

SERIES 10000 FAULT CODES

Inverter Faults

Overview

Series 10000 fault codes relate to the Inverter. The following table shows the fault number, fault description, system severity level (SSL), isolation message, and comment for each fault. The troubleshooting procedure for each message follows the table.

Fault No	Fault Description	SSL	Isolation Message	Comment
10000	IDSP CSUM	7	Internal Fault	
10001	IDSP RAM FAIL	7	Internal Fault	
10002	IDSP ADC CONV	4	Internal Fault	
10003	IDSP ADC ACC	4	Internal Fault	
10004	IDSP INTRDSPCOM	4	Internal Fault	
10005	IDSP IPM MODULE	4	Grid Fault	
10006	IDSP NEUT IGBT	4	Grid Fault	Stationary
		2	Grid Warning	HEV
10007	IDSP DC OV	4	Grid Fault	
10008	IDSP OV A	4	Protective Relay Fault	
10009	IDSP OV B	4	Protective Relay Fault	
10010	IDSP OV C	4	Protective Relay Fault	
10011	IDSP UV A	4	Protective Relay Fault	
10012	IDSP UV B	4	Protective Relay Fault	
10013	IDSP UV C	4	Protective Relay Fault	
10014	IDSP OC A	4	Grid Fault	
10015	IDSP OC B	4	Grid Fault	
10016	IDSP OC C	4	Grid Fault	
10017	IDSP OVER FREQ	4	Protective Relay Fault	
10018	IDSP UNDR FREQ	4	Protective Relay Fault	
10019	IDSP DLTA FREQ	4	Protective Relay Fault	
10020	IDSP HTSK OTEMP	4	High-Temp Fault	
10021	IDSP HTSK OP	4	Internal Fault	
10022	IDSP HTSK SH	4	Internal Fault	
10023	IDSP CNTCTR OP	4	Internal Fault	
10024	IDSP CNTCTR CL	4	Internal Fault	
10025	IDSP SYNC TO	4	Grid Fault	
10026	IDSP MODE CHG	4	Internal Fault	

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Fault No	Fault Description	SSL	Isolation Message	Comment
10027	IDSP GRID UNBL	2	Grid Warning	
10028	IDSP GRID/LOAD	4	Grid Fault	
10029	IDSP BAT FAIL	4	Grid Fault	
10030	IDSP OV BAT	4	Grid Fault	
10031	IDSP UV BAT	4	Grid Fault	
10032	IDSP FAN FAIL	2	Internal Warning	Not Used
10033	IDSP DI OTMP	4	Internal Fault	Not Used
10034	IDSP DI BUS OV	4	Internal Fault	Not Used
10035	IDSP OP LIVE	4	User Connection Fault	
10036	IDSP SNSR CAL	4	Internal Fault	
10037	IDSP PRECHARGE	4	Internal Fault	
10038	IDSP FST OV	4	Protective Relay Fault	
10039	IDSP FST UV	4	Protective Relay Fault	
10040	IDSP RCURR	4	Internal Fault	
10041	IDSP XCURR	4	Internal Fault	
10042	IDSP NCURR	4	Internal Fault	
10043	IDSP DCV CNTL	4	Internal Fault	
10044	IDSP ACT ISL	4	Islanding Fault	
10045	IDSP PASS ISL	4	Islanding Fault	
10046	IDSP DC I DET	4	Internal Fault	Not Used
10047	IDSP FST OV A	4	Protective Relay Fault	
10048	IDSP FST OV B	4	Protective Relay Fault	
10049	IDSP FST OV C	4	Protective Relay Fault	
10050	IDSP FST UV A	4	Protective Relay Fault	
10051	IDSP FST UV B	4	Protective Relay Fault	
10052	IDSP FST UV C	4	Protective Relay Fault	
10053	IDSP FST UFREQ	4	Protective Relay Fault	
10054	IDSP INTR WARN	2	Internal Warning	

Observe Safety Precautions - Refer to *Safety Instructions* for Details

10000 Internal Fault IDSP CSUM

Inverter DSP Control Software Checksum Error

System Severity Level 7

A software checksum is stored and used to verify the program in the memory devices is correct and not altered. On power up, this checksum is re-verified to check that the software has not been altered. Failure of this check causes the software to declare a checksum test fault.

Symptom	Probable Cause	Analysis	Repair Solution
Inverter DSP control software contains wrong checksum value	Previous download of the Inverter DSP software was not successfully done.	The Inverter DSP software needs to be downloaded again.	Try to download the Inverter DSP software again. Make sure that the right DSP CRC file is used and the download process is finished completely.
	Abnormal electrical signals exist on the DPC Control Board.	Check if all the connectors are properly connected.	Connect the DPC Control Board correctly.
	System is not initialized properly	System needs rebooting.	Reboot the system.
	Faulty DPC Control Board.	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).

10001 Internal Fault IDSP RAM FAIL

Inverter DSP Processor RAM Test Failed

System Severity Level 7

RAM memory devices have been known to fail due to weaknesses incurred through age and abnormal electrical signals. To prevent software from storing data in a RAM location that may be volatile, an integrity check is performed. Incorrect read back verification from any RAM memory location causes the software to declare a RAM test failure.

Symptom	Probable Cause	Analysis	Repair Solution
The Power-On Self-Test (POST) for the RAM failed	Abnormal electrical signals exist on the DPC Control Board.	Check if all the connectors are properly connected.	Connect the DPC Control Board correctly.
	System is not initialized properly.	System needs rebooting.	Reboot the system.
	Faulty DPC Control Board.	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).

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10002 Internal Fault IDSP ADC CONV

Inverter Analog/Digital Conversion Failed

System Severity Level 4

The software declares a fail to convert fault when the analog to digital conversion process is not completed.

Symptom	Probable Cause	Analysis	Repair Solution
Analog to digital (A/D) conversion failed	The A/D conversions did not finish within the expected time.	The control software may contain bugs. Check if a newer version of the control software is released.	Update the control software.
	A/D conversion overruns occurred.	The control software may contain bugs. Check if a newer version of the control software is released.	Update the control software.
	System is not initialized properly.	System needs rebooting.	Reboot the system.
	Faulty DPC Control Board.	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).

