

# ***Matrix Telecom Inverter System Installation and Operation Guide***

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## Purpose

The purpose of this manual is to provide explanations and procedures for installing, operating, maintaining, and troubleshooting a Matrix Telecom Inverter System.

This manual should be read through carefully before installation and operation.

Please retain this manual for future reference.

## Audience

This guide is intended for use by:

- Installers competent in:
  - installing and commissioning dc power systems
  - safe working practices for ac and dc powered equipment
  - the relevant local electrical safety regulations and wiring standards
- Operators and maintenance staff competent in:
  - operation of dc power systems
  - safe working practices for ac and dc powered equipment

## Reporting Problems with this Guide

Please use this email address to report any problems you find in this guide:

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## For Further Information and Technical Assistance

For further information and technical assistance see Worldwide Support on page [77](#).



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## Overview

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## Matrix Inverter System

The Matrix Telecom Inverter System is an integrated AC power system, including inverter, either 50A or 100A static transfer switch, controller/interface and either 50A or 100A maintenance bypass switch modules.

Its modular, building block design and N+1 redundant configuration, make the Matrix suitable for critical telecommunication and industrial applications.



1kVA/1.5kVA Inverter N+1



1kVA/1.5kVA Inverter N+1 with 50A STS & controller



1kVA/1.5kVA Inverter N+1 with 50A STS, controller & PDU



1kVA/1.5kVA Inverter N+1 with 100A STS & controller



1kVA/1.5kVA Inverter N+1 with 100A STS, controller & PDU

**Features:**

- Pure Sine Wave Output with low distortion
- Versatile module design forms a variety of arrangements for different power needs
- Easily expands capacity up to 12 units with N+1 redundancy configuration
- "All master" dynamic mechanism eliminate single point failure to optimize reliability
- Hot-pluggable connection allows module addition or removal with no operation stop
- Ultimate high power density reducing space demand
- High efficiency (> 89%)
- Comprehensive LCD/LED display provides system status, and user-friendly panel eases program settings.

## Modules

### Inverter Module

The four inverter modules available are hot-swap, with -48Vdc input to 1000VA or 1500VA output at 120 or 230VAC, 50 or 60Hz. See Part Numbers on page 5.

The 19-inch hot-swap compatible inverter chassis is designed to parallel connect and synchronize all inverter modules. With this chassis, the Matrix has N+1 redundancy with up to 12 inverter modules to prevent any interruption if an inverter module fails.



### Controller Module (optional)

The DSP microprocessor technology of the controller (INV-MC-1000) gives real-time system status through the front panel LEDs, and allows program settings through the keypad and LCD display.





## Static Transfer Switch (STS) Module (optional)

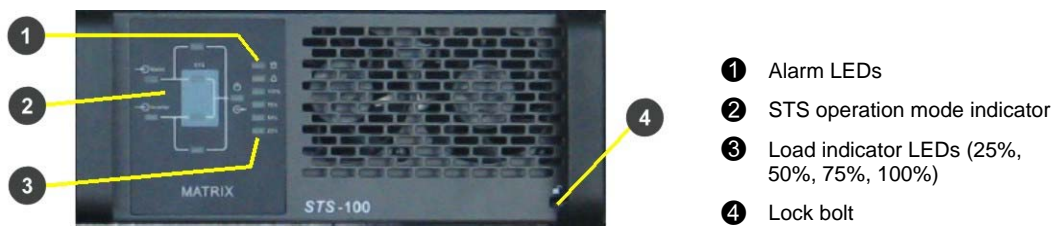
The 50A or 100A static transfer switches provide automatic and instantaneous load transfer, which further secures uninterrupted operation of sensitive electronic equipment.

For more information refer to STS/MBS Operation on page [59](#).

### 50A STS (INV-STS-050)

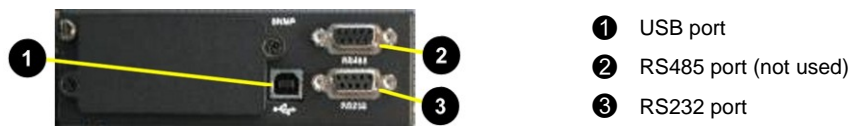


### 100A STS (INV-STS-100)



## Interface Module (optional)

The communication interface module (INV-IFC-1000) allows remote control and monitoring via USB or RS232 connection.



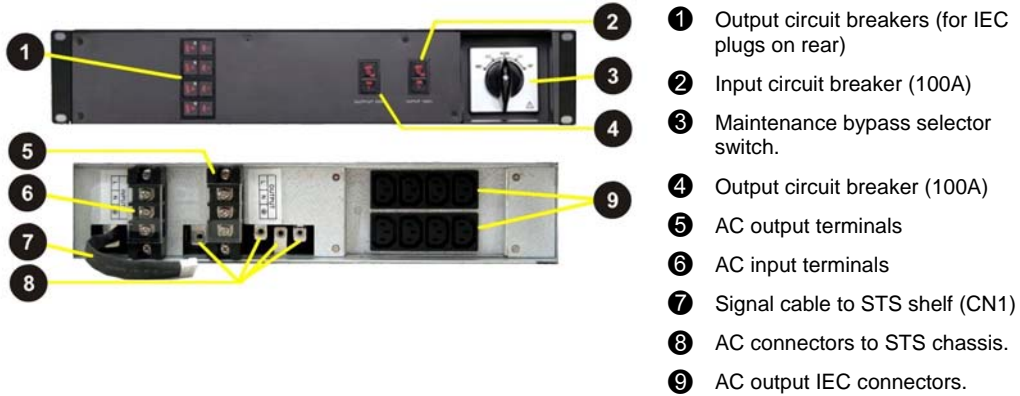
## Maintenance Bypass Switch (MBS) and Power Distribution Unit (PDU) (optional)

The 50A and 100A maintenance bypass switches allow for the safe removal of inverters or the static transfer switch without load power interruptions.

