

Operation Manual Addendum:

PRODiSC[®] Display User's Guide

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Overview

The PRODySC® touch screen display is a window to voltage sags and PRODySC protection. The display provides system status, voltage sag notification and history, runtime statistics and system history in a simple and intuitive touch-based user interface.



WARNING!



TO AVOID DAMAGING THE TOUCH DISPLAY:

- Do not subject the touch display to heavy impact.
- Use your bare finger or plastic stylus to press the touch display.
- Do not press, push, or rub the touch display surface with anything harder than HB pencil lead (no glass, metal, pens, screwdrivers, etc).
- Do not use anything that might cut or damage the touch screen membrane
- The touch display panel is not waterproof.
- Do not use alcohol, ammonia, toluene, or acetone cleaners on the display.

1 Quick Start

When the system first starts, a welcome screen displaying the PRODiSC product logo appears. This screen will disappear in about 5 seconds and is replaced with the "HOME" screen.

Note: The touch screen is optimized for use with a plastic stylus or bare finger.

At installation time perform the following steps to configure your system:

Step 1: Press the "CONFIG" button at the bottom of the "HOME" screen (See Figure 1).

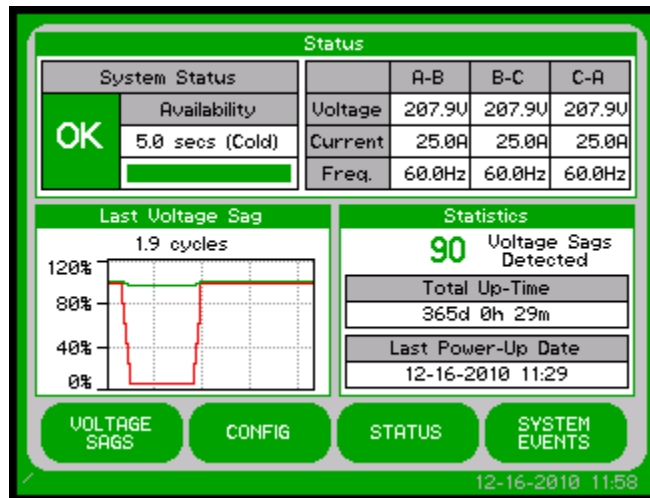


Figure 1 - Home Screen

Step 2: Begin calibration by pressing "CALIBRATE TOUCH SENSOR" (See Figure 2).

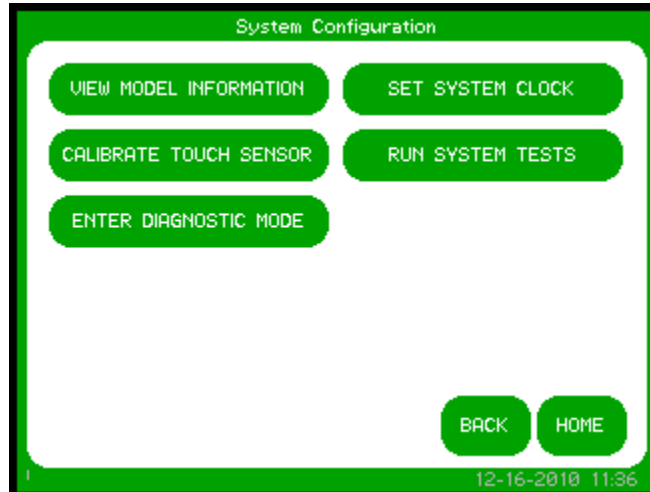


Figure 2 - System Configuration

Note: To recalibrate from any screen, hold anywhere on the screen for about 10 seconds. You will see a small progress bar at the bottom of the screen. When the progress bar reaches 100 percent, the calibration screen will open.

Step 3: The "Touch Screen Calibration" screen will then appear (See Figure 3). Press and hold on the center of the touch target, release when the touch target begins to flash. Repeat with the next two touch targets.

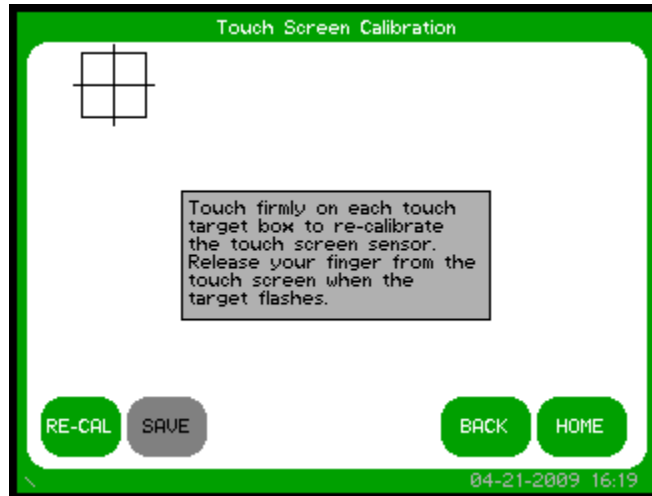


Figure 3 - Touch Screen Calibration

Step 4: The screen uses the new calibration configuration. You can test the calibration before saving by pressing anywhere on the screen to ensure the touch target appears where you press. After testing, press the "SAVE" button. Press the "BACK" button to return to the "System Configuration" screen.

