the PCS and the batteries in a typical outdoor container.

PCS Enclosure

⚠ DANGER

Do not enter the power conversion system enclosure unless trained, certified, and authorized to do so by S&C Electric Company. Potentially lethal voltages are present inside the PCS enclosure. High-voltage dc is present even without the utility power connected.

The PCS enclosure is meant to provide access for field troubleshooting purposes only when the unit is properly grounded. Never, under any circumstances, open the enclosure doors while it is online or has not been fully discharged and grounded. Failure to do this can result in equipment damage, personal injury, or even death.

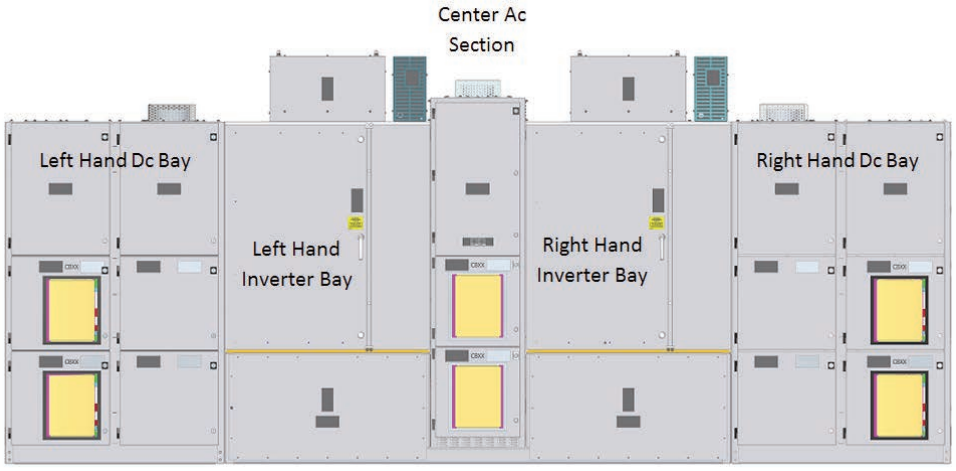


Figure 2. Location of the PCS bays.

As shown on Figure 2, the PCS enclosure consists of the following:

- Two dc bays (left and right sides)
- Two inverter bays (left and right sides)
- One center ac section

Dc Bays — Each dc bay contains the two dc circuit breakers and the ac and dc interface control panels. The two ac and dc circuit breakers are used to connect the energy storage system (batteries) to the PureWave UPS XT System. The ac and dc interface control panels are used to control the utility circuit breaker, the dc circuit breakers, the inverter, and the chopper. Included with these controls are all of the power supplies and interface circuit boards necessary to properly control the system. Fans are located at the top of each dc bay for cooling.

Inverter Bays — Each inverter bay contains the three-phase dc-ac inverter and the dc-dc chopper and ac filter inductor to transform the energy storage voltage into a three-phase ac power source. A blower is located at the top of each inverter bay to cool the power conversion modules. Variable frequency drives (VFDs) located next to the blowers are used to control blower speed.

Center Ac Section — This section contains the ac circuit breakers, ac filter capacitors, and the connections for the utility (ac) interconnection to the PureWave UPS XT System. A fan is also located at the top of this bay for cooling.

Figure 3 displays the PCS enclosure with the doors removed from the center ac section, left-side inverter, and left-side dc bays to show inner key components.

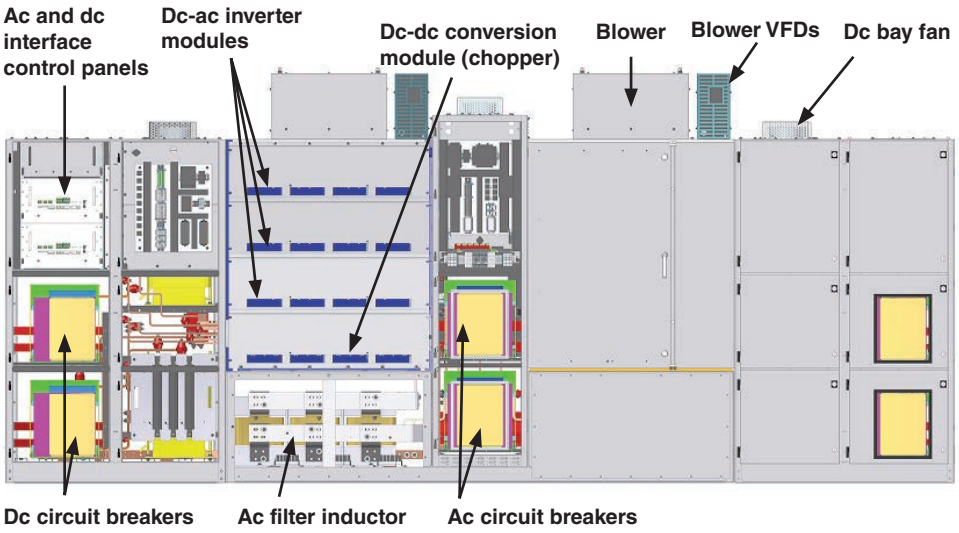


Figure 3. Location of key components within the bays.

Inverter Stop

The user can stop the system from running for servicing or emergency purposes by pressing the INVERTER STOP button. Pressing the button opens the PCS ac and dc circuit breakers. For outdoor containers, there is an INVERTER STOP button by each main door. See Figure 4 for the locations of the INVERTER STOP buttons in a typical outdoor container.

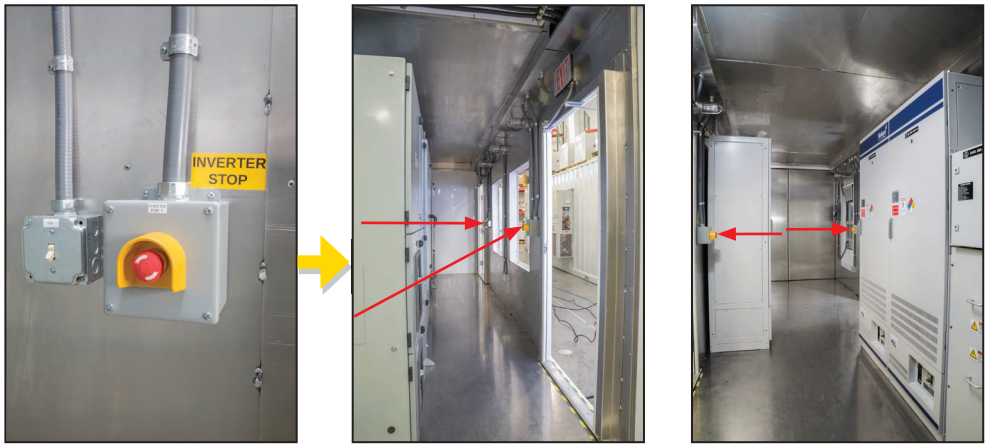


Figure 4. Locations of the INVERTER STOP buttons in a typical outdoor container.

System Switchgear

Medium-voltage switchgear is typically provided for the PureWave UPS XT System. See Figure 5. The switchgear provides a means to isolate the system from the load for emergencies or maintenance purposes. The switchgear size varies depending on the system. The following lists the major components of the switchgear:

Source bays — The switchgear lineup may have two or more source bays. These bays may be energized by the utility or by a set of diesel generators.

Bypass circuit breaker — The bypass switch is controlled by the system controls. The switch will connect the source bays to the load bays when the system is not providing protection for the load.

Input circuit breaker — The input circuit breaker is the input to the power electronic switch (PES) and operated by the system controls. To service the PES, this circuit breaker is opened. At the bottom of the input circuit breaker, a set of bus bars is used to connect the input circuit breaker to the input of the PES.

Load circuit breakers — Load circuit breakers provide power to downstream critical loads. These circuit breakers are normally closed.

Output circuit breaker — The output circuit breaker is the output of the PES and operated by the system controls. To service the PES, this circuit breaker is opened. At the bottom of the circuit breaker, a set of bus bars is used to connect the output circuit breaker to the input of the PES.

PCS circuit breakers — Each PCS has its own transformer, and each transformer is supplied by a circuit breaker.

Load bank switch — For testing and start-up of the PureWave UPS XT System, a switch to a load bank is provided. This switch is normally open but is closed when the system is being tested. A set of current transformers provides feedback for power in the load bank.

Power Electronic Switch

The power electronic switch (PES) consists of an assembly comprised of pairs of medium-voltage silicon-controlled rectifiers (SCRs) arranged in back-to-back modules. See Figure 5. The PES shall be capable of disconnecting the critical load from the utility source and transferring the load to the PureWave UPS XT System in approximately ¼ cycle when there is a utility source disturbance.