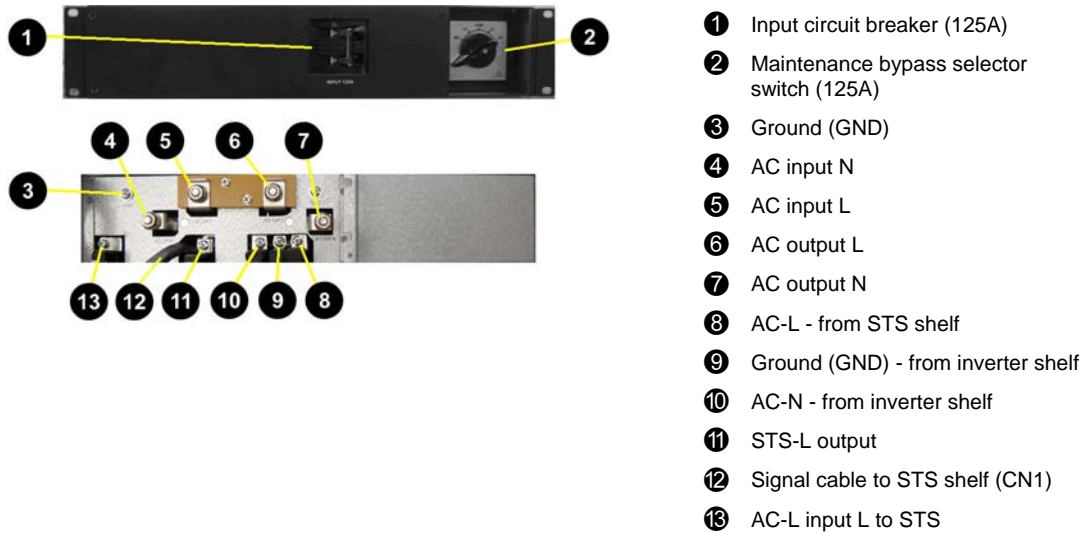
For more information refer to STS/MBS Operation on page 59.

The power distribution unit includes input circuit breakers, output circuit breakers (with 50A MBS only) and terminals. The ac output can be connected to the rear screw terminals or to the eight rear-mounted IEC connectors (with 50A MBS only).

### 50A MBS and PDU (INV-MBSDU-50)



### 100A MBS (INV-MBS-100)



## Part Numbers

Part Number	Description
INV-4810E	1000VA/800W inverter module (I/P: 48Vdc, O/P: 230Vac, 1U*5U)
INV-4810	1000VA/800W inverter module (I/P: 48Vdc, O/P: 120Vac, 1U*5U)
INV-4815E	1500VA/1200W inverter module (I/P: 48Vdc, O/P: 230Vac, 1U*5U)
INV-4815	1500VA/1200W inverter module (I/P: 48Vdc, O/P: 120Vac, 1U*5U)
INV-ST5-050	6kVA/12kVA static transfer switch module (50A, 1U*5U)
INV-ST5-100	12kVA/18kVA static transfer switch module (100A, 2U*5U)
INV-MC-1000	Controller module (LCD, 3*LED, 4*function key, 1U*2U)
INV-IFC-1000	RS232/USB interface module (1U*3U)
INV-SS-2-1U	19-inch inverter "hot-swap" chassis (1U)
INV-STSSS-1U	19-inch controller/STS "hot-swap" chassis for 50A STS (1U)
INV-STSSS-2U	19-inch controller/STS "hot-swap" chassis for 100A STS (2U)
INV-MBSDU-50	50A Maintenance Bypass, AC Distribution Panel (2U)
INV-MBS-100	100A Maintenance Bypass Panel (2U)
INV-IFP-15	Inverter/STS Blank Panel
INV-RFP-12	Controller Blank Panel
INV-CFP-13	Interface Blank Panel



## Overview

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## General

- 1 Before installing and using the Matrix Telecom Inverter System, read all instructions and cautionary markings on the equipment and all appropriate sections of this guide. Be sure to read all instructions and cautionary markings for any equipment attached to this unit.
- 2 This unit is designed for indoor use only. Do not expose the equipment to rain, snow, or spray.
- 3 To reduce the risk of fire hazard, do not cover or obstruct the ventilation openings. Do not install the equipment in a zero-clearance compartment.
- 4 Use only attachments recommended or sold by the manufacturer. Doing otherwise may result in a risk of fire, electric shock, or other injury.
- 5 To avoid a risk of fire and electric shock, make sure that existing wiring is in good condition and that wire is not undersized. Do not operate the equipment with damaged or substandard wiring.
- 6 Do not operate the equipment if it has been damaged in any way.

## Battery Precautions

To avoid personal injury and property damage, read these battery precautions on handling, charging and disposing of batteries.

- 1 Never reverse the INPUT+ and INPUT- polarity to the battery.
- 2 Keep the battery away from heat sources including direct sunlight, open fires, microwave ovens, and high-voltages. Temperatures over 60°C may cause damage. Make sure the area around the battery is well ventilated.
- 3 Never smoke or allow a spark or flame near the battery.
- 4 Use caution to reduce the risk of dropping a metal tool on the battery. A spark or short circuit to the battery or other electrical parts could cause an explosion.
- 5 Remove all metal items, such as rings, bracelets, and watches when working on the batteries.
- 6 Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
- 7 If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters your eye, immediately flood it with running cold water for at least twenty minutes and get medical attention immediately.
- 8 If you need to remove a battery, always remove the grounded terminal from the battery first. Make sure all accessories are off so you do not cause a spark.

## Wiring Requirements

- 1 Inverter system is intended to be installed as part of a permanently grounded electrical system per the National Electric Code ANSI/NFPA 70 (current edition). This is the single point earth ground for the inverter system.  
 *There is no electrical connection between earth and neutral within the inverter system.*
- 2 The grounds on the Inverter system are marked with this symbol: G / ⊕
- 3 The AC voltage and current on the Inverter system is marked with this symbol: L / N
- 4 The DC voltage and current on the Inverter system is marked with this symbol: -----

## Inspecting the Equipment and Reporting Damage

Unpack the equipment and inspect it carefully for possible damage that may have occurred while in transit. Do not use any damaged equipment.

Report any damage immediately, using a completed Equipment Incident Report on page [75](#).

- Keep the original packaging to use if any item needs to be returned for replacement or repair.*

## Overview

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## Handling and Storage

If the inverter system modules or shelves are to be stored prior to installation, they should be stored in a cool, dry, well-ventilated location where the rain, splashing water, chemical agents, etc. will not reach based on the environment specification standard.

The equipments should be covered with a tarpaulin or plastic wrapper to protect it against dust, dirt, paint, or other materials.

## Location

The inverter system is designed for installation in a protected environment.

Factors to be considered in selecting a location include ventilation, temperature, humidity, and accessibility. Install each unit in a clean, dry location with an unrestricted air flow and sufficient space for rear and front access.

The inverter system will provide its full capability in ambient temperatures stated in the Specifications on page [53](#). Higher ambient temperatures will lead to a shorter life.

Gasses from the battery can be corrosive and highly flammable, so isolate the inverter system units from the battery as much as possible.

## Unpacking and Inspection

Remove the unit from its packaging and inspect it for scratches, cracks, broken connectors and missing accessories. Refer to Inspecting the Equipment and Reporting Damage on page [8](#).

Inverter system modules and chassis ship with the following accessories. See Part Numbers on page 5.