Step 5: Set date and time by pressing "SET SYSTEM CLOCK" in "System Configuration."

Note: If the DySC system is integrated with an i-SENSE voltage Sag Detector option, NTP time syncing may be available. If the i-SENSE device is configured to Sync Time to DySC, the "SET SYSTEM CLOCK" button will be disabled, and system clock control will be relegated to the i-SENSE device.

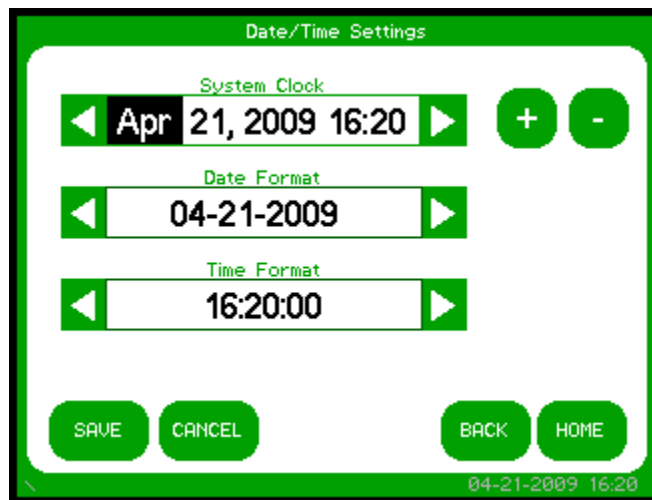


Figure 4 - Date/Time Settings

Step 6: Use the left/right arrows under "System Clock" (See Figure 4) to highlight each component. Use the plus (+) and minus (-) buttons to set the correct time and/or date.

Step 7: To set the date and time formats, press the left/right arrows under the "Date Format" and "Time Format" and scroll through the available date and time formats.

Step 8: Press the "SAVE" button to store the new date/time and format settings.

Note: Pressing "VIEW MODEL INFORMATION" on the "System Configuration" screen provides model information about the PRODySC, including the unit model number, unit serial number, voltage and current ratings, and individual component details such as serial numbers and firmware revisions.

2 Home Screen

The "HOME" screen of the display provides a snapshot view of the status of the entire system (See Figure 5). You can return to this screen from any other screen by pressing the "HOME" button. After 5 minutes of inactivity (i.e. not pressing the screen), the touch screen will automatically return to the "HOME" screen. The "HOME" screen is divided into four main areas described in Table 1.

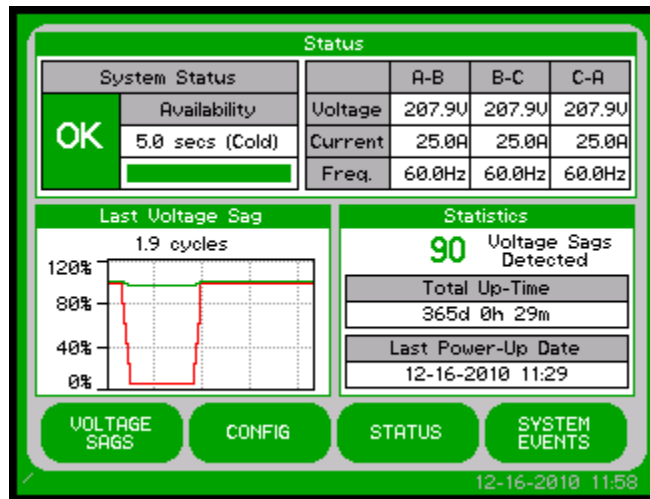


Figure 5 - Home Screen

Table 1 - Home Screen Description

Description	Function
Status	Real-time system operation: available runtime, output line-to-neutral (L-N) or line-to-line (L-L) voltage (model dependent), load current, and frequency
Last Voltage Sag	Rotating information about the last voltage sag: event start time, event duration, and sag depth
Statistics	Summary view of PRODySC performance based on sags detected, plus a rotating display of last power-up date, elapsed time (since power up), and total up-time
Main Menu	The menu buttons at the bottom of the screen navigate through: VOLTAGE SAGS: Displays the "Voltage Sag Log" screen CONFIG: Displays the "System Configuration" screen STATUS: Displays the "System Status" screen SYSTEM EVENTS: Displays the "System Event Log" screen

3 System Status

The "System Status" screen displays the real-time overall system status. Reach this screen by pressing "STATUS" on the "HOME" screen or the "Status" area at the top of the "HOME" screen (See Figure 5 on page 6).