10003 Internal Fault IDSP ADC ACC

Inverter Analog/Digital Accuracy Fault

System Severity Level 4

Software declares an A/D Accuracy fault when the A/D reference voltage is outside a preset value. The software also declares an A/D Accuracy fault when the calibration routine fails on timeout.

Symptom	Probable Cause	Analysis	Repair Solution
The reference voltage of the A/D conversion is not accurate enough.	System is not initialized properly.	System needs rebooting.	Reboot the system.
	Faulty DPC Control Board.	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).

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10004 Internal Fault IDSP INTRDSPCOM

Inverter Inter-DSP Communications Loss

System Severity Level 4

The Inverter Control DSP transmits information across the RS-485 communication link to other DSP's. When a new data packet is not received within a set time, the Inverter control software declares a fault.

Symptom	Probable Cause	Analysis	Repair Solution
Communication between Inverter DSP's is lost for a set time.	Inter-Bus cable is not connected.	Check the connection of the following cables: <ol style="list-style-type: none">1. Inter-Bus cables which run between the UCB boards of the MicroTurbine systems.2. Inter-Controller cables connecting the DPC Control Board to the UCB board.	Connect the Inter-Bus cable correctly.
	Inter-Bus terminators are not installed properly.	Check the UCB boards of the Multipac system. Make sure the Inter-Bus terminators are installed.	Install the Inter-Bus terminators.
	Faulty DPC Control Board.	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).

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10005 Grid Fault IDSP IPM MODULE

Inverter Intelligent Power Module Fault

System Severity Level 4

Hardware circuit protection is provided in the IPM device to detect overcurrent, undervoltage, and over temperature conditions. The software declares an IPM fault when any of these circuits is not operating properly.

Symptom	Probable Cause	Analysis	Repair solution
Inverter 3-phase IPM module fault is detected.	The utility grid experienced a very large disturbance, which caused either overcurrent or overvoltage/undervoltage faults to the IPM module.	This happens in the Grid Connect mode. The DPC Controller can ride through short period grid transient without reporting any fault. However, prolonged grid transient will cause the Inverter overcurrent and/or IPM faults.	After the grid becomes normal, restart the system.
	The soft-start parameters are not set properly.	This happens in the Stand Alone mode. Trying to start induction motors without proper settings of the soft-start parameters can cause this fault and/or AC overcurrent faults.	Adjust the soft-start parameters.
	Overload.	Overload can cause the Intelligent Power Module (IPM) fault and AC overcurrent faults.	Adjust the load.
	Load transients.	Some faults such as short circuits in the load can cause the IPM failure and/or AC overcurrent faults.	Fix the problem existing in the load.
	DC Bus voltage reached the hardware limits (900V).	Both the Inverter IPM fault and the generator IPM fault should be detected in this situation. One main reason to have this fault is the generator brake overtemperature. Excess offload operations can cause the brake overtemperature fault.	Increase the time between each offload operation.
	Low Power Supply voltage.	Check the Power Supply voltage - refer to the Troubleshooting a Micro-Turbine that Does Not Wake Up section.	Follow troubleshooting instructions for Power Supply.
	Inverter 3-phase IPM is damaged.	DPC needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

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10006 Grid Fault IDSP NEUT IGBT

Inverter Neutral IGBT Fault

System Severity Level 4 (Stationary) / 2 (HEV)

Hardware circuit protection is provided in the Neutral power module to detect overcurrent, undervoltage, and over temperature conditions. Software declares a Neutral IGBT fault when any of these circuits is not operating properly. An automatic recovery is attempted after a Neutral module shutdown.

Symptom	Probable Cause	Analysis	Repair Solution
Inverter Neutral IPM Module fault is detected.	Neutral IPM over-current.	The 3-phase load is unbalanced, or too much DC current is flowing to the load.	Adjust the load.
	Inverter Neutral IPM is damaged.	DPC needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

10007 Grid Fault IDSP DC OV

Inverter DC Bus Overvoltage

System Severity Level 4

Several components connected to the DC Bus have maximum operating voltage limits. To protect these components from failure, software detects a fault condition and shuts down the system when the DC Bus voltage input exceeds the DC Bus Voltage Limit.

Symptom	Probable Cause	Analysis	Repair solution
DC Bus voltage reading is higher than its fault limit	The DC Bus over-voltage fault limit is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the control software being used.	Re-program the Power Board PM.
	Open/loose connection.	Check the connection of the cable that connects to the port J15 of the DPC Control Board.	Tighten cable connections.
	DC Bus voltage reached fault limit.	One main reason to have this fault is the generator brake overtemperature. Excess number of offload operations in a short period of time can cause the brake overtemperature fault.	Increase the time between each offload operation.
	Faulty DPC Control Board.	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board.	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

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**10008 Protective Relay Fault
IDSP OV A**

Inverter Phase A Overvoltage
System Severity Level 4

**10009 Protective Relay Fault
IDSP OV B**

Inverter Phase B Overvoltage
System Severity Level 4

**10010 Protective Relay Fault
IDSP OV C**

Inverter Phase C Overvoltage
System Severity Level 4

In the Grid Connect mode, the AC overvoltage indicates that the grid is operating under some fault condition or that a local island has formed. In the Stand Alone mode, the AC overvoltage may damage the customer load. In either case, it is important that the Inverter be shut down. The software declares an AC overvoltage fault, when any of the magnitude estimates of the phase A, B or C voltage inputs exceeds $[(\sqrt{2}) \times \text{AC Max Voltage Limit}]$, for a period of time greater than the AC Overvoltage Timeout.