**Inverter Module**



**STS Module (50A)**



**STS Module (100A)**

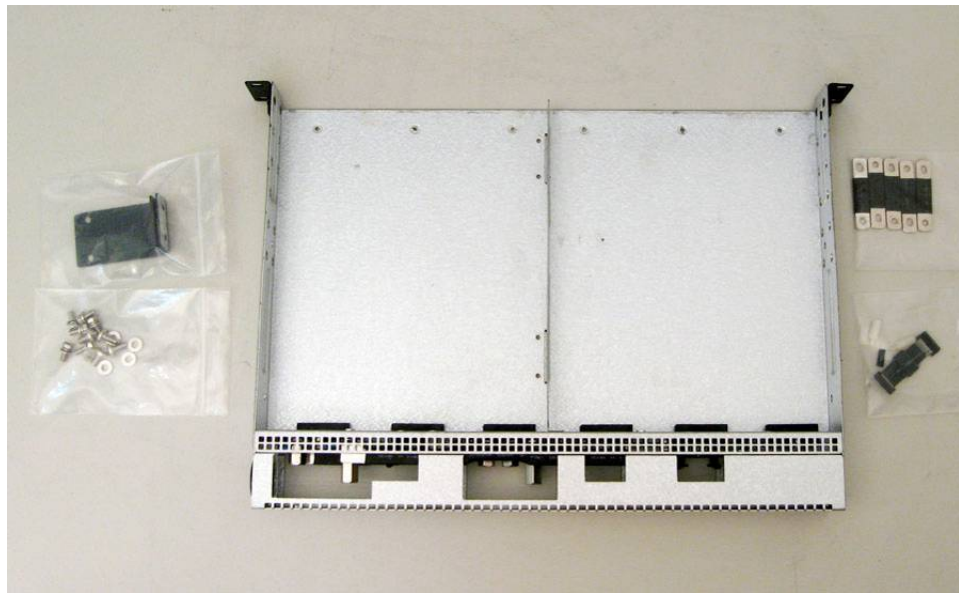


**Controller Module and Serial Cable**



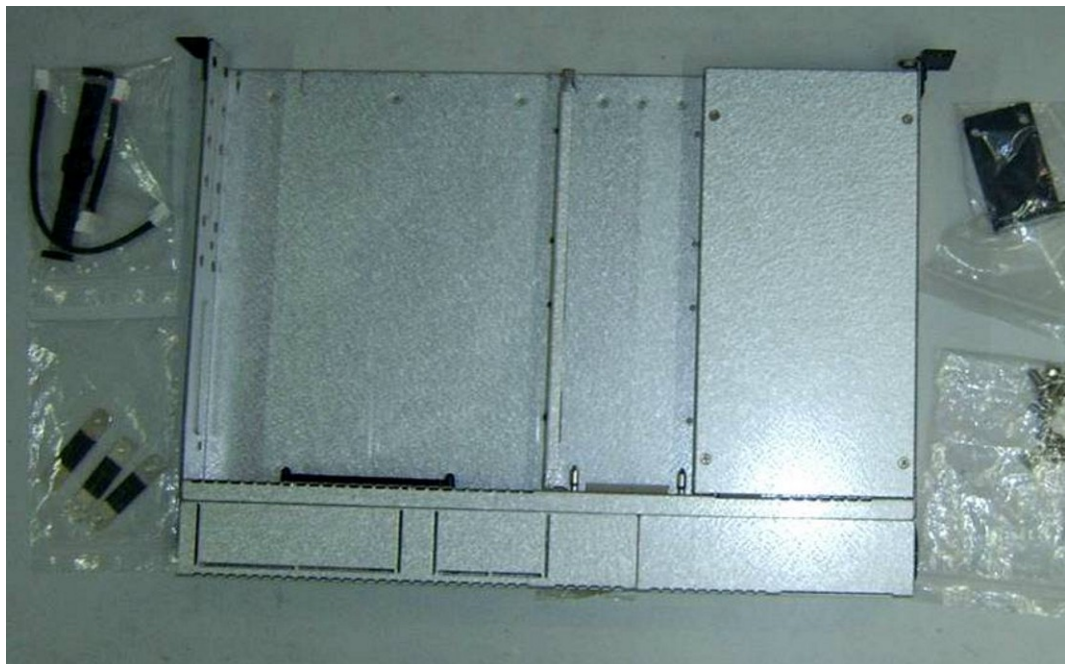
**Interface Module**





**Inverter Chassis**

Includes: 23" rack mount brackets (2), interconnection bus bars (5), busbar screws (8), mounting screws (4), communications cable (1), jumper (1)



**50A STS/controller/interface Chassis**

Includes: 23" rack mount brackets (2), interconnection bus bars (3), busbar screws (8), mounting screws (4), CAN cable for controller (1), DC power cable for controller (1), communications cable (1), 4-pin jumper (for CN1 if BMS is not used)



**100A STS/controller/interface Chassis**

Includes: 23" rack mount brackets (2), interconnection bus bars (3), busbar screws (8), mounting screws (4), CAN cable for controller (1), DC power cable for controller (1), communications cable (1), 4-pin jumper (for CN1 if BMS is not used)



**50A MBS/PD Shelf**

Includes: 23" rack mount brackets (2), interconnection bus bars (5), busbar screws (5), mounting screws (4)



**100A MBS Shelf**

Includes: 23" rack mount brackets (2), interconnection bus bars (5), busbar screws (12), mounting screws (4), jumper (1), cable grommets (3)

## **Frame Assembly**

### **Task 1 - Inverter Chassis Assembly**

**Step 1 - Change mounting brackets if required**




The inverter chassis is pre-installed with 19-inch rack brackets. For 23-inch rack mounting, replace the mounting brackets.

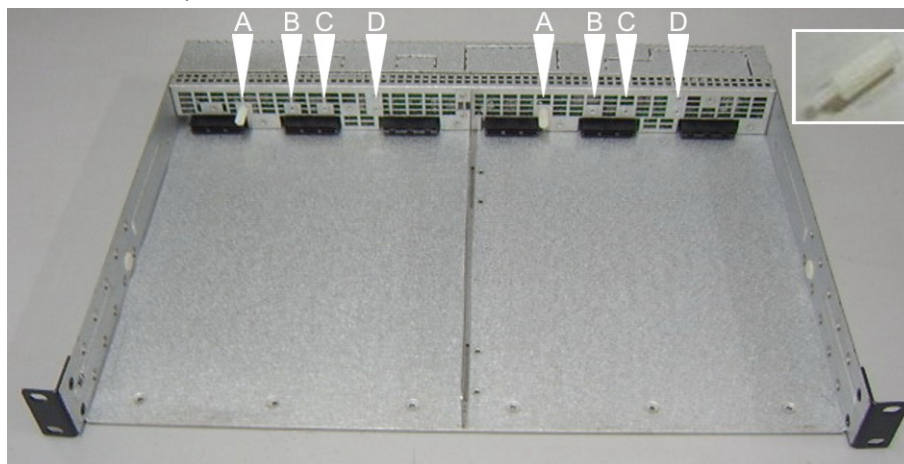
**Step 2 - Fit nylon module identification spacers**



**WARNING:** The system will fail to operate normally if inverter modules of different specification are inserted inverter shelves. The supplied nylon spacers (two per shelf) to ensure only inverter modules of the same specification can be fitted.