Figure 5. Medium-voltage switchgear and power electronic switch lineup for the PureWave UPS XT System.

The PES is designed with series SCRs in an N+1 configuration. Each phase of the PES can detect an open SCR. If a single shorted SCR is detected, the system will set off an alarm but remain in the **Ready** state, protecting the load. The system will go to the **Bypass** state if a second shorted SCR is detected in a phase that already has a shorted SCR, or if an open SCR is detected. For state definitions, please refer to page 21.

In the **Ready** state, the PES is gated closed by the system control and can carry full system current on a continuous basis. Upon detection of a utility source voltage or frequency disturbance exceeding the limit specified, the PES shall disconnect the critical load from the utility source. Upon return of the utility source to the specified limits, the system shall resynchronize with the utility source and re-close the PES, returning the system to the **Ready** state

PureWave UPS XT System Transformer

The transformer provided is external of the PureWave UPS XT System container and is a dry-type, three-phase coil and core design with a duty cycle rating suitable for supporting the battery run time at the specified MVA rating. This transformer shall provide the appropriate voltage and configuration to safely connect to the utility source. It also provides ac power for the controls via distribution through the switchgear.

Master Control Rack

The master control rack is a stand-alone rack that can be installed in the battery room or separate from the PureWave UPS XT System container. It contains the human machine interface (HMI), master control, and the associated circuitry needed to support control and operation of the PureWave UPS XT System. See Figure 6.

Figure 6. Master control rack.

Located on the master control rack is a drawer that contains the manual control panel for the PureWave UPS XT System. See Figure 7 below.

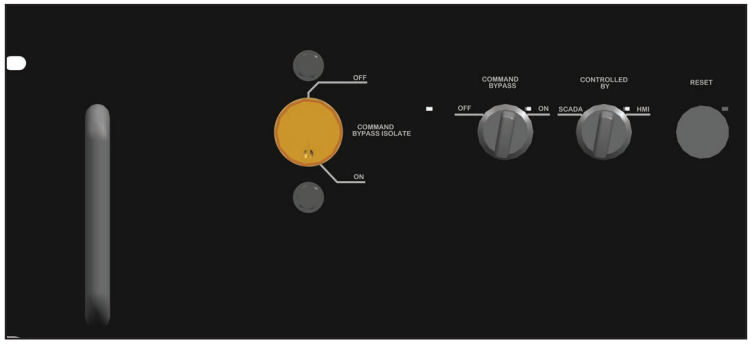


Figure 7. Master control rack control panel.

The manual controls on the panel are as follows:

COMMAND BYPASS ISOLATE — This key-lock is used to command on/off the **Bypass Isolate** state. The key can be removed in the **On** position and be used as part of a key flow. Contact S&C Electric Company for more key flow information.

COMMAND BYPASS — This switch is used to command on/off the **Bypass** state.

CONTROLLED BY — This switch enables the user to switch control from SCADA to the HMI and vice versa.

RESET — This pushbutton enables the user to administer a manual reset of the system.

Human Machine Interface (HMI)

Located on the master control rack, the HMI is used to control and monitor the PureWave UPS XT System. See Figure 8. The HMI computer can be activated from power saving mode when the mouse is moved or when a key on the keyboard is pressed. The user will then be prompted to enter a password to access the HMI program.

Figure 8. Master control rack with HMI screen and keyboard deployed.

HMI Program

The HMI program contains the following screens that, when selected, show the status of the PureWave UPS XT System and its different components. The screens are as follows:

UPS XT System Oneline

The **UPS XT System Oneline** tab displays an overview that includes the status of the source, power electronic switch (PES), and output circuit breakers. It also shows the status of the PCS and displays the line voltages, load voltages and currents, real power, and reactive power.

The user can place the HMI computer mouse over the **Legend** button to reveal a pop-up window that displays a color legend. If a **Circuit Breaker/Switch** indicator is green, it means the circuit breaker/switch is open. A red color means the circuit breaker/switch is closed. A yellow indicator means there is an alarm present. A gray indicator means the status of the component is unknown.

The PCS, Master Control, and Any System Alarm boxes (in yellow in Figure 9) can be clicked on to go to their respective *Status* screens, which are further explained in the "Status" section on page 18.

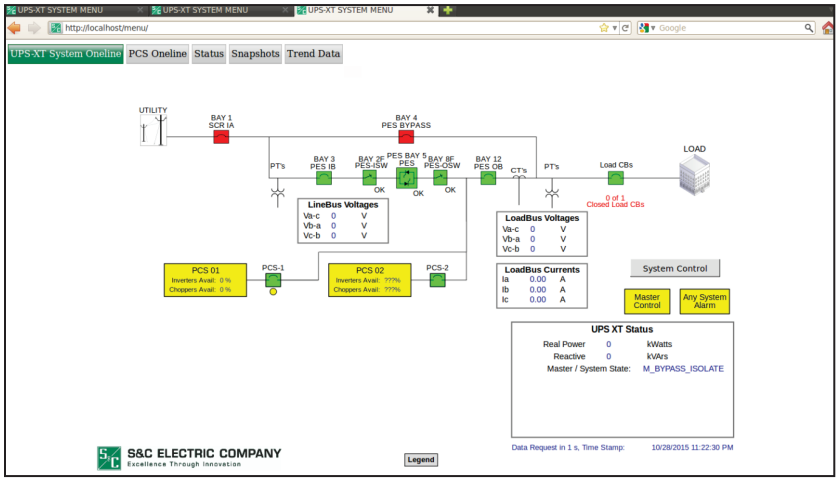


Figure 9. PureWave *UPS XT System Oneline* screen.

When clicked on, the **System Control** button will display a pop-up window that allows the user to request or remove a special charging algorithm. See Figure 10. When the user clicks on the **Request** button, the system will charge the batteries at a full rate when the load is grid-connected and charge at a reduced rate when the load is on a generator. If the user clicks on the **Remove** button, the system will always charge the batteries at the standard charging rate.

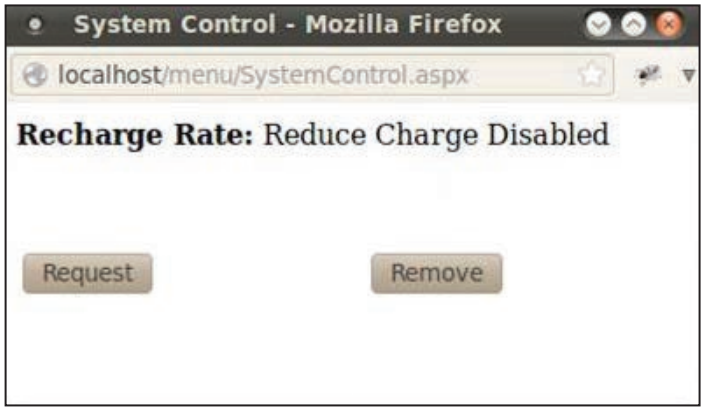


Figure 10. System Control button menu.

PCS Oneline

The **PCS Oneline** tab displays the details of a PCS. See Figure 11. Here, the states of the inverters, choppers, and the PCS circuit breakers are displayed. The **Screen Selection** menu located at the top right of the screen enables the user to select a PCS to monitor.

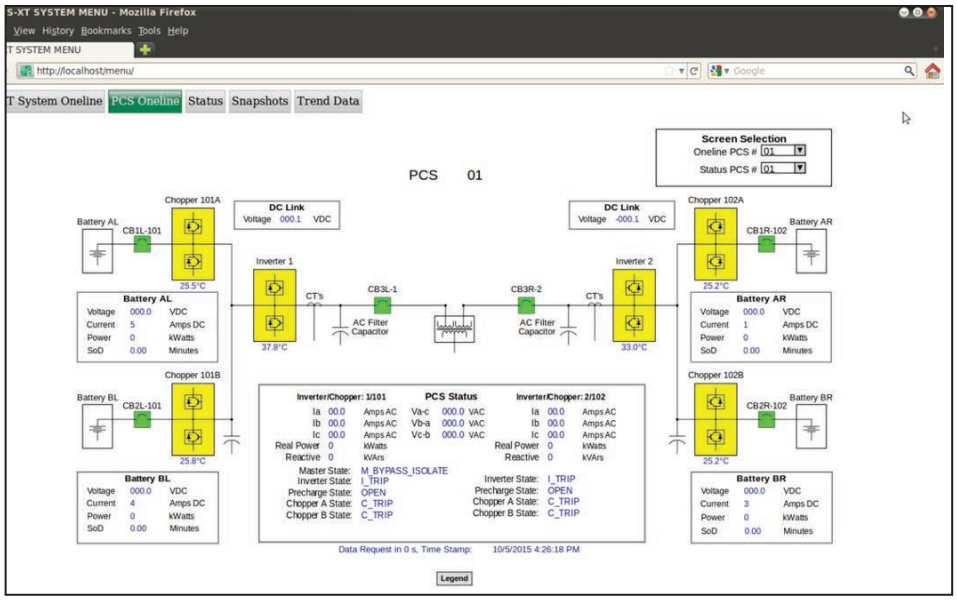


Figure 11. *PCS Oneline* screen.