Symptom	Probable Cause	Analysis	Repair Solution
Phase A, B or C voltage reading is higher than the AC overvoltage limit.	The AC over-voltage limit is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the control software being used.	Re-program the Frame PM or reset the limits.
	Open/loose connection.	Check the connection of the cable that connects to the port J15 of the DPC Control Board.	Tighten cable connections
	Phase A, B or C voltage is too high.	Inspect the grid voltage. If there is any transformer between the system and the grid, make sure that its wire connections are correct.	Solve the grid problem.
	The Neutral is not grounded properly.	Inspect the grounding wires. In the Grid Connect application, the Neutral should not be grounded. However, the Neutral must be grounded in the Stand Alone application.	Correct the error in grounding.
	The system failed before it is synchronized to the grid.	In the Grid Connect mode, if the system failed before it is synchronized to the grid, all of the following faults will be set: <ul style="list-style-type: none"> • Overvoltage and undervoltage in all three phases. • Overfrequency and underfrequency faults. Generally, one or more other faults will also be set, and the extra fault information gives the true reason of the failure.	Solve the problems indicated by the other fault codes.
	Faulty DPC Control Board.	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board.	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

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**10011 Protective Relay Fault
IDSP UV A**

Inverter Phase A Undervoltage
System Severity Level 4

**10012 Protective Relay Fault
IDSP UV B**

Inverter Phase B Undervoltage
System Severity Level 4

**10013 Protective Relay Fault
IDSP UV C**

Inverter Phase C Undervoltage
System Severity Level 4

In the Grid Connect mode, the AC undervoltage indicates that the grid is operating under some fault condition or that a local island has formed. In the Stand Alone mode, the AC undervoltage may cause the customer loads to malfunction. In either case, it is important that the Inverter be shut down. Software declares an AC undervoltage fault, when any of the magnitude estimates of the phase A, B or C voltage inputs falls below $[(\sqrt{2}) \times \text{AC Min Voltage Limit}]$, for a period of time greater than the AC Undervoltage Timeout.

Symptom	Probable Cause	Analysis	Repair Solution
Phase A, B or C voltage reading is lower than the AC undervoltage limit.	The AC undervoltage limit is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the control software being used.	Re-program the Frame PM or reset the limits.
	Debris or water in package.	Inspect the DPC Power Board, Control Board and the cables connecting them for any material that could short connections.	Clean DPC.
	Phase A, B or C voltage is too low.	Inspect the grid voltage. If there is any transformer between the system and the grid, make sure that its wire connections are correct.	Solve the problem of the grid.
	The Neutral is not grounded properly.	Inspect the grounding wires. In the Grid Connect application, the Neutral should not be grounded. However, the Neutral must be grounded in the Stand Alone application.	Correct the error in grounding.
	The system failed before it is synchronized to the grid.	In the Grid Connect mode, if the system failed before it is synchronized to the grid, all the following faults will be set: <ul style="list-style-type: none"> • Overvoltage and undervoltage in all three phases. • Overfrequency and underfrequency faults. Generally, one or more other faults will also be set, and the extra fault information gives the true reason of the failure.	Solve the problems indicated by the other fault codes.
	Faulty DPC Control Board.	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board.	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

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10014 Grid Fault IDSP OC A

Inverter Overcurrent Phase A

System Severity Level 4

10015 Grid Fault IDSP OC B

Inverter Overcurrent Phase B

System Severity Level 4

10016 Grid Fault IDSP OC C

Inverter Overcurrent Phase C

System Severity Level 4

Overcurrent protection prevents application of excessive stress to the Intelligent Power Module (IPM). The software declares an AC overcurrent fault when phase A, B or C current inputs exceed the Overcurrent Limit for any one sample. An automatic recovery is attempted after an overcurrent.

Symptom	Probable Cause	Analysis	Repair Solution
Phase A, B or C current reading is higher than the AC overcurrent limit.	The AC overcurrent limit is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the control software being used.	Re-program the Power Board PM.
	Open/loose connection	Check the connection of the cable that connects to the port J15 of the DPC Control Board.	Tighten cable connections.
	The utility grid experienced a very large disturbance, which caused overcurrent to the Inverter.	This happens in the Grid Connect mode. The DPC can ride through short period grid transient without reporting any fault. However, prolonged grid transient will cause the Inverter overcurrent and/or IPM faults.	After the grid becomes normal, restart the system.
	The soft-start parameters are not set properly.	This happens in the Stand Alone mode. Trying to start induction motors without proper settings of the soft-start parameters can cause AC overcurrent faults and/or IPM faults.	Adjust the soft-start parameters.
	Overloads.	Overloads can cause the IPM fault and AC overcurrent faults.	Adjust the load.
	Load transients.	Some faults, such short circuits, in the load can cause the AC overcurrent and/or IPM faults.	Fix the problem existing in the load.
	Faulty DPC Control Board.	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board.	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

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10017 Protective Relay Fault IDSP OVER FREQ

Inverter Overfrequency

System Severity Level 4

In the Grid Connect mode, the AC overfrequency indicates that the grid is operating under some fault condition, or that a local island has formed. In the Stand Alone mode, the AC overfrequency may damage the customer load. In either case, it is important that the Inverter be shut down. The software declares an AC overfrequency fault when the estimate of AC frequency exceeds AC Max Frequency Limit for a period of time greater than the AC Overfrequency Timeout.

Symptom	Probable Cause	Analysis	Repair Solution
The estimated AC frequency exceeds AC Max Frequency Limit, for a period of time greater than the AC Overfrequency Timeout setting.	The AC max frequency limit is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the control software being used.	Re-program the Power Board PM.
	The AC Over-frequency Timeout is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the control software being used.	Re-program the Power Board PM.
	The grid is in fault condition.	Check the quality of the grid and make sure that no local island has formed.	Clear the fault condition of the grid.
	Faulty DPC Control Board.	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board.	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

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10018 Protective Relay Fault IDSP UNDER FREQ

Inverter Underfrequency

System Severity Level 4

In the Grid Connect mode, the AC underfrequency indicates that the grid is operating under some fault condition or that a local island has formed. In the Stand Alone mode, the AC underfrequency may damage the customer load. In either case, it is important that the Inverter be shut down. The software declares an AC underfrequency fault when the estimate of AC frequency falls below AC Minimum Frequency Limit, for a period of time greater than the AC Underfrequency Timeout.