Insert the supplied nylon spacer into the correct holes on the shelf, based on module models as shown below.

 There are four holes above the connectors in each inverter slot.



- Position A for INV-4815
- Position B for INV-4815E
- Position C for INV-4810
- Position D for INV-4810E

**Step 3 - Mount chassis**



- 1 Fit the inverter chassis to the equipment rack, and align holes of mounting brackets and rack.
- 2 Secure the chassis with the four screws provided.



**Step 4 - Repeat for other inverter chassis as required**



Each inverter chassis holds two inverter modules. Repeat Steps 1 - 3 to install the remaining inverter chassis.

**Procedure complete**

## Task 2 - Controller/Interface/STS Chassis Assembly

Ignore this Task if the controller/interface/STS chassis is not fitted.

### Step 1 - Change mounting brackets if required




The controller/interface/STS chassis is pre-installed with 19-inch rack brackets.

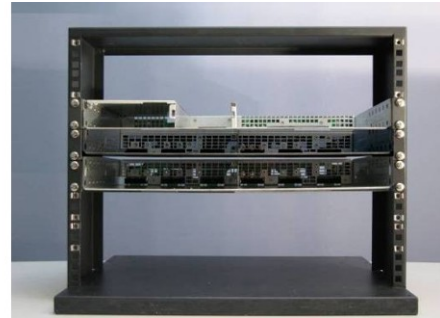
For 23-inch rack mounting, replace the mounting brackets.

### Step 2 - Mount chassis



 Each controller module or interface module can control up to 12 inverter units cascaded. It is recommended to install the controller/interface/STS chassis above or below the inverter shelves to ease inter-connections.

- 1 Fit the controller/interface/STS chassis (either 50A or 100A) to the equipment rack, and align holes of mounting brackets and rack.
- 2 Secure the chassis with the four screws provided.



### Step 3 - Insert jumper in CN1 on STS backplane (if required)



Ignore this Step if a maintenance bypass switch (MBS) is to be fitted. See details on page [25](#).

If no maintenance bypass switch (MBS) is to be fitted, insert the 4-pin jumper into connector CN1 on the STS backplane.



### Procedure complete

## Task 3 - Install MBS/PDU chassis

Ignore this Task if the MBS/PDU chassis is not fitted.

### Step 1 - Change mounting brackets if required



The MBS/PDU chassis is pre-installed with 19-inch rack brackets.

For 23-inch rack mounting, replace the mounting brackets.

**Step 2 - Mount chassis**

- 1 Fit the MBS/PDU chassis (either 50A or 100A) to the equipment rack, and align holes of mounting brackets and rack.
- 2 Secure the chassis with the four screws provided.

**Procedure complete****Wiring Connection**

**CAUTION:** Ensure all the power sources are OFF during wiring. Disconnect battery cables from battery.

The inverter modules are designed to operate in parallel for higher output current, two modules are automatically connected in parallel in each shelf. Two or more inverter shelves can be further connected in parallel for additional output power. This is done by connecting all inputs (BAT-, BAT+) in parallel, and outputs (Line, Neutral and Ground) in parallel. When paralleled there is no master unit and each unit adjusts its own power level for best power sharing. Please refer to the following wiring instructions for your needs.

When selecting wiring, consider the following factors:

- Current carrying capacity of the wire
- Maximum wire length needed
- Maximum ambient temperature

**Wire Size Tables**

**IMPORTANT:** Use the following table as a guide only. Ensure that the installation complies with the local wiring rules.

**Recommend Wire Size Versus Current - 1kVA Inverter modules (see Notes)**

Shelves	Input current Max.	110Vac output current Max.	230Vac output current Max.	Min. size of dc input wire Max.	Min. size of 110Vac O/P wire Max.	Min. size of 230Vac O/P wire Max.
1	46.0A	18.2A	8.7A	#8 AWG 10mm <sup>2</sup>	#14 AWG 2.5mm <sup>2</sup>	#16 AWG 1.5mm <sup>2</sup>
2	92.0A	36.4A	17.4A	#4 AWG 25mm <sup>2</sup>	#10 AWG 6mm <sup>2</sup>	#14 AWG 2.5mm <sup>2</sup>
3	138.0A	54.5A	26.1A	Connect to shelves in groups of up to two. See details on page <a href="#">19</a> .	#8 AWG 10mm <sup>2</sup>	#10 AWG 6mm <sup>2</sup>
4	184.0A	72.7A	34.8A		#6 AWG 16mm <sup>2</sup>	#10 AWG 6mm <sup>2</sup>
5	230.0A	90.9A	43.5A		#4 AWG 25mm <sup>2</sup>	#8 AWG 10mm <sup>2</sup>
6	276.0A	109.1A	52.2A		#2 AWG 35mm <sup>2</sup>	#8 AWG 10mm <sup>2</sup>


**Recommend Wire Size Versus Current - 1.5kVA Inverter modules (see Notes)**

Shelves	Input current Max.	110Vac output current Max.	230Vac output current Max.	Min. size of dc input wire Max.	Min. size of 110Vac O/P wire Max.	Min. size of 230VA O/P wire Max.
1	69.0A	27.3A	13.0A	#6 AWG 16mm <sup>2</sup>	#12 AWG 4mm <sup>2</sup>	#16 AWG 1.5mm <sup>2</sup>
2	137.9A	54.5A	26.1A	#2 AWG 35mm <sup>2</sup>	#8 AWG 10mm <sup>2</sup>	#10 AWG 6mm <sup>2</sup>
3	206.9A	81.8A	39.1A	Connect to shelves in groups of up to two. See details on page <a href="#">19</a> .	#6 AWG 16mm <sup>2</sup>	#10 AWG 6mm <sup>2</sup>
4	275.9A	109.1A	52.2A		#2 AWG 35mm <sup>2</sup>	#8 AWG 10mm <sup>2</sup>
5	344.8A	136.4A	65.2A		#2 AWG 35mm <sup>2</sup>	#6 AWG 16mm <sup>2</sup>
6	413.8A	163.6A	78.3A		#2 AWG 35mm <sup>2</sup>	#6 AWG 16mm <sup>2</sup>

**Notes:**

- 1 Total Power Rating (VA, W) = No. of shelf × Inverter module power rating (VA, W) \* 2
- 2 I/P current = Total power rating (W) ÷ 0.87 ÷ 40
- 3 O/P current = Total power rating (VA) ÷ AC voltage.