The user can click on any of the inverter and chopper boxes to access the alarm status page of that particular inverter or chopper. The **Status** tab is explained further on page 18.

The **Legend** button at the bottom of the screen is the same color as the **Legend** button shown on the *UPS XT System Oneline* screen explained on page 16.

Status

The **Status** tab lists the alarms for each PCS. See Figure 12. Using the **Screen Selection** menu at the top right of the screen, the user can select a PCS from the drop-down menus and the alarm type with the radio buttons (**Switch to Inverter**, **Switch to Chopper**, and **Switch to Master**) to monitor the system.

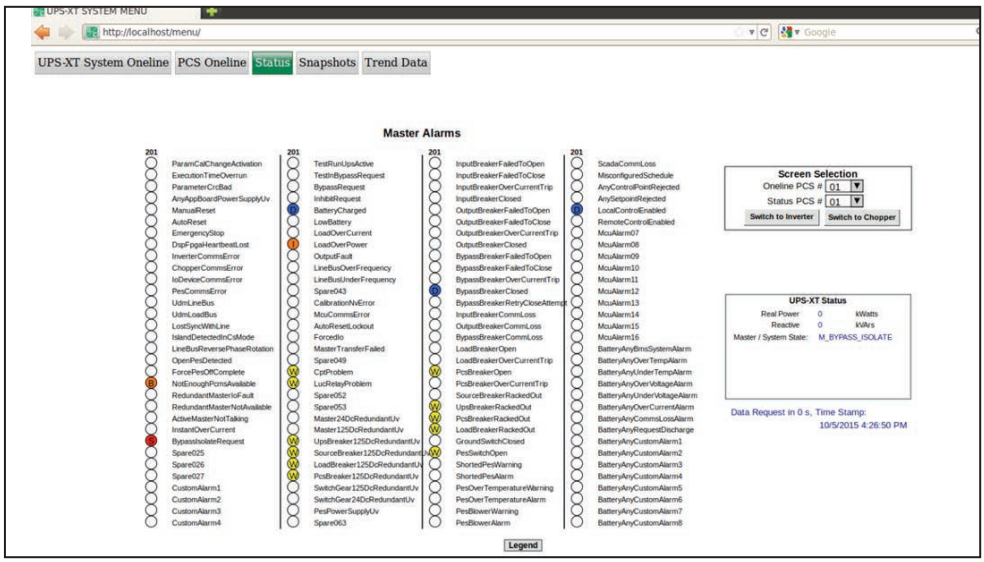


Figure 12. *Status* screen.

The alarm indicators are classified by color and a letter. The classifications can be found by placing the mouse over the **Legend** button located at the bottom of the screen. See Figure 13 for an illustration of the alarm legend.

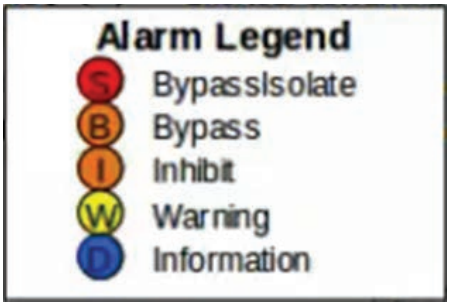


Figure 13. Alarm legend for *Status* screen.

Snapshots

The **Snapshots** tab displays snapshots that have occurred within the system. These snapshots assist in monitoring and troubleshooting the PureWave UPS XT System. See Figure 14. Snapshots are taken in pre-configured intervals of time. Please contact S&C Electric Company to reconfigure the snapshot frequency.

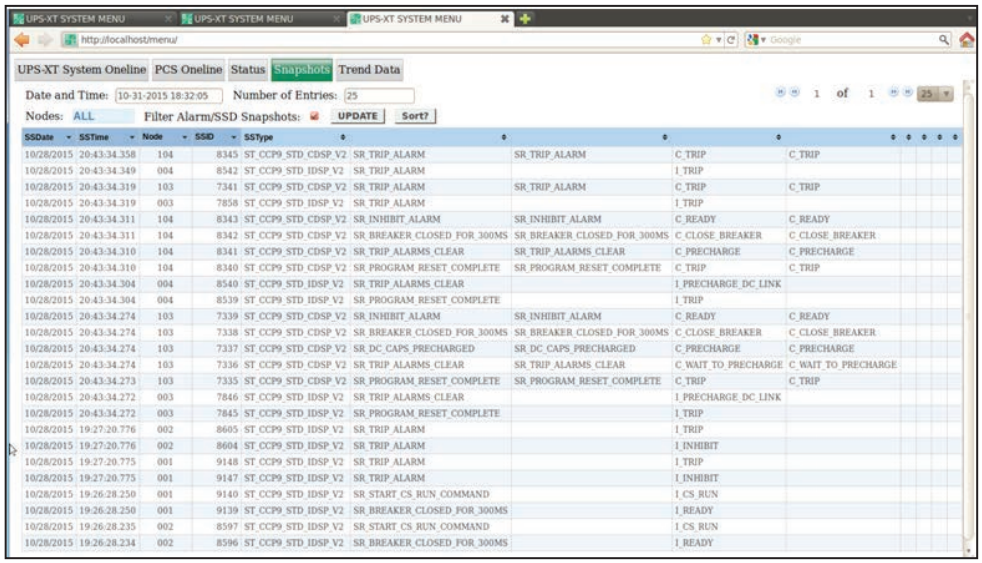


Figure 14. *Snapshots* screen.

These are the columns that appear on the snapshot screen:

SSDate–Indicates the date when the snapshot was taken

SSTime–Indicates the time when the snapshot was taken

Node–Indicates which node sent the snapshot

SSID–Indicates the ID number of the snapshot taken

SSType–Indicates the snapshot type (software version in the control)

(**6th Column)**–Indicates the snapshot reason

NOTICE

S&C personnel use the columns after the snapshot reason column for diagnostic purposes. Contact S&C Electric Company for more information.

The user can double-click on any single snapshot to show more detailed information for troubleshooting purposes and status verification of the PureWave UPS XT System. See Figure 15 for an example of the screen that displays when a snapshot is selected.

System Design

The S&C PureWave UPS XT System is a three-phase, solid state, extended-runtime uninterruptible power supply that operates in conjunction with the existing building electrical system to provide high-quality back-up power protection. It is a modular offline system suitable for outdoor container installation. Each PureWave UPS XT System container can consist of two Insulated-Gate Bipolar Transistor (IGBT) inverter modules, two dc-dc converter modules (choppers), and batteries. An isolation transformer (per container) and switchgear are external to the containers. The master control rack may be installed inside or external to the container.

The PureWave UPS XT System ac output voltage is a 480-Vac, wye three-wire connection. Interconnection to the utility distribution system is accomplished via cable interconnection through a separate isolation transformer. Contact S&C Electric Company for isolation transformer guide specifications.

The PureWave UPS XT System PCS has two 1.125-MW inverter sections. Each 1.125-MW inverter has two 562.5-kW dc inputs for cable connection to the batteries at a maximum of 786 Vdc. Fire suppression (FP-40S) is included, and the batteries in each rack are integrated with the dc load-break disconnect.

System Operation

In normal operation, the PureWave UPS XT System shall protect the critical load from utility voltage disturbances and outages. The system control shall continuously monitor the utility source voltage and frequency and determine whether they are within the limits specified. If these parameters are within their specified limits, the utility source shall power the critical load through the PES in the **Ready** state.

In the event of a utility disturbance, the **Run** state is initiated when the PureWave UPS XT System detects the disturbance, or when an open PES is detected in the **Ready** or **Inhibit** states. When the PES is opened, the load is disconnected from the utility, and simultaneously the PureWave UPS XT System starts providing 100% of the power to the load. The load is transferred from the utility to the PureWave UPS XT System in typically ¼-cycle.

When the utility disturbance is no longer present, the load is transferred back to the utility once the PureWave UPS XT System output voltage is synchronized to be in phase with the utility. The PES is now closed.