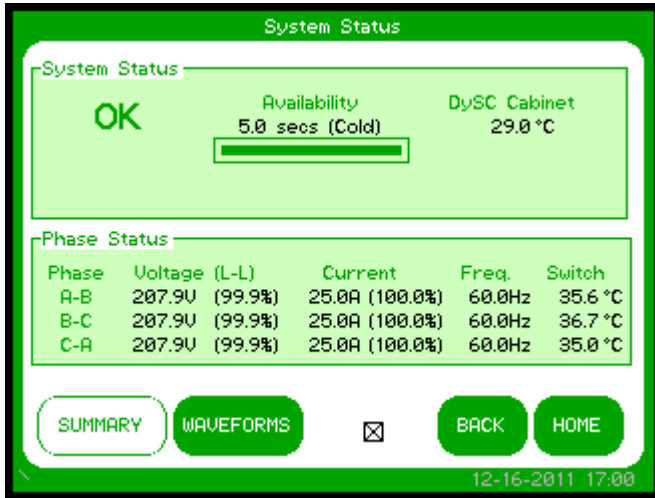


Figure 6 - System Status Summary

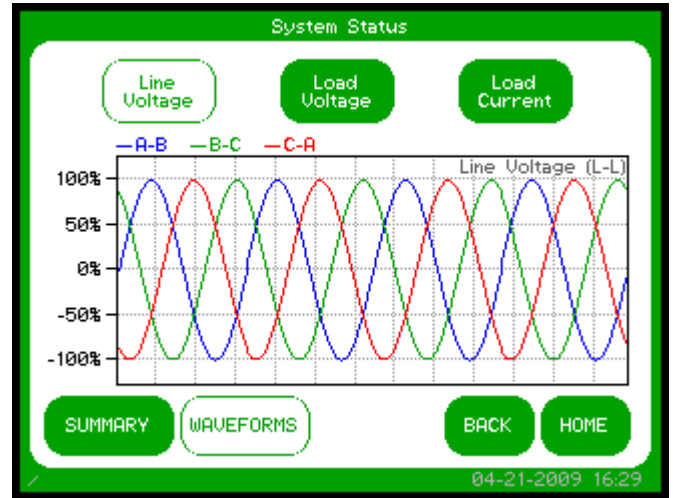


Figure 7 - System Status Waveforms

Table 2 - System Status Description

Description	Function
System Status	Overall system status including current operational status, availability to correct sags, and internal cabinet temperature
Phase Status	Voltage, current, frequency, and static switch temperature are displayed for all phases. The percentage displayed following the voltage and current is the percent of nominal value for the PRODiSC. Nominal values are listed on the "View Model Information" screen.
Waveforms	A sample of a 4 cycle waveform that includes real-time line voltage, load voltage, or load current can be selected for display

4 Voltage Sag Events

A voltage sag is defined as the period when input RMS voltage drops to less than 88.5% of the rated DySC voltage. Details of each voltage sag and corresponding PRODiSC protection are captured and saved to the voltage sag log.

4.1 Voltage Sag Log

The "Voltage Sag Log" screen (See Figure 8) displays a list of the last 61 voltage sags. Reach this screen by pressing "VOLTAGE SAGS" on the "HOME" screen (See Figure 5 on page 6).

#	Time	RMS%	Duration
30	04-21-2009 15:19:25 ✓	5%	1.9 cycles
29	04-21-2009 08:22:45 ✓	10%	3.9 cycles
28	04-21-2009 01:26:05 ✓	15%	5.9 cycles
27	04-20-2009 18:29:25 ✓	20%	7.9 cycles
26	04-20-2009 11:32:45 ✓	25%	9.9 cycles
25	04-20-2009 04:36:05 ✓	30%	11.8 cycles
24	04-19-2009 21:39:25 ✓	35%	13.8 cycles
23	04-19-2009 14:42:45 ✓	40%	15.8 cycles
22	04-19-2009 07:46:05 ✓	45%	17.8 cycles
21	04-19-2009 00:49:25 ✓	50%	19.8 cycles

04-21-2009 16:10

Figure 8- Voltage Sag Log

Table 3 - Voltage Sag Log Description

Description	Function
#	Unique ID within the list (0-60) to identify the voltage sag
Time	Start time and date of the voltage sag
Check Mark	Denotes the PRODiSC protected the voltage sag
RMS %	Worst-case RMS voltage (percent of nominal) across all phases
Duration	Duration of the voltage sag
Note: Use the up/down arrows to navigate through the list. Press the "SELECT" button to view additional details about the voltage sag	

4.2 Voltage Sag Detail

The "Voltage Sag Detail" screen (See Figure 9) displays all the information that was recorded during the voltage sag. At the top of the screen just below the screen title, the worst-case remaining RMS voltage, percent nominal, and the voltage sag duration is displayed. Reach this screen by selecting an event from the "Voltage Sag Log" as shown in Figure 8. To select an event, use the up and down arrows to select the event you want to display, and press the "SELECT" button.