**Task 4 - Single-Shelf Wiring Option**

 Ignore this Task if the system has more than one inverter chassis.

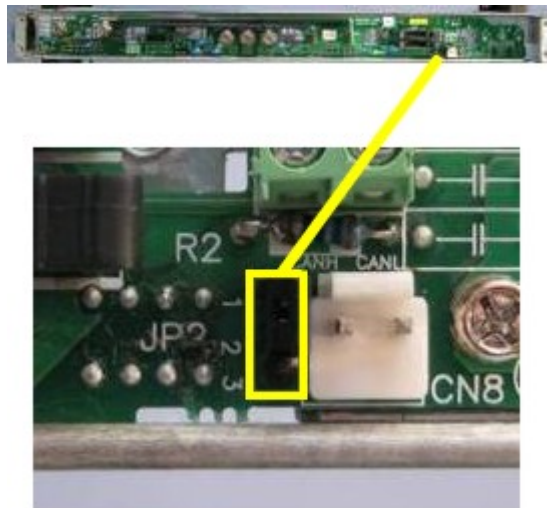
**Step 1 - Remove inverter shelf rear cover**



**Step 2 - Insert JP2 jumper**



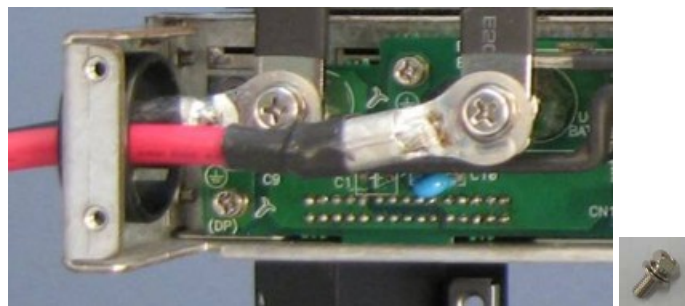
For single-shelf systems only, insert the jumper supplied from PIN 1 - 2 of connector JP2.




**Step 3 - Connect dc input**



- 1 Refer to the Wire Size Tables on page 16 and local wiring rules, and select the correct size dc input cable for the current and cable length.
- 2 Terminate the cables with M4 crimp lugs.



- 3 Route the cables to the negative (BAT-) and positive (BAT+) dc input terminal studs through the left-side panel.
- 4 Secure the connections with the screws and washers supplied. Tighten the screws according to the Standard Torque Settings on page 58.

 Do **not** connect the other end of cables to the battery or -48V DC source at this stage.

**WARNING:** DC source voltage must be between 45V and 58 V.

**CAUTION:** Reverse polarity connections will damage the unit and are not covered by the warranty. Ensure correct polarity (positive to positive, negative to negative) before completing connections to the battery or dc source, and the inverter unit.

#### Step 4 - Connect ac output cables (if required)



Ignore this Step if a static transfer switch (STS) or a maintenance bypass switch (MBS) is fitted.


- 1 Refer to the Wire Size Tables on page 16 and local wiring rules, and select the correct size ac cable.
- 2 Terminate the cables with M4 crimp lugs.
- 3 Route the cables to the ac neutral, ground and line terminal studs through the left-side panel.
- 4 Secure the connections with the screws and washers supplied. Tighten the screws according to the Standard Torque Settings on page 58.



- 1 Neutral
- 2 Earth
- 3 Line (phase).

#### Step 5 - Connect inverter alarm (if required)




 CN11 on the inverter shelf backplane is the inverter alarm. It will send out alarm signal if either inverter in the shelf fails.  
*This alarm is typically used if the inverters are stand-alone (no controller).*

If required, connect from CN11 to a suitable digital input of an external alarm monitoring system. See details on page 57.

#### Procedure complete



## Task 5 - Multi-Shelf Wiring Option

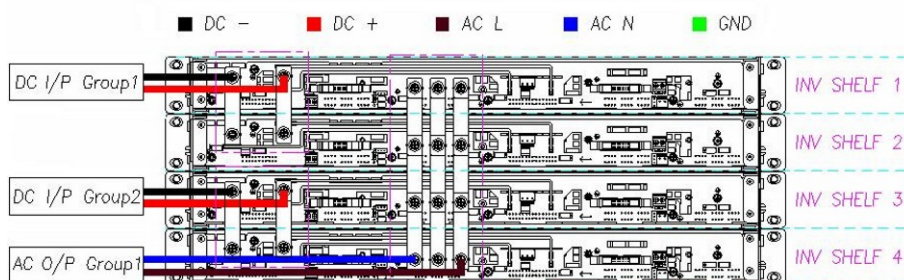
 Ignore this Task if the system has only one inverter chassis.

### Group Connection

The dc input current to the inverters must not exceed the current limit of dc cables. If the total input current of all inverters exceeds the cable current limit, split the inverters into groups and choose suitable wire size for each group.

For example:

An inverter system with eight 1000VA/48Vdc/120Vac inverter modules (8kVA). The total input current is 151.5A. Connect the inverters in two groups of four using the with separate dc cables to each group (75.8A each) as shown.




### Step 1 - Remove inverter shelf rear cover

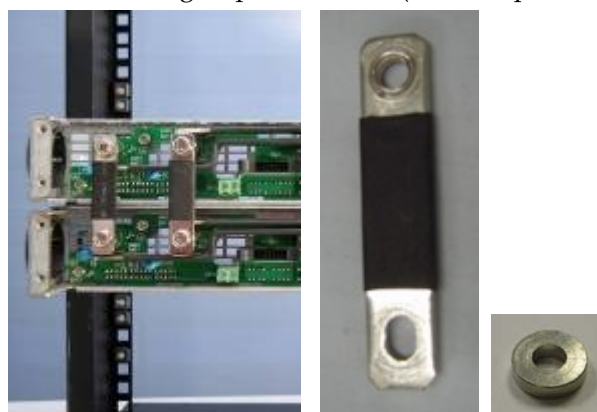


### Step 2 - Connect dc input




 When necessary, use the spacers provided to keep the bars vertical.

- 1 Use the bars provided to connect together all the dc negative input (BAT-) studs for each group of inverters (see Group Connection above).
- 2 Use the bars provided to connect together all the dc positive input (BAT+) studs for each group of inverters (see Group Connection above).