Symptom	Probable Cause	Analysis	Repair Solution
The estimated AC frequency exceeds AC Min Frequency Limit for a period of time greater than the AC Underfrequency Timeout setting.	The AC Minimum Frequency Limit is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the control software being used.	Re-program the Power Board PM.
	The AC Under-Frequency Timeout is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the control software being used.	Re-program the Power Board PM.
	The grid is in fault condition.	Check the quality of the grid and make sure that no local island has formed.	Clear the fault condition of the grid.
	Faulty DPC Control Board.	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board.	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

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10019 Protective Relay Fault IDSP DLTA FREQ

Inverter Rate of Change of Frequency

System Severity Level 4

This fault is only tested in Grid Connect modes, where an excessive rate of change of frequency indicates that a local island has formed. This detection mechanism is the primary way of detecting islanding when the island is supported by synchronous rotating generators in addition to Capstone systems. The software declares this fault when the estimate of rate of change of frequency exceeds the Frequency Filter Crossover, for a period of time greater than the AC Underfrequency Timeout.

Symptom	Probable Cause	Analysis	Repair Solution
The estimate of Rate of Change of Frequency (ROCOF) exceeds the Frequency Filter Crossover for a period of time greater than the AC Underfrequency Timeout.	The AC Frequency Filter Crossover is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the control software being used.	Re-program the Power Board PM.
	The Rate of Change of Frequency fault Timeout period is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the control software being used.	Re-program the Power Board PM.
	The grid is in fault condition. Especially, a local island has formed.	Check the quality of the grid and make sure that no local island has formed.	Clear the fault condition of the grid.
	Faulty DPC Control Board.	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board.	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

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10020 Hi-Temp Fault IDSP HTSK OTMP

Inverter Heat Sink Overtemperature

System Severity Level 4

The Intelligent Power Module (IPM) power rating decreases as the operating temperature increases. The software declares a heat sink overtemperature when the measured heat sink temperature exceeds the Heat Sink Temperature Limit of 110 °C for any one sample period.

Symptom	Probable Cause	Analysis	Repair Solution
The measured heat sink temperature exceeds its limit.	The Heat Sink temperature limit is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the control software being used.	Re-program the Power Board PM.
	Debris or water in package.	Check and clean connectors connecting J11 and J12 of the Power Board, and J15 of the Control Board. Check related cables and make sure that they are in good condition.	Clean the DPC.
	Open/loose connection	Check the connection between J20 of the Power Board and the cooling fan. Check the connection between the J23 of the Power Board and the vent fan.	Fix any loose or faulty connection.
	The Cooling fan and/or vent fan failed or the cooling airflow is blocked.	Inspect the cooling fan and vent fan, make sure that it is working properly. Check if the cooling airflow is blocked.	Fix any problem relating the cooling fan and cooling airflow.
	Faulty DPC Control Board	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

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10021 Internal Fault IDSP HTSK OP

Inverter Heat Sink Sensor Open

System Severity Level 4

The software declares a Heat Sink Sensor Open fault when the measured heat sink temperature is less than the Heat Sink Temperature Open Limit of -60 °C for any one sample period.

Symptom	Probable Cause	Analysis	Repair Solution
The measured Heat Sink temperature is lower than the assumed Thermistor Open temperature.	The assumed Thermistor Open temperature is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the control software being used.	Re-program the Power Board PM.
	Open/loose connection.	Check and clean connectors connecting J11 and J12 of the Power Board, and J15 of the Control Board. Check related cables and make sure that they are in good condition.	Clean the DPC.
	Faulty DPC Control Board	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

10022 Internal Fault IDSP HTSK SH

Inverter Heat Sink Sensor Short

System Severity Level 4

The software declares a Heat Sink Sensor Short fault when the measured heat sink temperature exceeds the Heat Sink Temperature Short Limit of 200 °C for any one sample period.

Symptom	Probable Cause	Analysis	Repair Solution
The measured heat sink temperature is higher than the assumed Thermistor Short Temperature.	The assumed Thermistor Short temperature is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the control software being used.	Re-program the Power Board PM.
	Debris or water in package.	Check and clean connectors connecting J11 and J12 of the Power Board, and J15 of the Control Board. Check related cables and make sure that they are in good condition.	Clean the DPC.
	Faulty DPC Control Board	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

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10023 Internal Fault IDSP CNTCTR OP

Inverter AC Output Contactor Failed to Open

System Severity Level 4

The software declares that the contactor failed in the open position, if the contactor closed status remains low for more than the Contactor Closing Time of one second, after the contactor drive request goes from low to high.

Symptom	Probable Cause	Analysis	Repair Solution
The Contactor Closed status remains low for more than the Contactor Closing Time, after the contactor drive request went from low to high.	The Contactor Closing Time is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the control software being used.	Re-program the Power Board PM.
	Open/loose connection	Check the connection between J21 and the AC output contactor.	Tighten the cable connection.
	Faulty DPC Control Board	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

10024 Internal Fault IDSP CNTCTR CL

Inverter AC Output Contactor Failed to Close

System Severity Level 4

The software declares that the contactor failed in the closed position, if the contactor closed status remains high for more than the Contactor Opening Time of one second, after the contactor drive request went from high to low.

Symptom	Probable Cause	Analysis	Repair Solution
The Contactor Closed status remains high for more than the Contactor Opening Time after the Contactor drive request went from low to high.	The Contactor Opening Time is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the control software being used.	Re-program the Power Board PM.
	Open/loose Connection	Check the connection between J21 and the AC Output Contactor.	Tighten the cable connection.
	Faulty DPC Control Board	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

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10025 Grid Fault IDSP SYNC TO

Inverter DSP Synchronization Timeout

System Severity Level 4

In Grid Connect operation, the software declares a Synchronization Timeout fault if the Inverter fails to acquire basic information about the grid voltages within the Grid Acquire Timeout. After successful grid acquisition, the software declares a Synchronization Timeout fault if another AC waveform fault is detected, or if DC Bus is not precharged by the end of the Grid Synchronization Timeout of 0.05 second.

In Stand Alone Master mode, the software declares a Synchronization Timeout fault if any of the measured AC voltages exceed the Live Voltage Threshold. (This would indicate a grid connection.)

In Stand Alone Slave mode, the software declares a Synchronization Timeout fault unless the Inverter has locked to the angle broadcast on the InterDSP Bus by the master, and the measured AC voltages do not exceed the Live Voltage Threshold, by the end of the Bus Synchronization Timeout of 0.05 second.