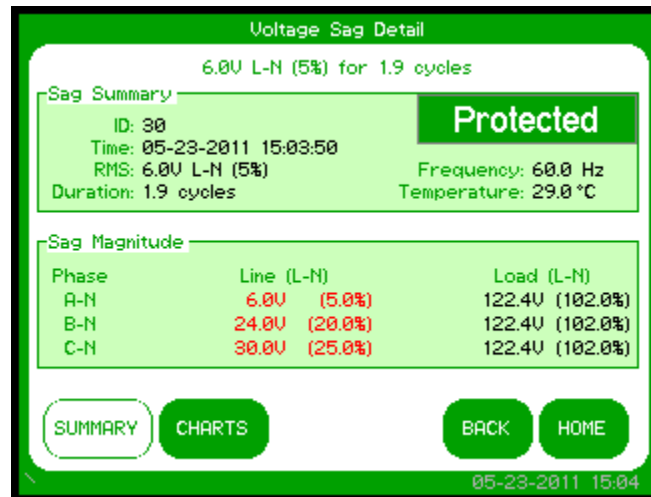


Figure 9- Voltage Sag Detail

Table 4 - Voltage Sag Detail Description

Description	Function
Sag Summary	<p>ID: Unique ID within the list (0-60) to identify the voltage sag</p> <p>Time: Start time of the voltage sag</p> <p>RMS: Worst-case RMS voltage (L-N) and percent of rated voltage across all phases</p> <p>Duration: Duration of the voltage sag</p> <p>Frequency: Frequency of the line prior to the start of the voltage sag</p> <p>Temperature: Internal temperature of the PRODiSC prior to the start of the voltage sag</p>
Sag Magnitude	<p>Line Voltage: Line RMS voltage and percent of rated (L-N). Voltages $\leq 80\%$ of nominal are displayed in red.</p> <p>Load Voltage: Load RMS voltage and percent of nominal (L-N).</p>
Correction Result	<p>The "Correction Result" is displayed in a box in the upper-right-hand corner of the "Event Summary" section. The "Correction Result" conveys how the PRODiSC performed correcting the voltage sag. The possible values are:</p> <p>Protected: The output RMS voltage on all phases is $\geq 85\%$ percent of nominal and the PRODiSC correction was active for the duration of the voltage sag (will be displayed in green).</p> <p>Fault: An unexpected system fault occurred during the sag (will be displayed in red)</p> <p>Faulted: The PRODiSC system was faulted when the sag occurred (will be displayed in red).</p>

The "Voltage Sag Detail" for the most recent event can also be accessed by pressing the "Last Voltage Sag" area of the "HOME" screen.

4.3 Voltage Sag RMS Voltage Charts

The line and load RMS voltage (L-N) of each phase is recorded for 8 cycles prior to the start of the voltage sag followed by the first 300 cycles (5 seconds @ 60Hz) of the voltage sag (See Figure 10). Reach this screen by pressing "CHARTS" on the "Voltage Sag Detail" screen as shown in Figure 9 on page 9.

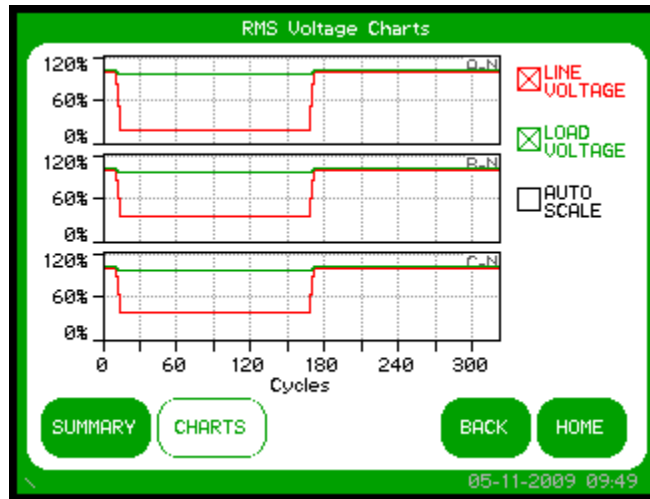


Figure 10 - RMS Voltage Charts

Line voltage is shown in red and load voltage is shown in green. By pressing the check boxes in the right column, you can toggle each data series Off and On as well as enable y-axis auto-scaling.

Note: 300 cycles = 5.0 seconds at 60 Hz or 6 seconds at 50 Hz.

4.4 Voltage Sag Notification

While the voltage sag is still in-progress, a flashing red box in the upper left-hand corner will display "SAG-IN-PROGRESS." This box will appear on every screen until the voltage sag ends.