- 3 Refer to the Wire Size Tables on page 16 and local wiring rules, and select the correct size dc input cable for the current and cable length, for each group of inverters.

- 4 Terminate the cables with M4 crimp lugs.
- 5 Route the cables to the negative (BAT-) and positive (BAT+) dc input terminal studs of each group through the left-side panel.
- 6 Secure the connections with the screws and washers supplied. Tighten the screws according to the Standard Torque Settings on page 58.

 Do **not** connect the other end of cables to the -48V DC source at this stage.

**WARNING:** DC source voltage must be between 45V and 58 V.

**CAUTION:** Reverse polarity connections will damage the unit and are not covered by the warranty. Ensure correct polarity (positive to positive, negative to negative) before completing connections to the battery or dc source, and the inverter unit.

### Step 3 - Check no jumper in JP2




Check there is no jumper inserted into JP2 connector of any inverter shelves.

### Step 4 - Install signal cable(s)




Use the flat communication cables provided to inter-connect all shelves through the signal ports CN20 and CN21.



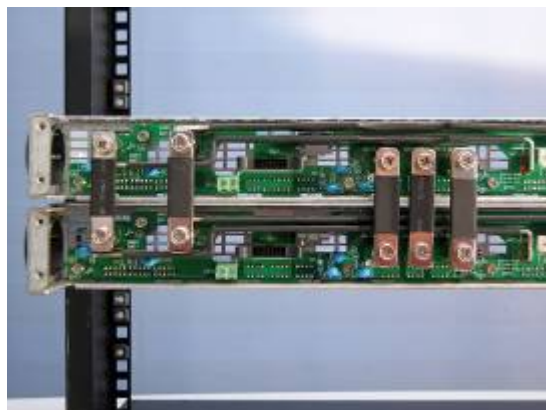
 Use the upper port (CN21) to connect to an inverter shelf above, and the lower port (CN20) to connect to an inverter shelf below.

### Step 5 - Connect ac outputs



 When necessary, use the spacers provided to keep the bars vertical.

- 1 Use the bars provided to connect together all the ac neutral (UC3), ac ground (UC4) and ac line (UC5) studs.



- 2 If a static transfer switch (STS) or a maintenance bypass switch (MBS) is fitted, then go to 4.
- 3 If no static transfer switch (STS) or a maintenance bypass switch (MBS) is fitted:
  - Refer to the Wire Size Tables on page [16](#) and local wiring rules, and select the correct size ac cable.
  - Terminate the cables with M4 crimp lugs.
  - Route the cables to the ac neutral, ground and line terminal studs through the left-side panel.
- 4 Secure the connections with the screws and washers supplied. Tighten the screws according to the Standard Torque Settings on page [58](#).

#### Step 6 - Connect ac output cables (if required)



Ignore this Step if a static transfer switch (STS) or a maintenance bypass switch (MBS) is fitted.

- 1 Refer to the Wire Size Tables on page [16](#) and local wiring rules, and select the correct size ac cable.
- 2 Terminate the cables with M4 crimp lugs.
- 3 Route the cables to the ac neutral, ground and line terminal studs through the left-side panel.
- 4 Secure the connections with the screws and washers supplied. Tighten the screws according to the Standard Torque Settings on page [58](#).



*Do **not** connect the other end of cables to ac load equipment at this stage.*

#### Step 7 - Connect inverter alarm (if required)



*CN11 on the inverter shelf backplane is the inverter alarm. It will send out alarm signal if either inverter in the shelf fails.*

*This alarm is typically used if the inverters are stand-alone (no controller).*

If required, connect from CN11 to a suitable digital input of an external alarm monitoring system. See details on page [57](#).

#### Procedure complete

### Task 6 - Connect Controller (if used)

**CAUTION:** Ensure all the power sources are OFF during wiring. Disconnect battery cables from battery.

#### Step 1 - Remove controller rear cover

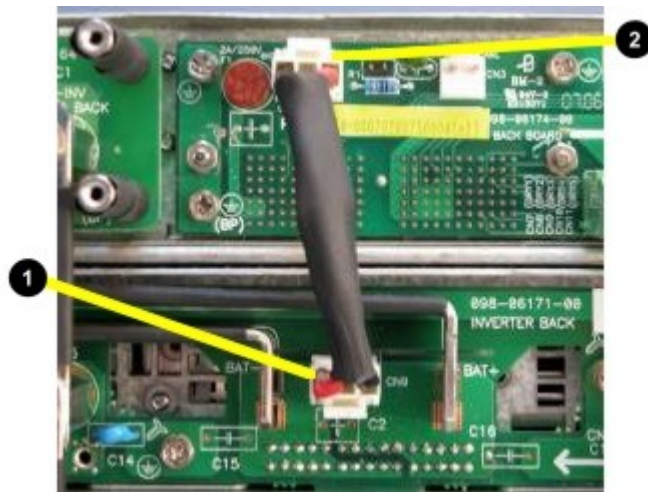


**Step 2 - Controller DC input wiring**



Controller module and interface module are powered from inverter modules. Either:

- If 100A STS is fitted:  
Use the supplied 3-pin power cables to connect from CN12 on the controller backplane to CN6 on the STS backplane, and from CN7 on the STS backplane to CN9 on the inverter shelf backplane.
- Otherwise:  
Use the supplied 3-pin power cable to connect from CN12 on the controller/interface/STS shelf backplane to CN9 on the inverter shelf backplane.

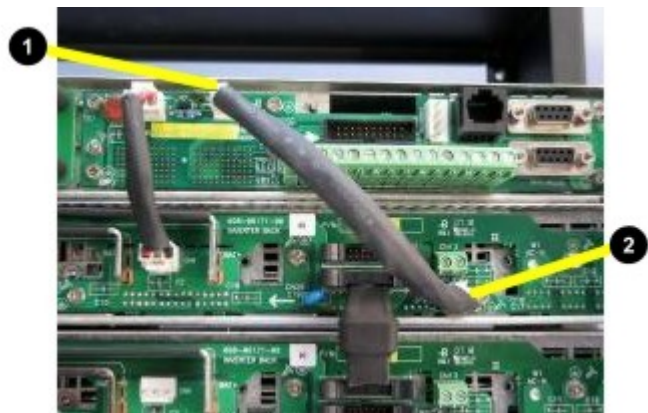


❶ CN9 connector on inverter backplane      ❷ CN12 connector on controller/interface shelf.

**Step 3 - Controller CAN bus wiring**



Use the supplied signal cable to connect from CN3 on the controller/interface shelf backplane to CN8 connector on the inverter shelf backplane.



❶ CN3 connector on controller/interface shelf      ❷ CN8 connector on inverter backplane

**Step 4 - Dry contact connections**



Use #30~16 AWG to connect to the relay dry contacts.