Symptom	Probable Cause	Analysis	Repair Solution
Inverter fails to acquire basic information about the grid voltages within the Grid Acquire Timeout time	Grid is not connected.	The Undervoltage faults can also be observed in this situation. Also, the displayed AC voltages should be very small. Check the grid connection, and make sure that the connection is not configured in Stand Alone mode, and the grid breaker is in ON state.	Fix grid connection error.
	The AC undervoltage limit and/or the AC overvoltage limit are wrongly set.	Make sure that the Frame PM is programmed properly and is supported by the control software being used.	Re-program the Frame PM or reset the limits.
	Open/loose connection	Check the connection of the cable that connects the port J15 of the DPC Control Board.	Tighten cable connections.
	Debris or water in package	Inspect the DPC Power Board, Control Board, and the cables connecting them for any material that could short connections.	Clean the DPC.
	Grid quality is too poor.	Additional faults, such as Rate of Change of Frequency, Undervoltage, and Under-frequency faults should also be seen in this situation. Check the quality of the voltage waveform.	Reduce the noise injected to the grid by other electric equipment.

Continued on next page

Observe Safety Precautions - Refer to *Safety Instructions* for Details

10025 Grid Fault IDSP SYNC TO (Cont'd)

Symptom	Probable Cause	Analysis	Repair Solution
Inverter fails to acquire basic information about the grid voltages within the Grid Acquire Time-out time (Continued)	Faulty DPC Control Board	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

10026 Internal Fault IDSP MODE CHG

Inverter Illegal Mode Change Fault

System Severity Level 4

The software declares an Illegal Mode Change fault if the commanded mode undergoes a change in value that is not supported on the Inverter state machines.

Symptom	Probable Cause	Analysis	Repair Solution
The Commanded mode undergoes a change in value that is not supported on the Inverter state machines.	The control software version of the Inverter DSP does not match that of the Main CPU.	Check software version information of both the Inverter DSP and the Main CPU.	Reload the right control software to both the Inverter DSP and the Main CPU.
	Error in the control software of the main CPU.	Record all of the commands used when this fault happened, and report this to software development group.	Generate incident report to describe how to repeat this fault.

Observe Safety Precautions - Refer to *Safety Instructions* for Details

10027 Grid Warning IDSP GRID UNBL

Inverter Grid Unbalance Warning

System Severity Level 2

The software declares a Grid Unbalance warning fault when either the current or voltage control loops have been deemed out of control for longer than the Grid Unbalance Timeout period. If two warning faults are received within the period given by Warning to Error Timeout, a grid/load fault will be declared.

Symptom	Probable Cause	Analysis	Repair Solution
Either the current or voltage control loops have been deemed out of control for longer than the Grid Unbalance Timeout period. This fault exists only in the control software with version number lower than 4.20.	The control software version of the Inverter DSP does not match that of the Main CPU.	Check software version information of both the Inverter DSP and the Main CPU.	Reload the right control software to both the Inverter DSP and the Main CPU.
	The parameters used to detect this fault are not set properly.	Make sure that the Frame PM is programmed properly and is supported by the installed control software.	Re-program the Frame PM or reset the limits.
	Open/loose connection	Check the connection of the cables between the DPC Control Board and Power Board.	Tighten cable connections.
	Debris or water in package	Inspect the DPC Power Board, Control Board and the cables connecting them for any material that could short connections.	Clean DPC.
	Faulty DPC Control Board	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

Observe Safety Precautions - Refer to *Safety Instructions* for Details

10028 Grid Fault IDSP GRID/LOAD

Inverter Grid or Load Failure

System Severity Level 4

The software declares a Grid or Load Failure fault when two warning faults are received within the period given by Warning to Error Timeout.

Symptom	Probable Cause	Analysis	Repair Solution
Two warning errors are received within the period given by Warning to Error Timeout. This fault exists only in the control software with version number lower than 4.20	The control software version of the Inverter DSP does not match that of the Main CPU.	Check software version information of both the Inverter DSP and the Main CPU.	Reload the right control software to both the Inverter DSP and the Main CPU.
	The parameters used to detect this fault are not set properly.	Make sure that the Frame PM is programmed properly and is supported by the installed control software.	Re-program the Frame PM or reset the limits.
	Open/loose connection	Check the connection of the cables between the DPC Control Board and Power Board.	Tighten cable connections.
	Debris or water in package	Inspect the DPC Power Board, Control Board and the cables connecting them for any material that could short connections.	Clean DPC.
	Faulty DPC Control Board	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

Observe Safety Precautions - Refer to *Safety Instructions* for Details

10029 Grid Fault IDSP BAT FAIL

Inverter Battery Failure

System Severity Level 4

The software declares a Battery Failure fault when the battery voltage produced by the leg current controllers remains above the Battery High Overvoltage or below the Battery Low Undervoltage, for a period of time greater than that of the Battery Failure Timeout.

Symptom	Probable Cause	Analysis	Repair Solution
The battery voltage produced by the leg current controllers has remained above the Battery High Overvoltage, or below the Battery Low Undervoltage, for a period of time greater than that of the Battery Failure Timeout.	Battery Management system not regulating battery voltage properly	Look at the fault history for voltage or current faults.	Follow troubleshooting guides for these faults.
	Incorrect overvoltage or undervoltage limit	Check limits set in software.	Set correct limits.
	Incorrect battery current limit	Verify the limit is 128A and not 0 (zero).	Set BATLIM=128 using the CRMS
	Bad cell in Battery Pack	Check Battery.	Replace Battery Pack (See Work Instr. 440011).

10030 Grid Fault IDSP OV BAT

Inverter Battery Overvoltage

System Severity Level 4

If the battery voltage becomes too large, damage may be caused to either the DPC or the Battery Pack. The software declares a battery overvoltage fault, when the filtered battery voltage exceeds the Battery Overvoltage Limit, for a period of time greater than the Battery Overvoltage Timeout.