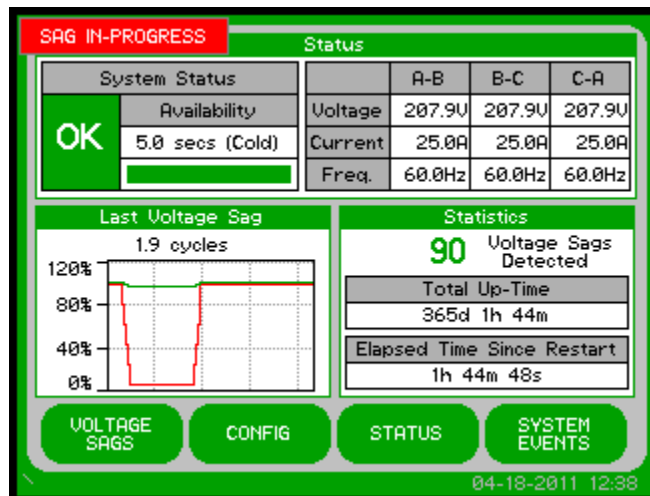


Figure 11 - Voltage Sag Detected

5 System Events

The PRODySC tracks all operational events which are classified into three groups based on severity.

Table 5 - System Event Description

Description	Function
Informational	Purely informational. No action is required.
Auto-Resetting	The PRODySC will reset within 60 seconds after the condition clears.
Call Service	For Critical and Fatal events, service support will be required. Contact SoftSwitching Technologies support

5.1 System Event Log

The "System Event Log" screen displays a list of the last 40 system events in chronological order (See Figure 12). Reach this screen by pressing "SYSTEM EVENTS" on the "HOME" screen (See Figure 5 on page 6).

#	Time	Name	Severity
26	04-17-2009 22:11:40	CAB2	Auto-Resetting
25	04-17-2009 15:15:00	CAB1	Auto-Resetting
24	04-17-2009 08:18:20	PLL	Auto-Resetting
23	04-17-2009 01:21:40	STAT_GATE	Auto-Resetting
22	04-16-2009 18:25:00	STAT	Auto-Resetting
21	04-16-2009 11:28:20	SKIIP	Auto-Resetting
20	04-16-2009 04:31:40	ULL_OV	Auto-Resetting
19	04-15-2009 21:35:00	OUTPUT_OV	Auto-Resetting
18	04-15-2009 14:38:20	DC_UV	Auto-Resetting
17	04-15-2009 07:41:40	INV_OC	Auto-Resetting
16	04-15-2009 00:45:00	OUTPUT_UV	Auto-Resetting

Figure 12 - System Event Log

Table 6 - System Event Log Description

Description	Function
#	Unique ID (0-39) to identify the system event (unique within the list)
Time	Start time of the system event
Name	Short name of the system event.
Severity	Severity of the system event
Note: Use the up/down arrows to navigate through the list. Press the "SELECT" button to view additional detail about the system event.	

System Event Detail

The "System Event Detail" screen is displayed when a specific system event is selected by pressing on the "SELECT" button on the "SYSTEM EVENT LOG" screen (See Figure on page 11). It provides detailed information that was recorded during the event (See Figure).

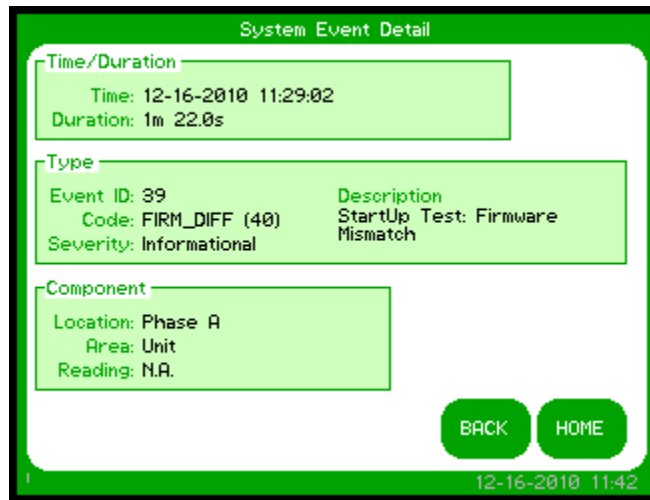


Figure 13 - System Event Detail

Table 7 – System Event Detail

Description	Function
Time/Duration	Time: Date and start time of the system event Duration: The amount of time the event lasted.
Type	Event ID: Unique ID within the list (0-39) to identify the event. Code: Abbreviation of the event followed by a numeric event code in parentheses. (For a list of codes and abbreviations see Table 9 in section 6.4 System Event Types) Severity: Severity of the event Description: Name of the event (See Table 9 in section 6.4 System Event Types)
Component	Location: The location in the system where the event originated (i.e. Phase A, Phase B, Phase C, etc.). Area: The specific area within the location where the event originated (i.e. Inverter, etc.). Reading: In some cases, the system will record a relevant data value during the event i.e. For an "Inverter Over-current Fault," the component "reading" is the current value that caused the event. If a data value is not appropriate for the event type, "N.A." is displayed.