Operating States

Listed in Table 1 below are the five operating states of the PureWave UPS XT System. Depending on the alarm condition encountered, the system can be in any of these states. The user interface shall inform the user system's current state. Below is the list and description of each state.

Table 1. Operating States for the PureWave UPS XT System

States	Description
Ready	This state is considered the normal mode of operation. The critical load is supplied by the utility source through the power electronic switch (PES), with the system ready to operate in the event of a utility disturbance or an open PES. The PES, input, and output circuit breakers are closed, and the bypass circuit breaker is open. The dc-dc converters will hold the battery voltage at top of charge.
Run	This state is initiated from the Ready state when the utility disturbance monitor (UDM) detects a utility disturbance, or when an open PES is detected in the Ready or Inhibit state. The critical load is supplied by the batteries through the dc-dc converter and inverter module(s). The output circuit breaker is closed, and the bypass circuit breaker is open. The input circuit breaker will open to minimize the voltage across the PES if the voltage becomes too high.
Inhibit	In this state, the critical load is supplied by the utility source through the PES, with the PureWave UPS XT System inhibited from running in the event of a utility disturbance. The input and output circuit breakers or switches are overcurrent and the bypass circuit breaker is open. This state is used in the event of an over-current (transformer inrush) or over-power condition. Charged batteries will be maintained at their float voltage. Once the inhibit alarm clears, the system will return to the Ready state.
Bypass	In this state, the critical load is supplied by the utility source through the closed bypass circuit breaker. The PES, input, and output circuit breakers are closed. The PES remains on (conducting). The batteries are kept charged at float voltage.
Bypass Isolate	This state is initiated when the PureWave UPS XT System is to be serviced. The critical load is supplied by the utility source through the closed bypass circuit breaker. The input and output circuit breakers are open.

Resets

To clear an alarm condition, the PureWave UPS XT System will require a reset to set the unit to the Ready state. This enables the system to be ready for another event should one occur. Table 2 lists the three resets available for the system: **Manual**, **Auto**, and **Self**.

Table 2. Reset Types for the PureWave UPS XT System

Reset Types	Description
Manual	This type of reset requires a person to use the HMI, a SCADA connection, or to push the **Reset** button on the master control rack to reset the system from certain alarms. These alarms typically require investigation before resetting.
Auto	This type of reset will automatically be performed until a predetermined reset count has been reached. After the count has been reached, the alarm will lock on, necessitating the need for a manual reset. If no alarms have occurred for a pre-determined time, the auto-reset count is cleared.
Self	This type of reset will clear alarms when the alarm condition clears and the time delay off (specific to the alarm) is complete.

Alarms List and Troubleshooting Tips

The PureWave UPS XT System contains an extensive self-diagnosis system. If any abnormal condition occurs or if the unit cannot support the critical load, the system will activate an alarm. The following pages show lists of alarms categorized by alarm type. Alarm types are categorized as **Information**, **Warning**, **Inhibit**, **Bypass**, and **Bypass Isolate**. Each alarm type is separated by the component where the alarm came from (Master, Inverter, or Chopper). The reset type is also listed for each alarm.

NOTICE

The alarms in the following tables are listed according to alarm type at the time of shipment. Alarms may be reconfigured during operation and should be documented accordingly.

The troubleshooting tips listed in the following tables are for guidance purposes. Please contact S&C Electric Company if more troubleshooting assistance is required or if there are any doubts about how to handle an alarm event.

Information Status Alarms

These notifications provide the status of the PureWave UPS XT System and/or its components. The system operation is not affected with this type of alarm. See Table 3 for the listed information status alarms.

Table 3. Information Status Alarms

Master	Description	Reset Type
AutoReset	Indicates the inverter is resetting a problem. ***Troubleshooting Tip*: No action is required.**	SELF
BatteryAnyBmsSystemAlarm	Indicates a nonspecific alarm condition at the battery. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
BatteryAnyCommsLossAlarm	Indicates there was a communication issue internal to the battery. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
BatteryAnyOverCurrentAlarm	Indicates the battery detected an overcurrent condition. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
BatteryAnyOverTempAlarm	Indicates one or more cells within the battery have exceeded their temperature limits. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
BatteryAnyOverVoltageAlarm	Indicates one or more cells within the battery have exceeded their voltage limits. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
BatteryAnyRequestDischarge	Indicates the battery is requesting a discharge of the battery for maintenance. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
BatteryAnyUnderTempAlarm	Indicates one or more cells within the battery have a temperature below its lower limit. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
BatteryAnyUnderVoltageAlarm	Indicates one or more cells within the battery have a voltage below its lower limit. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
BatteryCharged	Indicates the batteries are at top of charge. ***Troubleshooting Tip*: No action is required.**	SELF
BypassBreakerClosed	Indicates the bypass circuit breaker is closed. ***Troubleshooting Tip*: No action is required.**	SELF

Table Continued ►

Table 3. Information Status Alarms—Continued

Master	Description	Reset Type
ForcePesOffComplete	Indicates the PES is turned off. ***Troubleshooting Tip*: No action is required.**	SELF
InputBreakerClosed	Indicates the input circuit breaker is closed. ***Troubleshooting Tip*: No action is required.**	SELF
InstantOverCurrent	Indicates the PureWave UPS XT System has detected load current in excess of its ratings. ***Troubleshooting Tip*: Check the load against what the PureWave UPS XT System was sized for.**	SELF
LocalControlEnabled	Indicates the PureWave UPS XT System was placed in a state to accept commands locally at the HMI and not from SCADA. ***Troubleshooting Tip*: No action is required.**	SELF
LowBattery	Indicates the battery energy is too low for the PureWave UPS XT System to pick up the load. ***Troubleshooting Tip*: No action is required.**	SELF
ManualReset	Indicates the inverter has been reset manually. ***Troubleshooting Tip*: No action is required.**	SELF
OutputBreakerClosed	Indicates the output circuit breaker is closed. ***Troubleshooting Tip*: No action is required.**	SELF
PesBlowerAlarm	Indicates the PES blowers should be running but are not moving sufficient air. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
RemoteControlEnabled	Indicates the PureWave UPS XT System was placed in a state to accept commands from SCADA and not locally at the HMI. ***Troubleshooting Tip*: No action is required.**	SELF
TestInBypassRequest	Indicates the PureWave UPS XT System was requested to be in a state to do a test run while bypassed. ***Troubleshooting Tip*: No action is required.**	SELF
TestRunUpsActive	Indicates a test run of the PureWave UPS XT System was requested. ***Troubleshooting Tip*: No action is required.**	SELF
Inverter	**Description**	**Reset Type**
AutoResetCommand	Indicates an auto reset has been sent. Auto resets allow the inverter to try resetting a problem, but if it returns quickly, the resets are locked out. ***Troubleshooting Tip*: No action is required.**	SELF
AutoResetLockout	Indicates the PureWave UPS XT System has tried to clear an auto-reset alarm on its own. After the reset attempts are exhausted without the alarm clearing, the alarm will require a manual reset. ***Troubleshooting Tip*: No action is required.**	MANUAL
ChopperNotReadyOrRun	Indicates the chopper is not available for charge/discharge. ***Troubleshooting Tip*: No action is required.**	SELF
CloseBreakerComplete	Indicates the ac breaker has been closed, and the system will proceed to the Ready state. ***Troubleshooting Tip*: No action is required.**	SELF
CurrentLimitSnapshot	Indicates when any phase goes into current limit. The alarm is used to take a snapshot and limits the number of snapshots. ***Troubleshooting Tip*: No action is required.**	SELF
ManualResetCommand	Indicates the inverter has been reset manually. ***Troubleshooting Tip*: No action is required.**	SELF
PrechargeAboveMinDelay	Indicates the inverter is stuck in the pre-charge state. ***Troubleshooting Tip*: No action is required.**	SELF

***Table Continued* ►**

Table 3. Information Status Alarms—Continued

Chopper	Description	Reset Type
AutoResetCommand	Indicates an auto reset has been sent. Auto resets allow the inverter to try resetting a problem. But if it returns quickly, the resets are locked out. ***Troubleshooting Tip*: No action is required.**	SELF
AutoResetLockout	Indicates the PureWave UPS XT System has tried to clear an auto reset alarm on its own. After the reset attempts are exhausted without the alarm clearing, the alarm will require a manual reset. ***Troubleshooting Tip*: No action is required.**	MANUAL
DcBreakerIsOpenA	Indicates the Chopper A dc breaker is open. ***Troubleshooting Tip*: No action is required.**	SELF
DcBreakerIsOpenB	Indicates the Chopper B dc breaker is open. ***Troubleshooting Tip*: No action is required.**	SELF
InverterNotReadyOrRun	Indicates the inverter is not available for charge/discharge. ***Troubleshooting Tip*: No action is required.**	SELF
ManualResetCommand	Indicates the inverter has been reset manually. ***Troubleshooting Tip*: No action is required.**	SELF

Warning Alarms

These alarms indicate a problem that may need attention but will not affect the proper operation of the system. The system will continue to operate when a "warning" is being displayed. See Table 4 for the listed warning alarms.