Symptom	Probable Cause	Analysis	Repair Solution
The filtered battery voltage exceeds the Battery Overvoltage Limit for a period of time greater than the Battery Overvoltage Timeout.	Battery Management system not regulating battery voltage properly	Look at regenerative braking and the rest of the system.	Change Power Demand in Battery Management software more quickly to prevent overvoltage.
	Incorrect overvoltage limit	Check limit set in software.	Set correct overvoltage limit.

Observe Safety Precautions - Refer to Safety Instructions for Details

10031 Grid Fault IDSP UV BAT

Inverter Battery Undervoltage

System Severity Level 4

If the battery voltage become too low, damage may be caused to the Battery Pack. The software declares a battery undervoltage fault, when the filtered battery voltage is less than the Battery Undervoltage Limit, for a period of time greater than the Battery Undervoltage Timeout.

Symptom	Probable Cause	Analysis	Repair Solution
The filtered battery voltage is less than the Battery Undervoltage Limit for a period of time greater than the Battery Undervoltage Timeout.	Battery Management system not regulating battery voltage properly	Look at regenerative braking and the rest of the system.	Change Power Demand in Battery Management software more quickly to prevent undervoltage.
	Incorrect undervoltage limit	Check limit set in software.	Set correct undervoltage limit.

10035 User Connection Fault IDSP OP LIVE

Inverter Output Live On Stand Alone Start

System Severity Level 4

Upon entering Stand Alone master mode, the software declares an Output Live on Stand Alone start fault, if any of the measured AC voltages exceed the Live Voltage Threshold. (This would indicate a grid connection.)

Symptom	Probable Cause	Analysis	Repair Solution
The measured AC voltages exceed the Live Voltage Threshold	Inverter output is connected to the grid while the system is commanded to run in Stand Alone operation mode.	Check the system configuration and the positions of the circuit breakers.	Make sure that the grid or any other AC source is disconnected before running the system in Stand Alone mode.
	The voltage generated by the spinning AC motors is too high.	Check if there is any AC motor spinning in high speed.	Wait until the speeds of the AC motors are low enough, and then start the system in Stand Alone mode.

Observe Safety Precautions - Refer to *Safety Instructions* for Details

10036 Internal Fault IDSP SNSR CAL

Inverter Sensor Calibration Failure

System Severity Level 4

When the inverter is enabled, a calibration is performed to determine the DC offset of the output current sensors. If this offset exceeds the maximum current sensor offset for longer than the current sensor calibration timeout of one second, a sensor calibration fault is declared.

Symptom	Probable Cause	Analysis	Repair Solution
The DC offset of the output current sensors determined during the calibration period exceeds the maximum current sensor offset.	The maximum current sensor offset is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the installed control software.	Re-program the Power Board PM.
	Open/loose Connection	Check the connection of the cable that connects the port J15 of the DPC Control Board.	Tighten cable connections.
	Faulty DPC Control Board	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

Observe Safety Precautions - Refer to *Safety Instructions* for Details

10037 Internal Fault IDSP PRECHARGE

Inverter Failed to Precharge

System Severity Level 4

In Grid Connect operation, the software declares a Failed to Precharge fault if the DC Bus is not precharged by the end of the Grid Synchronization Timeout of one second.

Symptom	Probable Cause	Analysis	Repair Solution
In Grid Connect operation, the DC Bus is not pre-charged by the end of the Grid Synchronization Timeout time.	The control parameter of Grid Synchronization Timeout is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the installed control software.	Re-program the Power Board PM.
	Open/loose connection	Open the DPC cover and check if the wires between the line filter & pre-charge board.	Tighten cable connections.
	The precharge resistors are burnt.	Open the DPC cover and check the condition of the precharge resistors.	Replace the line filter & precharge board.
	Faulty DPC Control Board	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

Observe Safety Precautions - Refer to *Safety Instructions* for Details

10038 Protective Relay Fault IDSP FST OV

Inverter Fast Overvoltage

System Severity Level 4

In Grid Connect mode, the fundamental component of the AC voltage demand for the inverter IPM is limited to be less than or equal to the Fast Overvoltage limit. If the Fast Overvoltage limit is reached for more than the Fast Overvoltage Timeout (0.02 sec), an internal warning is logged. At this point, the inverter output is suspended and a re-synchronization occurs. If two warnings are logged within the period given by Warning to Error Timeout (30 sec), the system will shut down and declare errors for all events logged as warnings.

Symptom	Probable Cause	Analysis	Repair Solution
In Grid Connected modes, the fundamental component of the AC voltage demand for the Inverter IPM is more than the Fast Overvoltage Limit for more than the Fast Overvoltage Timeout period.	The Fast Overvoltage limit is wrongly set.	Make sure that the Frame PM is programmed properly and is supported by the installed control software.	Re-program the Frame PM.
	The Fast Overvoltage Timeout period is wrongly set.	Make sure that the Frame PM is programmed properly and is supported by the installed control software.	Re-program the Frame PM.
	Open/loose connection	Check the connection of the cable that connects the port J15 of the DPC Control Board.	Tighten cable connections.
	The grid impedance is too high.	Check the system connection and make sure that the grid impedance is within the limit set by the specification.	Fix the problem in the system connection.
	Faulty DPC Control Board	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

Observe Safety Precautions - Refer to *Safety Instructions* for Details

10039 Protective Relay Fault IDSP FST UV

Inverter Fast Undervoltage

System Severity Level 4

In Grid Connect mode, the fundamental component of the AC voltage demand for the inverter IPM is limited to be greater than or equal to the Fast Undervoltage limit. If the Fast Undervoltage limit is reached for more than the Fast Undervoltage Timeout (0.05 sec), an internal warning is logged. At this point, the inverter output is suspended and a re-synchronization occurs. If two warnings are logged within the period given by Warning to Error Timeout (30 sec), the system will shut down and declare errors for all events logged as warnings.