5.2 System Event Notification

When the PRODiSC system first detects an event condition, the "System Fault Detection" dialog box will be displayed (See Figure). Within the "System Fault Detection" box, the name, severity, and location of the event will be displayed.

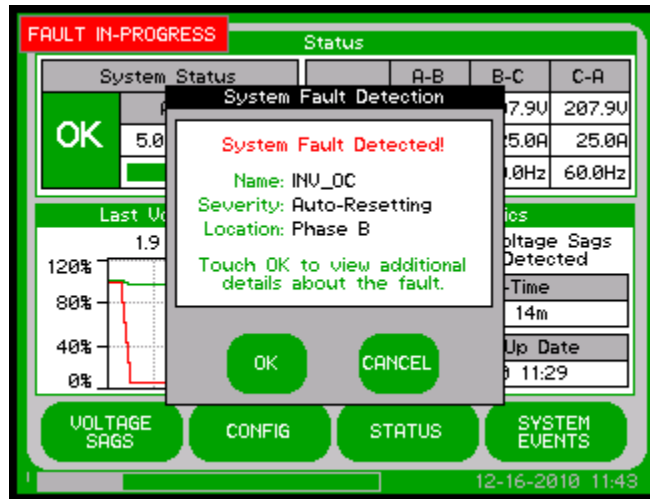


Figure 14 - System Fault Detection

Pressing the "OK" button will open the "System Event Detail" screen as shown in Figure on page 12. The event will appear in the event list after the event is over. The window can be closed by pressing the "CANCEL" button or waiting 15 seconds.

When the event condition clears, a new dialog box will be displayed. Press "OK" to view the complete event detail, or "CANCEL" to close the dialog box (See Figure).

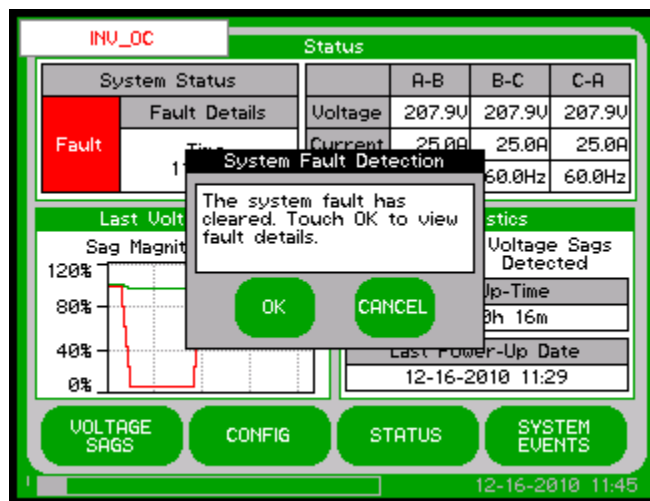


Figure 15 - System Fault Detection - Cleared

If a "Call Service" severity event is detected, record the event details including: name, description, location, and reading. Contact product support immediately. If the event clears, the touch screen will automatically go back to normal operation.