Refer to Alarm Settings on page 38 to set the alarm mode of the dry contacts.

Dry Contact 1 CN7			Dry Contact 2 CN8			Dry Contact 3 CN9			Dry Contact 4 CN10			Dry Contact 5 CN11		
NC	COM	NO	NC	COM	NO	NC	COM	NO	NC	COM	NO	NC	COM	NO

**Procedure complete**

**Task 7 - Connect STS (if used)**

**CAUTION:** Shut down all the power sources and disconnect battery cables from battery before wiring.

**Step 1 - Remove STS rear cover**



**Step 2 - Connect STS signal cable**



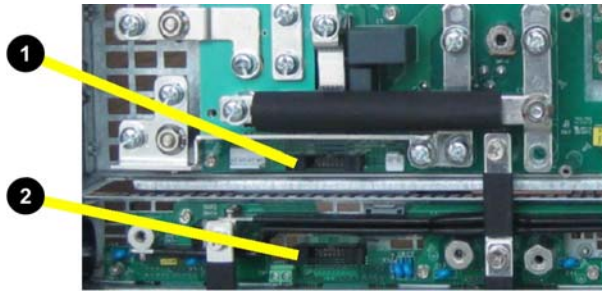
Connect the supplied STS signal cable from the rear panel of STS Shelf to the rear panel of the inverter shelf. Either:

- For 50A STS Module: connect from CN2 on STS to CN7 on inverter.



- ❶ Parallel signal port (CN2) on the 50A STS shelf backplane
- ❷ Parallel signal port (CN7) on inverter shelf backplane

- For 100A STS Module: connect from CN11 on STS to CN7 on inverter.



- ❶ Parallel signal port (CN11) on 100A STS shelf backplane
- ❷ Parallel signal port (CN7) on inverter shelf backplane

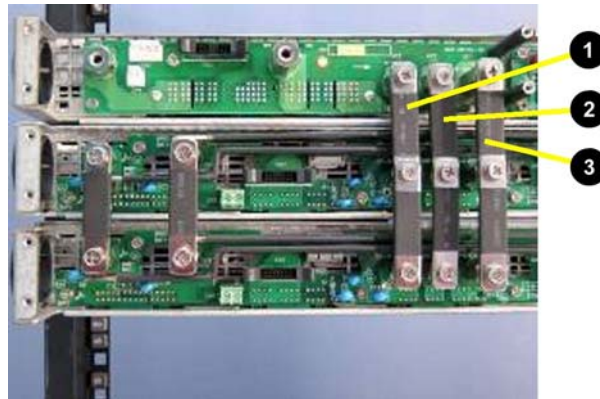
**Step 3 - Install AC bus bar between STS and Inverter**



☐ *When necessary, use the spacers provided to keep the bars vertical.*

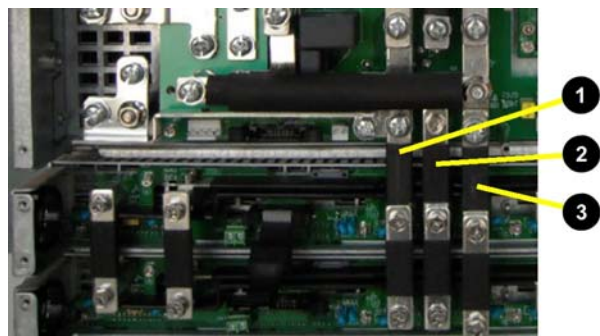
Connect AC BUS of the Controller/Interface/STS shelf to the AC BUS connector of the top inverter:

- 50A STS Module:



- ❶ AC neutral (UC3)
- ❷ Earth (UC1)
- ❸ Inverter AC Line

- 100A STS Module:



- ❶ AC neutral
- ❷ Earth
- ❸ Inverter AC Line

**Step 4 - Connect AC Output Wires to STS (if required)**

Ignore this Step if a maintenance bypass switch (MBS) is fitted.

If no maintenance bypass switch (MBS) is fitted:

- Refer to the Wire Size Tables on page [16](#) and local wiring rules, and select the correct size ac cable.
- Terminate the cables with M4 crimp lugs.
- Connect ac input line to L-AC. Connect AC input neutral to AC-N.
- Connect ac output line to AC-L OUT. Connect AC output neutral to AC-N.
- Secure the connections with the screws and washers supplied. Tighten the screws according to the Standard Torque Settings on page [58](#).

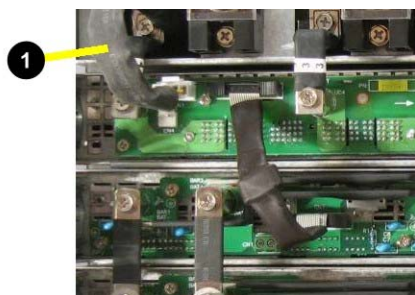


*Do **not** connect the other end of cables to the ac load equipment at this stage.*

**Procedure complete**

**Task 8 - Connect MBS (if used)****Step 1 - Remove MBS rear cover****Step 2 - Connect Signal Cable between MBS, STS and Inverter Chassis**

Connect the 4-pin MBS cable to connector CN1 on the controller/interface/STS chassis. (If fitted, remove the 4-pin jumper from CN1.)



- ① 4-pin MBS cable to connector CN1 on the controller/interface/STS chassis backplane.

Step 3 - Connect AC Bus Bars



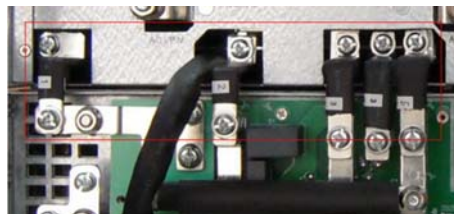
☐ When necessary, use the spacers provided to keep the bars vertical.

Connect the 5 bus bars supplied with the MBS/PD shelf from UC3, UC2, UC1 on STS backplane PCB to the corresponding connectors on the MBS/PD shelf.

- 50A MBS:
  - Bus Bar 1 for UC3 (inverter output N)
  - Bus Bar 1 for UC2 (Ground)
  - Bus Bar 2 x 1 for UC1 (inverter output L)
  - Bus Bar 3 x 1 for UC4 (STS output L)
  - Bus bar 4 x 1 for UC5 (AC input L)



- 100A MBS:
  - Bus Bar 3 for inverter output N
  - Bus Bar 3 for Ground
  - Bus Bar 5 x 1 for inverter output L
  - Bus Bar 2 x 1 for STS output L
  - Bus bar 1 x 1 for AC input L





**Step 4 - Connect AC Wires**



- 1 Refer to the Wire Size Tables on page 16 and local wiring rules, and select the correct size ac cable.
- 2 Terminate the cables with M4 crimp lugs.
- 3 Route the ac input cables to the AC input terminals on the back left of MBS/PD shelf. Connect according to the labels.
- 4 Either:
  - Connect AC output cables to the ac output terminals on the back right of MBS shelf. Connect according to the labels, or
  - For 50A MBS only, connect to the ac output IEC connectors.