Symptom	Probable Cause	Analysis	Repair Solution
In Grid Connected modes, the fundamental component of the AC voltage demand for the Inverter IPM is less than the Fast Undervoltage Limit for more than the Fast Undervoltage Timeout period.	The Fast Undervoltage Limit is wrongly set.	Make sure that the Frame PM is programmed properly and is supported by the installed control software.	Re-program the Frame PM.
	The Fast Undervoltage Timeout period is wrongly set.	Make sure that the Frame PM is programmed properly and is supported by the installed control software.	Re-program the Frame PM.
	Faulty DPC Control Board	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

Observe Safety Precautions - Refer to Safety Instructions for Details

10040 Internal Fault IDSP RCURR

Inverter Real Current Error

System Severity Level 4

In Grid Connect mode, the errors are monitored between measured and reference values of the Real component of inverter current. If the error exceeds the maximum current error for the Current Error Timeout (one second), an internal warning is logged. At this point, the inverter output is suspended and a re-synchronization occurs. If two warnings are logged within the period given by Warning to Error Timeout (30 sec), the system will shut down and declare errors for all events logged as warnings.

Symptom	Probable Cause	Analysis	Repair Solution
The error between the measured and reference values of the real current exceeds the Maximum Current Error for the Current Error Timeout period.	The Maximum Current Error is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the installed control software.	Re-program the Power Board PM.
	The Current Error Timeout period is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the installed control software.	Re-program the Power Board PM.
	Open/loose connection	Check the connection of the cable that connects the port J15 of the DPC Control Board.	Tighten cable connections.
	Debris or water in package	Inspect the DPC Power Board, Control Board and the cables connecting them for any material that could short connections.	Clean DPC.
	Faulty DPC Control Board	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

Observe Safety Precautions - Refer to *Safety Instructions* for Details

10041 Internal Fault IDSP XCURR

Inverter Reactive Current Error

System Severity Level 4

In Grid Connect mode, the errors are monitored between measured and reference values of the Reactive component of inverter current. If the error exceeds the maximum current error for the Current Error Timeout (one second), an internal warning is logged. At this point, the inverter output is suspended and a re-synchronization occurs. If two warnings are logged within the period given by Warning to Error Timeout (30 sec), the system will shut down and declare errors for all events logged as warnings.

Symptom	Probable Cause	Analysis	Repair Solution
The error between the measured and reference values of the Reactive Current exceeds the Maximum Current Error for the Current Error Timeout period.	The Maximum Current Error is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the installed control software.	Reprogram the Power Board PM.
	The current Error Timeout period is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the installed control software.	Re-program the Power Board PM.
	Open/loose connection.	Check the connection of the cable that connects the port J15 of the DPC Control Board.	Tighten cable connections.
	Debris or water in package.	Inspect the DPC Power Board, Control Board and the cables connecting them for any material that could short connections.	Clean DPC.
	Faulty DPC Control Board.	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board.	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

Observe Safety Precautions - Refer to *Safety Instructions* for Details

10042 Internal Fault IDSP NCURR

Inverter Neutral Current Error

System Severity Level 4

In Grid Connect mode, the errors are monitored between measured and reference values of the Neutral component of inverter current. If the error exceeds the maximum current error for the Current Error Timeout (one second), an internal warning is logged. At this point, the inverter output is suspended and a re-synchronization occurs. If two warnings are logged within the period given by Warning to Error Timeout (30 sec), the system will shut down and declare errors for all events logged as warnings.

Symptom	Probable Cause	Analysis	Repair Solution
The error between the measured and reference values of the Neutral current exceeds the Maximum Current Error for the Current Timeout period.	The Maximum Current Error is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the installed control software.	Re-program the Power Board PM.
	The Current Error Timeout period is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the installed control software.	Re-program the Power Board PM.
	Open/loose Connection	Check the connection of the cable that connects the port J15 of the DPC Control Board.	Tighten cable connections.
	Debris or water in package	Inspect the DPC Power Board, Control Board and the cables connecting them for any material that could short connections.	Clean DPC.
	Faulty DPC Control Board	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

Observe Safety Precautions - Refer to *Safety Instructions* for Details

10043 Internal Fault IDSP DCV CNTL

Inverter DC Voltage Control Fault

System Severity Level 4

In Grid Connect DC voltage control mode, the Real Current reference is limited to the inverter output current limit. If this current limit is reached for more than the DC Voltage Control Timeout (one second), an internal warning is logged. At this point, the inverter output is suspended and a re-synchronization occurs. If two warnings are logged within the period given by Warning to Error Timeout (30 sec), the system will shut down and declare errors for all events logged as warnings.

Symptom	Probable Cause	Analysis	Repair Solution
In Grid Connected DC voltage control mode, the Real Current reference has reached the Inverter output current limit for more than the DC Voltage Control Timeout period.	The DC Voltage Control Timeout period is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the installed control software.	Re-program the Power Board PM.
	Open/loose connection.	Check the connection of the cable that connects the port J15 of the DPC Control Board.	Tighten cable connections.
	Debris or water in package.	Inspect the DPC Power Board, Control Board and the cables connecting them for any material that could short connections.	Clean DPC.
	Faulty DPC Control Board.	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board.	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

Observe Safety Precautions - Refer to *Safety Instructions* for Details

10044 Islanding Fault IDSP ACT ISL

Inverter Active Island Detection

System Severity Level 4

If the Active Anti-islanding feature is enabled and a Rate of Change of Frequency (ROCOF) fault is detected, an Active Island detection fault will be declared.

Symptom	Probable Cause	Analysis	Repair Solution
If Active Anti-islanding is enabled and a ROCOF fault is detected.	The grid is in fault condition. Especially, a local island has formed	Check the quality of the grid and make sure that no local island has formed.	Clear the fault condition of the grid.
	The grid 3-phase voltages are distorted too much.	Check the harmonic injection to the grid by the nearby electronics and other high power equipment.	Improve the quality of the grid voltage waveform.
	Some or all of the PM parameters used to detect this fault are set wrongly.	Make sure that the Power Board PM is programmed properly and is supported by the installed control software.	Re-program the Power Board PM.

10045 Islanding Fault IDSP PASS ISL

Inverter Passive Island Detection

System Severity Level 4

If the Active Anti-islanding feature is not enabled and a Rate of Change of Frequency (ROCOF) fault is detected, a Passive Island detection fault will be declared.