Table 4. Warning Alarms

Master	Description	Reset Type
AnySetpointRejected	Indicates the analog set point was not updated (possibly out of range). ***Troubleshooting Tip*: Verify the analog outputs are within the range of the system.**	SELF
AutoResetLockout	Indicates the PureWave UPS XT System has tried to clear an auto reset alarm on its own. After the reset attempts are exhausted without the alarm clearing, the alarm will require a manual reset. ***Troubleshooting Tip*: Clear the other alarms.**	MANUAL
BypassBreakerFailedToClose	Indicates the bypass circuit breaker was commanded closed, but it did not indicate the breaker was closed. ***Troubleshooting Tip*: Contact S&C Electric Company.**	MANUAL
BypassBreakerFailedToOpen	Indicates the bypass circuit breaker was commanded open, but it did not indicate the breaker was open. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
BypassBreakerOverCurrentTrip	Indicates the bypass circuit breaker tripped because of overcurrent. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
CalibrationNvError	Indicates an error has occurred while reading the analog calibration values. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
CapSwitchOpen	Indicates the disconnect switch to the capacitor bank is open. ***Troubleshooting Tip*: Verify the position of the switch in the switchgear. If it is closed, contact S&C Electric Company.**	SELF
ChopperCommsError	Indicates one (or more) of the chopper(s) is not functioning. ***Troubleshooting Tip*: Stop the system, and re-seat the Ethernet cables. If the alarm remains, contact S&C Electric Company.**	SELF

Table Continued ►

Table 4. Warning Alarms—Continued

Master	Description	Reset Type
ForcedIo	Indicates the input/output data has been forced into the PureWave UPS XT System through the HMI. ***Troubleshooting Tip*: No action is required.**	SELF
InputBreakerFailedToClose	Indicates the switchgear input circuit breaker was commanded closed, but it did not indicate the breaker was closed. ***Troubleshooting Tip*: Contact S&C Electric Company.**	MANUAL
InputBreakerFailedToOpen	Indicates the switchgear input circuit breaker was commanded open, but it did not indicate the breaker was open. ***Troubleshooting Tip*: Contact S&C Electric Company.**	MANUAL
InputBreakerOverCurrentTrip	Indicates the switchgear input circuit breaker tripped because of overcurrent. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
InverterCommsError	Indicates one (or more) of the inverter(s) is not communicating. ***Troubleshooting Tip*: Stop the system, and re-seat the Ethernet cables. If the alarm remains, contact S&C Electric Company.**	SELF
IoDeviceCommsError	Indicates the master did not receive a response from an I/O device. ***Troubleshooting Tip*: Stop the system, and re-seat the Ethernet cables. If the alarm remains, contact S&C Electric Company.**	SELF
LineBusOverFrequency	Indicates the line frequency at the inverter ac connection is above the Over Frequency threshold. ***Troubleshooting Tip*: No action is required.**	SELF
LineBusReversePhaseRotation	Indicates a phase sequence(s) is not correct. ***Troubleshooting Tip*: Check the phasing and voltage sensing cabling.**	SELF
LineBusUnderFrequency	Indicates the inverter detects a low input frequency. ***Troubleshooting Tip*: No action is required.**	SELF
LoadBreaker125DcRedundantUV	Indicates the 125-Vdc power supply for the load breaker is in an undervoltage condition. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
LoadBreakerOpen	Indicates the load breaker is presently open. ***Troubleshooting Tip*: Check all load circuit breakers. If they are all closed and the alarm is active, contact S&C Electric Company.**	SELF
LoadBreakerOverCurrentTrip	Indicates the load breaker tripped due to overcurrent. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
LoadBreakerRackedOut	Indicates that a load circuit breaker(s) is racked out. ***Troubleshooting Tip*: If the circuit breaker(s) is racked in and the alarm is active, contact S&C Electric Company.**	SELF
LostSyncWithLine	Indicates the inverter is unable to synchronize with the ac terminal voltage. ***Troubleshooting Tip:* No action is required.**	SELF
Master125DcRedundantUV	Indicates that if redundant station batteries are installed, one of the station batteries is below the Under Voltage threshold. ***Troubleshooting Tip:* Contact S&C Electric Company.**	SELF

Table Continued ►

Table 4. Warning Alarms—Continued

Master	Description	Reset Type
Master24DcRedundantUV	If redundant power supplies are installed, this alarm indicates one of the 24-V power supplies is below the Under Voltage threshold. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
OtherPsUvAlarms	Indicates there are other power supplies are below the Under Voltage threshold. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
OutputBreakerFailedToClose	Indicates the output circuit breaker did not close as expected. ***Troubleshooting Tip*: Contact S&C Electric Company.**	MANUAL
OutputBreakerFailedToOpen	Indicates the output circuit breaker did not open as expected. ***Troubleshooting Tip*: Contact S&C Electric Company.**	MANUAL
OutputBreakerOverCurrentTrip	Indicates the output circuit breaker trip unit detected an overcurrent condition. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
ParameterCrcBad	Indicates an error has been detected in the section of memory where parameter configuration is stored. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
PcsBreaker125DcRedundantUV	Indicates the redundant dc power supply for the PCS circuit breaker is indicating a low-voltage condition. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
PcsBreakerOpen	Indicates the PCS circuit breaker is presently open. ***Troubleshooting Tip*: If the circuit breakers are all closed and the alarm is active, contact S&C Electric Company.**	SELF
PcsBreakerOverCurrentTrip	Indicates the PCS circuit breaker is tripped because of overcurrent. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
PcsBreakerRackedOut	Indicates the 480-Vac circuit breaker in the PCS is racked out. ***Troubleshooting Tip*: If the circuit breaker is racked in and the alarm is active, contact S&C Electric Company.**	SELF
PesBlowerWarning	Indicates the PES blowers should be running but are moving less air than expected. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
PesOverTemperatureWarning	Indicates the PES is too hot. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
ScadaCommLoss	Indicates the SCADA controller is not communicating with the PureWave UPS XT System. ***Troubleshooting Tip*: Verify the SMP4 is communicating.**	SELF
ShortedPesWarning	Indicates the PureWave UPS XT System diagnostics have indicated a potentially short-circuited portion of one or more phases in the PES. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
SourceBreaker125DcRedundantUV	Indicates the source circuit breaker power supply has a low-voltage condition. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF

Table Continued ►

Table 4. Warning Alarms—Continued

Master	Description	Reset Type
SourceBreakerRackedOut	Indicates a source circuit breaker(s) is racked out. ***Troubleshooting Tip*: If the circuit breaker is racked in and the alarm is active, contact S&C Electric Company.**	SELF
SwitchGear125DcRedundantUV1	Indicates one of the redundant dc power supplies in the switchgear has a low-voltage condition. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
SwitchGear125DcRedundantUV2	Indicates one of the redundant dc power supplies in the switchgear has a low-voltage condition. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
SwitchGear24DcRedundantUV1	Indicates one of the redundant dc power supplies in the switchgear has a low-voltage condition. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
SwitchGear24DcRedundantUV2	Indicates one of the redundant dc power supplies in the switchgear has a low voltage condition. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
UdmLineBus	Indicates a utility disturbance has been detected on the source. ***Troubleshooting Tip*: No action is required.**	SELF
UdmLoadBus	Indicates a disturbance has been detected on the load. ***Troubleshooting Tip*: No action is required.**	SELF
UpsBreaker125DcRedundantUV	Indicates that the PureWave UPS XT System circuit breaker power supply has a low voltage condition. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
UpsBreakerRackedOut	Indicates that the PureWave UPS XT System circuit breaker feeding the PCS is racked out. ***Troubleshooting Tip*: If the circuit breaker is racked in and the alarm is active, contact S&C Electric Company.**	SELF
Inverter	**Description**	**Reset Type**
DcLinkMidpointUnbalance	Indicates that the midpoint of the dc link is unbalanced. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
GroundedNeutral	Indicates that the neutral has been grounded. ***Troubleshooting Tip*: Contact S&C Electric Company.**	MANUAL
GroundFaultAc	Indicates that the ac voltage is detected on the resistively grounded transformer neutral. ***Troubleshooting Tip*: Contact S&C Electric Company.**	MANUAL
GroundFaultDc	Indicates the dc voltage is detected on the resistively grounded transformer neutral. ***Troubleshooting Tip*: Contact S&C Electric Company.**	MANUAL
Igbt1CurrentLimit	Indicates IGBT1 is working at its limit. ***Troubleshooting Tip*: If this is a continued occurrence, verify there is no phase-to-phase fault or a load condition that can overload the system.**	SELF