5.3 System Event Types

Table 8 - System Event Codes and Severities

Code	Short Name	Description	Severity	Area
1	POWER_ON	Unit Power On	Informational	Unit
2	ST_UP_ST	StartUp Test Start	Informational	Unit
3	T_COM_ST	Communication Test Start	Informational	Unit
4	T_FAN_ST	Fan Test Start	Informational	Unit
5	T_IN_ST_1	Inverter Test (.5 cycles) Start	Informational	Unit
6	T_IN_ST_2	Inverter Test (3 cycles) Start	Informational	Unit
7	T_IN_ST_3	Inverter Test (5.5 seconds) Start	Informational	Unit
8	T_IGBT_ST	IGBT Test Start	Informational	Unit
9	EXTERNAL	External Fault	Auto-Resetting	Inverter
10	CABINET	External Slave Cabinet Fault	Auto-Resetting	Inverter
11	RUN_TO	Inverter Run Timeout Fault	Auto-Resetting	Inverter
12	LIM_CYCLE	Inverter Limit Cycle Timeout Fault	Auto-Resetting	Inverter
13	STAT_OT	Static Switch Over-temperature Fault	Auto-Resetting	Static Switch
14	STAT_OL	Static Switch Overload Fault	Auto-Resetting	Static Switch
15	DC_OV	DC Bus Over-voltage Fault	Auto-Resetting	Inverter
16	CNTRL_UV	Controller Power Under-voltage Fault	Auto-Resetting	Inverter
17	OUTPUT_UV	Output Under-voltage Fault	Auto-Resetting	Inverter
18	INV_OC	Inverter Over-current Fault	Auto-Resetting	Inverter
19	DC_UV	DC Bus Under-voltage Fault	Auto-Resetting	Inverter
20	OUTPUT_OV	Output Over-voltage Fault	Auto-Resetting	Inverter
21	VLL_OV	Line-to-Line Over-voltage Fault	Auto-Resetting	Inverter
22	IGBT	IGBT Pack Fault	Auto-Resetting	Inverter
23	STAT	Static Switch Fault	Auto-Resetting	Static Switch
24	STAT_GATE	Static Switch Gate Fault	Auto-Resetting	Static Switch
25	PLL	Phase Lock Loop Fault	Auto-Resetting	Inverter
26	CAB1	Slave Cabinet 1 Fault	Auto-Resetting	Inverter
27	CAB2	Slave Cabinet 2 Fault	Auto-Resetting	Inverter
28	CRIT_CAB1	Critical Slave Cabinet 1 Fault	Call Service	Static Switch
29	CRIT_CAB2	Critical Slave Cabinet 2 Fault	Call Service	Static Switch
30	CRIT_OL	Critical Static Switch Overload Fault	Call Service	Static Switch
31	CONFIG	Configuration Fault	Call Service	Inverter
32	CNTRL_MEM	Controller Memory Fault	Call Service	Inverter
33	UNBALANCE	StartUp Test: DC Bus Unbalance Fault	Call Service	Inverter
34	LINE_CHK	StartUp Test: Line Voltage Check Fault	Call Service	Inverter
35	ID_TO	StartUp Test: ID Count Timeout Fault	Call Service	Unit
36	ID_BAD	StartUp Test: ID Count Mismatch Fault	Call Service	Unit
37	CNFG_TO	StartUp Test: Configuration Timeout Fault	Call Service	Unit
38	CNFG_BAD	StartUp Test: Configuration Wrong Fault	Call Service	Unit
39	FIRM_TO	StartUp Test: Firmware Check Timeout Fault	Auto-Resetting	Unit
40	FIRM_DIFF	StartUp Test: Firmware Mismatch	Informational	Unit
41	SRL_TO	StartUp Test: Serial Number Check Timeout Fault	Auto-Resetting	Unit
42	SRL_DIFF	StartUp Test: Serial Number Mismatch	Informational	Unit
43	T_COM_TO	Communication Test Timeout Fault	Auto-Resetting	Unit
44	T_INV_TO	Inverter Test Timeout Fault	Auto-Resetting	Unit
45	T_IGBT_TO	IGBT Test Timeout Fault	Auto-Resetting	Unit
46	OPEN_DOOR	Unit door open	Call Service	Unit
47	SYS_OVTMP	System Over-temp	Call Service	Unit
48	OPEN_FUSE	Input fuse open	Call Service	Unit
49	OPEN_SCR_A	Open SCR phase A	Call Service	Unit

Code	Short Name	Description	Severity	Area
50	OPEN_SCR_B	Open SCR phase B	Call Service	Unit
51	OPEN_SCR_C	Open SCR phase C	Call Service	Unit
52	EXT_MB	External Mechanical Bypass Command	Call Service	Unit
53	DYN_BRAKE	Dynamic Brake fault	Call Service	Unit
54	SLAVE_OL	Slave Critical SCR OverLoad	Call Service	Unit
55	MSTR_A_UV	Master Board Under Voltage phase A	Call Service	Unit
56	MSTR_B_UV	Master Board Under Voltage phase B	Call Service	Unit
57	MSTR_C_UV	Master Board Under Voltage phase C	Call Service	Unit
58	PLC	Programmable Logic Controller Fault	Call Service	PLC
59	PLC_ST_MM	Programmable Logic Controller State Mismatch	Call Service	Unit
60	IGBT_TST_FAIL	IGBT Test Failure Fault	Call Service	Inverter
61	SELF_TST_ST	Self Test Start	Informational	Unit
62	SELF_TST_PS	Self Test Pass	Informational	Unit
63	SELF_TST_FAIL	Self Test Fail	Call Service	Unit
64	ER_CAP_OV	Over Voltage condition detected in the ER section	Auto-Resetting	ER
65	ER_OP_FUSE	Open fuse condition detected in the ER section	Call Service	ER
66	ER_UNBAL	ER cabinet DC bus halves were unbalanced	Call Service	ER
67	ER_CAP_OT	ER section capacitors were over temperature	Auto-Resetting	ER
68	ER_AMB_OT	ER section ambient was over temperature	Auto-Resetting	ER
69	GND_FLT	A ground fault was detected in the DySC system	Call Service	Unit
70	PLC_ADC_FL	PLC Analog input channel failure	Auto-Resetting	PLC
71	ER_ST_MM	Possible ER section control device failure	Auto-Resetting	ER

*Fault Codes: 10, 22-24, 26-30, 46-63 do not apply to DySC 25A – 100A sized units.

*Fault Codes: 10, 22, 26-30, 54-57, 59-63 do not apply to DySC 200A sized units.