Symptom	Probable Cause	Analysis	Repair Solution
If Active Anti-islanding is not enabled and a ROCOF fault is detected.	The grid is in fault condition. Especially, a local island has formed	Check the quality of the grid and make sure that no local island has formed.	Clear the fault condition of the grid.
	The grid 3-phase voltages are distorted too much.	Check the harmonic injection to the grid by the near-by electronic and other high power equipment.	Improve the quality of the grid voltage waveform.
	Some or all of the PM parameters used to detect this fault are set wrongly.	Make sure that the Power Board PM is programmed properly and is supported by the installed control software.	Re-program the Power Board PM.

Observe Safety Precautions - Refer to *Safety Instructions* for Details

**10047 Protective Relay Fault
IDSP FOVA**

Inverter Fast Overvoltage Phase A Detection

System Severity Level 4

**10048 Protective Relay Fault
IDSP FOVB**

Inverter Fast Overvoltage Phase B Detection

System Severity Level 4

**10049 Protective Relay Fault
IDSP FOVC**

Inverter Fast Overvoltage Phase C Detection

System Severity Level 4

In the Grid Connect mode, an AC high overvoltage indicates that the grid is operating under some fault condition or that a local island has formed.

In the Stand Alone mode, the AC overvoltage may damage the customer load. In either case, it is important that the Inverter be shut down.

A high overvoltage condition exists when any of the magnitude estimates of the phase A, B or C voltage inputs exceeds $[(\sqrt{2}) \times \text{Fast Overvoltage Limit}]$. If this fast overvoltage limit is reached for more than the Fast Overvoltage Timeout (0.02 sec), an internal warning is logged. At this point the Inverter output is suspended and a re-synchronization occurs.

If two warnings are logged within the period given by Warning to Error Timeout (30 sec), then the system will shut down and declare errors for all events logged as warnings.

Symptom	Probable Cause	Analysis	Repair Solution
In Grid Connected modes, the fundamental component of the AC voltage demand for the Inverter IPM is more than the Fast Overvoltage Limit for more than the Fast Overvoltage Timeout period.s	The fast over-voltage limit is wrongly set.	Make sure that the Frame PM is programmed properly and is supported by the installed control software.	Re-program the Frame PM.
	The Fast Over-voltage Timeout period is wrongly set.	Make sure that the Frame PM is programmed properly and is supported by the installed control software.	Re-program the Frame PM.
	Open/loose connection.	Check the connection of the cable that connects the port J15 of the DPC Control Board.	Tighten cable connections.
	The grid impedance is too high.	Check the system connection and make sure that the grid impedance is within the limit set by the specification.	Fix the problem in the system connection.
	Faulty DPC Control Board.	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board.	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

Observe Safety Precautions - Refer to Safety Instructions for Details

**10050 Protective Relay Fault
IDSP FUVA**

Inverter Fast Undervoltage Phase A Detection

System Severity Level 4

**10051 Protective Relay Fault
IDSP FUVB**

Inverter Fast Undervoltage Phase B Detection

System Severity Level 4

**10052 Protective Relay Fault
IDSP FUV C**

Inverter Fast Undervoltage Phase C Detection

System Severity Level 4

In the Grid Connect mode, an AC low undervoltage indicates that the grid is operating under some fault condition or that a local island has formed.

In either case, it is important that the Inverter be shut down.

A low undervoltage condition exists when any of the magnitude estimates of the phase A, B or C voltage inputs is less than $[(\sqrt{2}) \times \text{Fast Undervoltage Limit}]$. If this fast undervoltage limit is reached for more than the Fast Undervoltage Timeout (0.05 sec), an internal warning is logged. At this point the Inverter output is suspended and a re-synchronization occurs.

If two warnings are logged within the period given by Warning to Error Timeout (30 sec), then the system will shut down and declare errors for all events logged as warnings.

Symptom	Probable Cause	Analysis	Repair Solution
In Grid Connected modes, the fundamental component of the AC voltage demand for the Inverter IPM, is less than the Fast Undervoltage Limit for more than the Fast Undervoltage Timeout period.	The fast undervoltage limit is wrongly set.	Make sure that the Frame PM is programmed properly and is supported by the installed control software.	Re-program the Frame PM.
	The Fast Undervoltage Timeout period is wrongly set.	Make sure that the Frame PM is programmed properly and is supported by the installed control software.	Re-program the Frame PM.
	Faulty DPC Control Board.	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board.	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

Observe Safety Precautions - Refer to Safety Instructions for Details

10053 Protective Relay Fault IDSP FST UFREQ

Inverter Fast Underfrequency Detection

System Severity Level 4

This fault is only active in the Grid Connect mode. Fast Underfrequency indicates that the grid is operating under some fault condition or that a local island has formed. In either case, it is important that the Inverter be shut down. Software shall declare a fast underfrequency fault when the estimate of AC frequency falls below the Fast Underfrequency Limit for a period of time greater than the Fast Underfrequency Timeout.

Symptom	Probable Cause	Analysis	Repair Solution
The estimated AC frequency falls below the Fast Underfrequency Limit, for a period of time greater than the Fast Underfrequency Timeout setting.	The Fast Underfrequency Limit is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the control software being used.	Re-program the Power Board PM.
	The Fast Underfrequency Timeout is wrongly set.	Make sure that the Power Board PM is programmed properly and is supported by the control software being used.	Re-program the Power Board PM.
	The grid is in fault condition	Check the quality of the grid and make sure that no local island has formed.	Clear the fault condition of the grid.
	Faulty DPC Control Board	DPC Control Board needs replacing.	Replace DPC Control Board (See Work Instr. 513176).
	Faulty DPC Power Board	DPC Power Board needs replacing.	Replace DPC Power Board (See Work Instr. 440094).

10054 Internal warning IDSP INTR WARN

Inverter Loss of Inter-DSP Communications Warning

System Severity Level 2

The Inverter Control DSP transmits information across the RS-485 communication link to other DSP's for output waveform synchronization. The Inverter control software declares this fault when a new data packet is not received within a set time.

Symptom	Probable Cause	Analysis	Repair Solution
Faulty Communication.	Loose harness connections.	Verify harness connections to/from each UCB in MultiPac.	Tighten harness connections.
	Failed harness	RS-485 harness has failed.	Replace faulty harness.

Observe Safety Precautions - Refer to Safety Instructions for Details