Table Continued ►

Table 4. Warning Alarms—Continued

Inverter	Description	Reset Type
Igbt1OverTemperatureWarning	Indicates IGBT1 is too hot. ***Troubleshooting Tip*: Check the vents at the back of the PCS enclosure to ensure there are no air restrictions. Also check the variable frequency drives, blower, ac fans, and dc fans for proper functionality.**	SELF
Igbt1ThermistorOpen	Indicates the thermistor for IGBT1 is open-circuit. ***Troubleshooting Tip*: If the ambient air is very cold, this alarm can be a normal condition. If the inverter is running, the IGBTs are fine. But if this alarm occurs with an overcurrent alarm, contact S&C Electric Company.**	SELF
Igbt1ThermistorShorted	Indicates the thermistor for IGBT1 is shorted. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
Igbt2CurrentLimit	Indicates IGBT2 is working at its limit. ***Troubleshooting Tip*: If this is a continued occurrence, verify there is no phase-to-phase fault or a load condition that can overload the system.**	SELF
Igbt2OverTemperatureWarning	Indicates IGBT2 is too hot. ***Troubleshooting Tip*: Check the vents at the back of the PCS enclosure to ensure there are no air restrictions. Also check the variable frequency drives, blower, ac fans, and dc fans for proper functionality.**	SELF
Igbt2ThermistorOpen	Indicates the thermistor for IGBT2 is open-circuit. ***Troubleshooting Tip*: If the ambient air is very cold, this alarm can be a normal condition. If the inverter is running, the IGBTs are fine. But if this alarm occurs with an overcurrent alarm, contact S&C Electric Company.**	SELF
Igbt2ThermistorShorted	Indicates the thermistor for IGBT2 is shorted. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
Igbt3CurrentLimit	Indicates IGBT3 is working at its limit. ***Troubleshooting Tip*: If this is a continued occurrence, verify there is no phase-to-phase fault or a load condition that can overload the system.**	SELF
Igbt3OverTemperatureWarning	Indicates IGBT3 is too hot. ***Troubleshooting Tip*: Check the vents at the back of the PCS enclosure to ensure there are no air restrictions. Also check the variable frequency drives, blower, ac fans, and dc fans for proper functionality.**	SELF
OverFrequency	Indicates that the line frequency at the inverter ac connection are above the Over Frequency threshold. ***Troubleshooting Tip*: The inverter will respond based on the over-frequency settings. Default settings are according to IEEE 1547. To change the sensitivity, the Time Delay On or the Frequency threshold can be changed.**	SELF
OverVoltage	Indicates whether any of the three phases at the ac connection is above the overvoltage threshold. ***Troubleshooting Tip*: The inverter will respond based on the over-voltage settings. Default settings are according to IEEE 1547. To change the sensitivity, the Time Delay On or the Voltage threshold can be changed.**	SELF
ParamCalNvError	Indicates corrupt memory was found in the inverter settings that can cause a malfunction in the inverter. ***Troubleshooting Tip*: Power-cycle the inverter control. If the alarm still remains, contact S&C Electric Company.**	SELF

Table Continued ►

Table 4. Warning Alarms—Continued

Inverter	Description	Reset Type
Redundant125VdcSupplyBad	Indicates that if redundant station batteries are installed, one of the station batteries is no longer working. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
Redundant24VdcSupplyBad	Indicates that if redundant power supplies are installed, one of the 24-V power supplies is no longer working. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
TransformerOverTempWarning	Indicates the transformer temperature is above the manufacturer's warning level. Reduce the transformer current. ***Troubleshooting Tip*: Reduce the output level of the operation.**	SELF
UnderFrequency	Indicates the inverter detects a low input frequency. ***Troubleshooting Tip*: The inverter will respond based on the under-frequency settings. Default settings are according to IEEE 1547. To change the sensitivity, the Time Delay On or the Frequency threshold can be changed.**	SELF
UnderVoltage	Indicates the inverter detects a low input voltage. ***Troubleshooting Tip*: The inverter will respond based on the under-voltage settings. Default settings are according to IEEE 1547. To change the sensitivity, the Time Delay On or the Voltage threshold can be changed.**	SELF
VeryOverFrequency	Indicates the inverter detects a very high input frequency. ***Troubleshooting Tip*: The inverter will respond based on the very over-frequency settings. Default settings are according to IEEE 1547. To change the sensitivity, Time Delay On or the Frequency threshold can be changed.**	SELF
VeryOverVoltage	Indicates the inverter detects a very high input voltage. ***Troubleshooting Tip*: The inverter will respond based on the very over-voltage settings. Default settings are according to IEEE 1547. To change the sensitivity, the Time Delay On or the Voltage threshold can be changed.**	SELF
VeryUnderFrequency	Indicates the inverter detects a very low input frequency. ***Troubleshooting Tip*: The inverter will respond based on the very under-frequency settings. Default settings are according to IEEE 1547. To change the sensitivity, the Time Delay On or the Frequency threshold can be changed.**	SELF
VeryUnderVoltage	Indicates the inverter detects a very low input voltage. ***Troubleshooting Tip*: The inverter will respond based on the very under-voltage settings. Default settings are according to IEEE 1547. To change the sensitivity, the Time Delay On or the Voltage threshold can be changed.**	SELF

***Table Continued* ►**

Table 4. Warning Alarms—Continued

Chopper	Description	Reset Type
AnyNegative24VdcSupplyBad	Indicates one of the negative 24-V power supplies is no longer working. ***Troubleshooting Tip*: De-energize the system troubleshoot PS4 (power supply at the top of the ac section). If the alarm remains, contact S&C Electric Company.**	SELF
Control125VdcSupplyBad	Indicates that if redundant station batteries are installed, one of the station batteries is no longer working. ***Troubleshooting Tip*: Check the fuses and circuit breakers in the backup control power path.**	SELF
GroundedNeutral	Indicates the neutral has been grounded. ***Troubleshooting Tip*: Return the system to the original resistively ground configuration.**	MANUAL
GroundFaultAc	Indicates the ac voltage is detected on the resistively grounded transformer neutral. ***Troubleshooting Tip*: De-energize the system, find the fault on the ac side of the system, and repair the fault.**	MANUAL
GroundFaultDc	Indicates the dc voltage is detected on the resistively grounded transformer neutral. ***Troubleshooting Tip*: De-energize the system, and contact S&C Electric Company and the battery manufacturer.**	MANUAL
Igbt1CurrentLimit	Indicates IGBT1 is working at its limit. ***Troubleshooting Tip*: If this is a continued occurrence, verify there is no phase-to-phase fault or a grid condition that can overload the system.**	SELF
Igbt1OverTemperatureWarning	Indicates IGBT1 is too hot. ***Troubleshooting Tip*: Check the vents at the back of the PCS enclosure to ensure there are no air restrictions. Also check the variable frequency drives, blower, ac fans, and dc fans for proper functionality.**	SELF
Igbt1ThermistorOpen	Indicates the thermistor for IGBT1 is open-circuit. ***Troubleshooting Tip*: If the ambient air is very cold, this alarm can be a normal condition. If the inverter is running, the IGBTs are fine. But if this alarm occurs with an overcurrent alarm, contact S&C Electric Company.**	SELF
Igbt1ThermistorShorted	Indicates the thermistor for IGBT1 is shorted. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
Igbt2CurrentLimit	Indicates IGBT2 is working at its limit. ***Troubleshooting Tip*: If this is a continued occurrence, verify there is no phase-to-phase fault or a grid condition that can overload the system.**	SELF
Igbt2OverTemperatureWarning	Indicates IGBT2 is too hot. ***Troubleshooting Tip*: Check the vents at the back of the PCS enclosure to ensure there are no air restrictions. Also check the variable frequency drives, blower, ac fans, and dc fans for proper functionality.**	SELF
Igbt2ThermistorShorted	Indicates the thermistor for IGBT2 is shorted. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
Igbt2ThermistorOpen	Indicates the thermistor for IGBT2 is open-circuit. ***Troubleshooting Tip*: If the ambient air is very cold, this alarm can be a normal condition. If the inverter is running, the IGBTs are fine. But if this alarm occurs with an overcurrent alarm, contact S&C Electric Company.**	SELF