*Fault Codes: 10, 26, 27-30, 54-57, 59-63 do not apply to DySC 400A sized units.

*Fault Codes: 61-63 only apply to HCGT type DySC units.

*Fault Codes: 64-71 only apply to DySC systems integrated with an intelligent extended run section.

6 System Configuration

Press the "CONFIG" button at the bottom of the "HOME" screen to enter the "System Configuration" screen (See [Figure 16](#)). The "SET SYSTEM CLOCK" and "CALIBRATE TOUCH SENSOR" functions are described in Section 2 Quick Start.

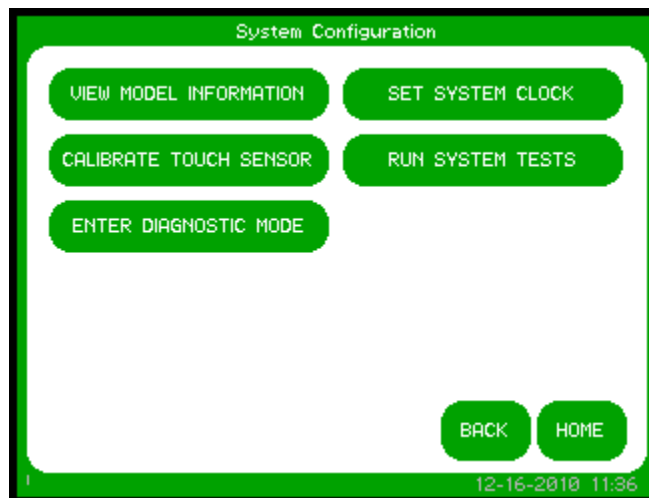


Figure 16 - System Configuration

6.1 Model Information

Touch “VIEW MODEL INFORMATION” to go to the “Model Information” screen (See [Figure 17](#)).

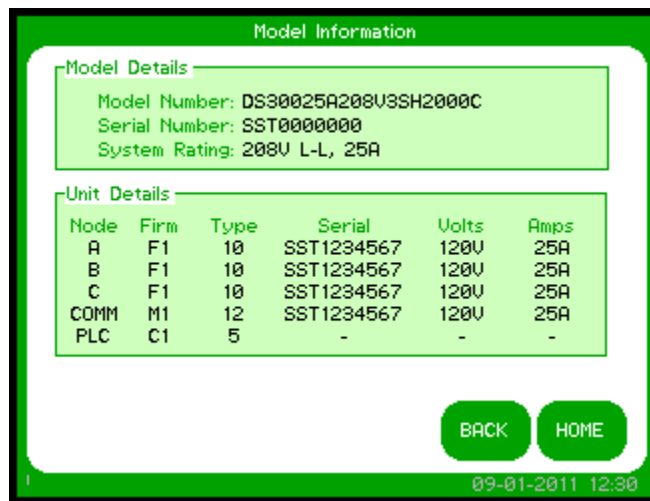


Figure 17 - Model Information

Table 9 - Model Information

Description	Function
Model Details	<p>Model Number: System Model number</p> <p>Serial Number: System serial number</p> <p>System Rating: System voltage and current ratings</p>
Unit Details	<p>Node: The location index for the details listed to the right</p> <p>Firm: The firmware version for the location indexed.</p> <p>Type: Unique code specifying firmware part number for the location indexed.</p> <p>Serial: The serial number for the location indexed</p> <p>Volts: The rated voltage for the locations</p> <p>Amps: The rated current for the location indexed</p>

6.2 Run System Tests

Press the "RUN SYSTEM TESTS" to enter the "System Tests" screen. Press "2 MINS" to run the system fans for 2 minutes (See [Figure 18](#)).

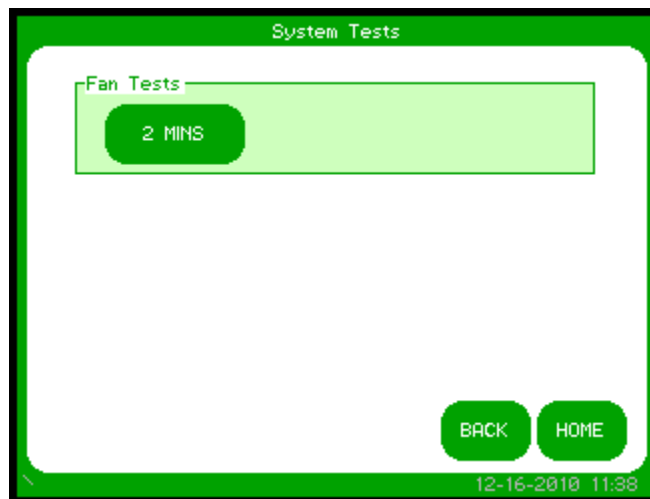


Figure 18 - System Tests

6.3 Diagnostics Mode

This is not a user function. It is numerical code protected for authorized service personnel.