Table Continued ►

Table 4. Warning Alarms—Continued

Chopper	Desciption	Reset Type
Igbt3CurrentLimit	Indicates IGBT3 is working at its limit. ***Troubleshooting Tip*: If this is a continued occurrence, verify there is no phase-to-phase fault or a grid condition that can overload the system.**	SELF
Igbt3OverTemperatureWarning	Indicates IGBT3 is too hot. ***Troubleshooting Tip*: Check the vents at the back of the PCS enclosure to ensure there are no air restrictions. Also check the variable frequency drives, blower, ac fans, and dc fans for proper functionality.**	SELF
Igbt3ThermistorOpen	Indicates the thermistor for IGBT3 is open-circuit. ***Troubleshooting Tip*: If the ambient air is very cold, this alarm can be a normal condition. If the inverter is running, the IGBTs are fine. But if this alarm occurs with an overcurrent alarm, contact S&C Electric Company.**	SELF
Igbt3ThermistorShorted	Indicates the thermistor for IGBT3 is shorted. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
ParamCalNvError	Indicates corrupt memory was found in the chopper settings that can cause a malfunction in the chopper. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
Redundant24VdcSupplyBad	Indicates that if redundant power supplies are installed, one of the 24-V power supplies is no longer working. ***Troubleshooting Tip*: De-energize the system and troubleshoot PS1 or PS3 (power supplies at the top of the ac section). If the alarm remains, contact S&C Electric Company.**	SELF

Inhibit Alarms

These alarms indicate when a problem needs attention that will affect the proper operation of the system. The system will stop operating when an **Inhibit** alarm is being displayed. However, the ac and dc circuit breakers will remain closed. See Table 5 for the listed **Inhibit** alarms.

Table 5. Inhibit Alarms

Master	Description	Reset Type
AnyAppBoardPowerSupplyUv	Indicates an application board power supply is below the required voltage value. ***Troubleshooting Tip*: Contact S&C Electric Company.**	AUTO
InhibitRequest	Indicates the system inhibit has been issued over SCADA or from the local control rack. ***Troubleshooting Tip*: Check the HMI as well as the SCADA points for an Inhibit request. If there is no request, contact S&C Electric Company.**	SELF
LoadOverCurrent	Indicates the current flowing to the load is beyond the rating of the PureWave UPS XT System. ***Troubleshooting Tip*: Check the load against what the PureWave UPS XT System was sized for.**	SELF
LoadOverPower	Indicates the load power is beyond the rating of the PureWave UPS XT System ***Troubleshooting Tip*: Check the load against what the PureWave UPS XT System was sized for.**	SELF
McuCommsError	Indicates the interprocessor communications on the control board are not functioning correctly. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
ParamCalChangeActivation	Indicates either a configuration parameter or analog calibration value is being saved and activated. ***Troubleshooting Tip*: No action is required.**	SELF
PesCommsError	Indicates the PureWave UPS XT System controls are not presently communicating with the PES. ***Troubleshooting Tip*: Stop the system, and re-seat the Ethernet cables. If the alarm remains, contact S&C Electric Company.**	SELF
Inverter	**Description**	**Reset Type**
AnyAppBoardPowerSupplyBad	Indicates one of the power supplies on the application board is not at the correct voltage. ***Troubleshooting Tip*: Contact S&C Electric Company.**	AUTO
ChopperInhibitingVs	Indicates the chopper is not allowing a voltage source run. ***Troubleshooting Tip*: Check the chopper alarms. If there are no chopper alarms active, contact S&C Electric Company.**	SELF
DcLinkUnderVoltage	Indicates the internal dc bus voltage fell below 650 V. ***Troubleshooting Tip*: If running, investigate the ground fault. If starting up the system, verify circuit breakers CB5R and CB5L are closed.**	AUTO
EthernetProblem	Indicates the Ethernet communications between the inverter and master are not functioning correctly. ***Troubleshooting Tip*: Re-seat the yellow Ethernet cable at the inverter control chassis (J7 of EA2R) and at the ac section (EA22 port 2). Also, check the Ethernet connection at the inverter control chassis (J7 of EA2L) and at the ac section (EA22 port 4).**	SELF
Igbt1GateDriveAlarm	Indicates the IGBT1 gate drive is in an abnormal condition, usually because of undervoltage. ***Troubleshooting Tip*: Reset the alarm.**	SELF

Table Continued ▶

Table 5. Inhibit Alarms—Continued

Inverter	Description	Reset Type
Igbt1OverTemperatureTrip	Indicates the IGBT1 is running at too high a temperature. ***Troubleshooting Tip*: De-energize the system. Check the filters in the intake hoods, and check the rear hoods to ensure the dampers can move freely.**	AUTO
Igbt1GateDriveAlarm	Indicates the IGBT1 gate drive is in an abnormal condition, usually because of undervoltage. ***Troubleshooting Tip*: Reset the alarm.**	AUTO
Igbt1OverTemperatureTrip	Indicates the IGBT1 is running at too high a temperature. ***Troubleshooting Tip*: De-energize the system. Check the filters in the intake hoods, and check the rear hoods to ensure the dampers can move freely.**	SELF
InhibitCommand	Indicates the inverter was commanded to inhibit by the master. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
LostSynchronism	Indicates the inverter is unable to synchronize to the ac terminal voltage. ***Troubleshooting Tip*: If the utility voltage, frequency, and phase rotation are good, contact S&C Electric Company. If the voltage, frequency, or phase rotation is bad, the inverter may not be able to lock to the utility until the voltage and frequency are both within tolerance.**	SELF
McuCommsError	Indicates the interprocessor communications on the control board are not functioning correctly. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
OutputFault1	Indicates the utility fault detected based on voltage sag is to 70% and current limit has lasted for 20 ms. ***Troubleshooting Tip*: Investigate the fault on the inverter ac connection.**	MANUAL
OutputFault2	Indicates the utility fault detected based on voltage sag is to 90% and current limit has lasted for 100 ms. ***Troubleshooting Tip*: Investigate the fault on the inverter ac connection. Chances are this was not a transient event because the timer for this alarm is slower.**	MANUAL
ParamCalChangeActivation	Indicates either a configuration parameter or analog calibration value is being saved and activated. ***Troubleshooting Tip*: No action is required.**	SELF
ReversePhaseRotation	Indicates a phase connection(s) is not correct. ***Troubleshooting Tip*: Verify the phasing by checking the utility connection wires.**	SELF
TccOverload	Indicates the PureWave UPS XT System time-current trip curve was exceeded and the unit tripped offline. ***Troubleshooting Tip*: Reduce the island load.**	MANUAL
UncontrolledBatteryPower	Indicates more current is flowing in the battery than expected based on operation. ***Troubleshooting Tip*: Investigate the ac side of the system for voltage sags.**	SELF

Table Continued ►

Table 5. Inhibit Alarms—Continued

Chopper	Description	Reset Type
AnyAppBoardPowerSupplyBad	Indicates one of the power supplies on the application board is not at the correct voltage. ***Troubleshooting Tip*: Contact S&C Electric Company.**	AUTO
DcLinkUnderVoltage	Indicates the internal dc bus voltage fell below 650 V. ***Troubleshooting Tip*: If running, investigate the ground fault. If starting up the system, verify circuit breakers CB5R and CB5L are closed.**	AUTO
DcStorageOverPowerA	Indicates Battery A has been discharging above rated power for too long. ***Troubleshooting Tip*: Contact S&C Electric Company.**	AUTO
DcStorageOverPowerB	Indicates Battery B has been discharging above rated power for too long. ***Troubleshooting Tip*: Contact S&C Electric Company.**	AUTO
DcStorageOverVoltageA	Indicates the battery connected to Chopper A terminal voltage exceeded the trip threshold. ***Troubleshooting Tip*: Contact S&C Electric Company.**	AUTO
DcStorageOverVoltageB	Indicates the battery connected to Chopper B terminal voltage exceeded the trip threshold. ***Troubleshooting Tip*: Contact S&C Electric Company.**	AUTO
EthernetProblem	Indicates the Ethernet communications between the chopper and master are not functioning correctly. ***Troubleshooting Tip*: Re-seat the yellow Ethernet cable at the chopper control chassis (J7 of EA1R) and at the ac section (EA22 Port 1).**	SELF
Igbt1GateDriveAlarm	Indicates the IGBT1 gate drive is in an abnormal condition, usually because of undervoltage. ***Troubleshooting Tip*: Reset the alarm.**	AUTO
Igbt1OverTemperatureTrip	Indicates IGBT1 is running at too high a temperature. ***Troubleshooting Tip*: De-energize the system. Check the filters in the intake hoods, and check the rear hoods to ensure the dampers can move freely.**	AUTO
Igbt2GateDriveAlarm	Indicates the IGBT2 gate drive is in an abnormal condition, usually because of undervoltage. ***Troubleshooting Tip*: Reset the alarm.**	AUTO
Igbt2OverTemperatureTrip	Indicates IGBT2 is running at too high a temperature. ***Troubleshooting Tip*: De-energize the system. Check the filters in the intake hoods, and check the rear hoods to ensure the dampers can move freely.**	AUTO
Igbt3GateDriveAlarm	Indicates the IGBT3 gate drive is in an abnormal condition, usually because of undervoltage. ***Troubleshooting Tip*: Reset the alarm.**	AUTO

Table Continued ►

Table 5. Inhibit Alarms—Continued

Chopper	Description	Reset Type
Igbt3OverTemperatureTrip	Indicates IGBT3 is running at too high a temperature. ***Troubleshooting Tip*: De-energize the system. Check the filters in the intake hoods, and check the rear hoods to ensure the dampers can move freely.**	AUTO
Igbt4GateDriveAlarm	Indicates the IGBT4 gate drive is in an abnormal condition, usually because of undervoltage. ***Troubleshooting Tip*: Reset the alarm.**	AUTO
Igbt4OverTemperatureTrip	Indicates IGBT4 is running at too high a temperature. ***Troubleshooting Tip*: De-energize the system. Check the filters in the intake hoods, and check the rear hoods to ensure the dampers can move freely.**	AUTO
InhibitCommand	Indicates the PureWave UPS XT System is in the Inhibit state because of user command. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
McuCommsError	Indicates the interprocessor communications on the control board is not functioning correctly. ***Troubleshooting Tip*: Contact S&C Electric Company.**	SELF
ParamCalChangeActivation	Indicates either a configuration parameter or analog calibration value is being saved and activated. ***Troubleshooting Tip*: No action is required.**	SELF

Bypass Alarms

These alarms indicate the system is running on bypass along with the PES when a **Bypass** alarm is being displayed. This is to relieve the PES from overuse by creating two paths to supply power to the load. See Table 6 for the listed **Bypass** alarms.

Table 6. Bypass Alarms

Master	Description	Reset Type
BypassBreakerCommLoss	Indicates the master has lost communication to the controller for the bypass circuit breaker. ***Troubleshooting Tip*: Stop the system and re-seat the Ethernet cables. If the alarm remains, contact S&C Electric Company.**	SELF
BypassRequest	Indicates the bypass request has been issued over SCADA or from the local control rack. ***Troubleshooting Tip*: Check the master control rack to determine whether bypass was commanded ON. Also check the SCADA points for a bypass request. If there is no request, contact S&C Electric Company.**	SELF
DspFpgaHeartbeatLost	Indicates internal processor communications has been lost. ***Troubleshooting Tip*: Contact S&C Electric Company.**	MANUAL
ExecutionTimeOverrun	Indicates the execution time of the code has exceeded the allowed limits. ***Troubleshooting Tip*: Contact S&C Electric Company.**	MANUAL
InputBreakerCommLoss	Indicates the master has lost communication to the controller for the input circuit breaker. ***Troubleshooting Tip*: Stop the system and re-seat the Ethernet cables. If the alarm remains, contact S&C Electric Company.**	SELF
NotEnoughPcmsAvailable	Indicates all of the inverter-chopper pairs are not available. Voltage-source applications risk of load loss is imminent. ***Troubleshooting Tip*: Check inverter and chopper alarms.**	SELF
OutputBreakerCommLoss	Indicates the master has lost communication to the controller for the output circuit breaker. ***Troubleshooting Tip*: Stop the system and re-seat the Ethernet cables. If the alarm remains, contact S&C Electric Company.**	SELF
OutputFault	Indicates the PureWave UP XT System fault is detected based on voltage sag and current limit being at or under respective thresholds. ***Troubleshooting Tip*: Check the load.**	MANUAL
PesOverTemperatureAlarm	Indicates the temperature of the PES is too hot. ***Troubleshooting Tip*: Contact S&C Electric Company.**	AUTO
ShortedPesAlarm	Indicates the PureWave UPS XT System diagnostics have a potentially short-circuited a portion of one or more phases in the PES. ***Troubleshooting Tip*: Contact S&C Electric Company.**	MANUAL

Bypass Isolate Alarms

These alarms indicate the system is solely on bypass. This states there is a problem that needs attention and will affect the proper operation of the system. The PES will not operate when the **Bypass Isolate** alarm is displayed. See Table 7 for the listed Bypass Isolate alarms.

Table 7. Bypass Isolate Alarms

Master	Description	Reset Type
BypassIsolateRequest	Indicates the bypass isolate request has been issued over SCADA or from the local control rack. ***Troubleshooting Tip*: Check the key switch on the master control rack and the SCADA points to see if a Bypass Isolate was requested.**	MANUAL
EmergencyStop	Indicates emergency shutdown has been activated. ***Troubleshooting Tip*: Check whether any of the inverter stop buttons was de-pressed.**	SELF
GroundSwitchClosed	Indicates the ground switch is closed. ***Troubleshooting Tip*: Verify the position of the switch in the switchgear. If it is closed, contact S&C Electric Company.**	SELF
OpenPesDetected	Indicates the diagnostics have detected at least one phase of the PES is open. ***Troubleshooting Tip*: Contact S&C Electric Company.**	AUTO

Basic Operation

The following describes how the user can operate the PureWave UPS XT System using the master control rack control panel and the HMI computer program.

⚠ CAUTION

Beware of the loud noise the trip mechanism makes during operation when performing work around the cicuit breakers.

Failure to do these steps may result in personal injury or equipment damage.

Powering ON the PureWave UPS XT System → Ready state

To power on the system and enable the **Ready** state:

(a) On the master control rack control panel, ensure the COMMAND BYPASS ISOLATE key-switch is in the **Off** position.

(b) On the master control rack control panel, ensure the COMMAND BYPASS switch is in the **Off** position.

(c) On the master control rack control panel, ensure the CONTROLLED BY switch is turned to the **HMI** position.

(d) Press the **RESET** button on the master control rack control panel.

(e) The system will go to the **Ready** state. It may take up to 60 seconds for the system to precharge and the circuit breakers to close.

Ready state → Bypass state

To place the system in the **Bypass** state:

(a) On the master control rack control panel, turn the COMMAND BYPASS switch to the **On** position.

(b) The system will go to the **Bypass** state (bypass circuit breaker will close).

Ready state → Bypass Isolate state

To place the system in the **Bypass Isolate** state:

(a) On the master control rack control panel, turn the COMMAND BYPASS ISOLATE key-switch to the **On** position.

(b) The system will go to the **Bypass Isolate** state (bypass circuit breaker will close, and the input and output circuit breakers will open. The inverter circuit breakers will also open).

Bypass state → Ready state

To place the system back to the **Ready** state from the **Bypass** state:

(a) Ensure there are no bypass alarm conditions remaining.

(b) On the master control rack control panel, ensure the COMMAND BYPASS switch is in the **Off** position.

(c) The system will go to the **Ready** state (bypass circuit breaker will open).

Bypass Isolate state → Ready state

To place the system back to the **Ready** state from the **Bypass Isolate** state:

(a) Review the **Status** screen on the HMI.

(b) Clear the underlying cause of all bypass and bypass isolate alarms.

(c) Review the position of the COMMAND BYPASS ISOLATE key-switch. Turn to the Off position if not already.

(d) Review the position of the COMMAND BYPASS switch. Turn to the Off position if not already.

(e) The system will go to the **Ready** state. It may take up to 60 seconds for the system to precharge and the circuit breakers to close.

Inhibit state → Ready state

To place the system back to the **Ready** state from the **Inhibit** state:

(a) Review the **Status** screen on the HMI.

(b) Clear the underlying cause of all inhibit alarms.

(c) The system will go to the **Ready** state.

Ready state → Stopping the PureWave UPS XT System

To stop the system:

(a) On the master control rack control panel, ensure the COMMAND BYPASS ISOLATE key-switch is in the **On** position.

(b) The bypass circuit breaker will close, then the input and output circuit breakers and PES will open. The inverter and dc/dc converter circuit breakers will open.

(c) Depress the INVERTER STOP buttons in the inverter and battery containers. The inverter circuit breakers will be held open.

Test in Bypass

(a) To ensure reliability, the PureWave UPS XT System can be tested using the **Test In Bypass** feature. Contact S&C Electric Company for more details.