50A MBS



100A MBS



*Do **not** connect the other end of cables to the ac load equipment at this stage.*

**Procedure complete**

**Task 9 - Rear Covers**

**Step 1 - Remove knockouts**



On each rear cover, remove the knockouts necessary to fit around the bars and cables.



Step 2 - Replace all rear covers



Procedure complete

## Module Installation and Removal

### Task 10 - Install STS and Inverter Modules

**CAUTION:** Do not install inverter modules with different specification. This will cause serious damage, and is not covered by the warranty. Ensure all inverter units have the same specifications before installation.

Step 1 - Install STS



- 1 If the MBS is fitted then put Maintenance Bypass Switch at MBP or IBP (Determined by mains and inverter output status) position.

The STS module has a safety lock to prevent insertion/removal if the MBS is in any other position.



- 2 Slide the STS into the shelf.
- 3 Turn the lock bolt counter-clockwise to the LOCK position.

Step 2 - Install inverters



- 1 Slide in each inverter, two per shelf.
- 2 Turn the lock bolt counter-clockwise to the LOCK position.



**Step 3 - Cover any unused inverter positions**



Cover any unused positions with the optional cover plate as follows.



*The cover plate is two pieces: Screw the inner silver metal piece to the chassis bottom plate. Use bolts to attach the black metal cover to the inner silver piece.*



**Step 4 - Cover controller and/or interface position**



If the controller module and/or interface module is not fitted, cover the positions with the optional cover plates.



*The cover plate is two pieces: Screw the inner silver metal piece to the chassis bottom plate. Use bolts to attach the black metal cover to the inner silver piece.*



**Procedure complete**

## Task 11 - Install Controller and Interface Modules

### Step 1 - Install the controller module



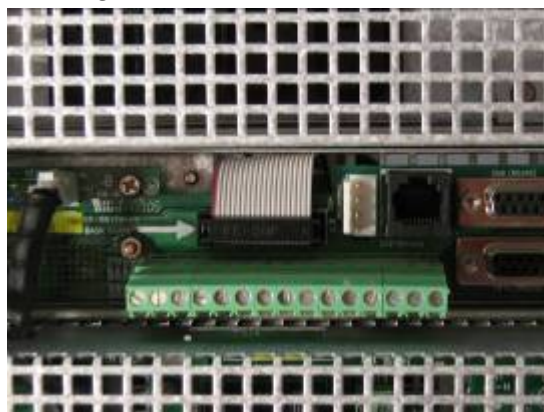
- 1 Slide the controller into the 2U-wide controller slot of the pre-wired controller/interface/STS chassis.
  - 2 Tighten the retaining screws.
- With the power on, the green LED of the controller unit would light if everything functions correctly with the power on.*



### Step 2 - Install interface module (if required)



- 1 Remove the interface rear cover.
- 2 Run the ribbon cable from the interface module CN3 to the interface rear PCB and connect to CN1.
- 3 Replace the interface rear cover.
- 4 Fit the interface module into the 3U-wide interface slot of the pre-wired controller/interface/STS chassis.
- 5 Tighten the retaining screw.



Procedure complete

## Overview

<b>Topic</b>	<b>Page</b>
Pre-Operation Check	<a href="#">31</a>
Apply Power	<a href="#">32</a>
Status Monitoring	<a href="#">32</a>
Parameter Setting	<a href="#">35</a>
Parameter Programming	<a href="#">37</a>

## Pre-Operation Check

### Inverter

- 1 Check if the dc input polarity is correct.
- 2 Check the dc input voltage is in the standard range.
- 3 Check the input dc wire size is correct.
- 4 Check all rear covers are fitted to avoid electric shock.
- 5 Check the ground wire is connected on the rear cover to avoid electric shock.
- 6 Check all inverter module lock bolts are in the LOCK position.

### STS (if used)

- 1 Check the MBS (if fitted) is at the normal "NORM" position.
- 2 Check the STS module lock bolt is in the lock position.
- 3 Check the rear cover is fitted.

### Controller / Interface (if used)

- 1 Check the controller module is correctly installed.
- 2 Check the interface module is correctly installed.
- 3 Check the rear cover of controller/interface/STS shelf is fitted.

## MBS/PDU (if used)

- 1 Check the mains ac is connected correctly.
- 2 Check MBS position:
  - If an STS is fitted then set the MBS at the normal "NORM" position.
  - If no STS is fitted then set the MBS at the inverter bypass (IBP) position.
- 3 Check the circuit breakers are On ("I").
- 4 Check the rear cover of MBS/PDU is fitted.

## Apply Power

- 1 Connect the dc input cables to the dc source according to the manufacturer's instructions.
  - ☐ Check for correct polarity.
- 2 Switch on the dc source.
- 3 Wait a few seconds then check the green LEDs on all inverter modules are on.
  - ☐ If any green LED is not on, or if any other LED is on or flashing then see Troubleshooting on page [41](#).
- 4 If a controller is fitted:
  - Check that the controller is operating correctly. See Status Monitoring on page [32](#).
  - If the controller's green LED is not on or if any other LED is on or flashing then see Troubleshooting on page [41](#).
  - Check all system parameters. See Parameter Setting on page [35](#).
- 5 Check that the output ac voltage and frequency are correct. If not then see Troubleshooting on page [41](#).
- 6 Connect the ac load equipment and check that it is operating correctly.

## Status Monitoring

When the controller module is installed with power on, the LCD screen will light and initially display "Waiting" during the self-diagnosis mode.



The general status screen is then shown.



Press **←** to display the "Main Menu".



Press **△** and **▽** then **←** to select the "STATUS" or the "SETTINGS" menu.

Inverter Status Menu	Description
Address	Inverter module location
Serial No	Serial number of the selected inverter module
OPV	Output voltage of the selected inverter module (V)
OPI	Output current of the selected inverter module (A)
OPF	Output frequency of the selected inverter module (Hz)
OPP	Power capacity of the selected inverter module (VA)
Input Volt	DC input voltage of the inverter system (V)
Power Used	Load level (%)
Heat Sink	Inverter heat sink temperature (°C)
Ambient Temp.	Inverter Ambient temperature (°C)
Run time	Inverter running time (hours)
Power Limited	Power limited (%)
HW Rev	Hardware version of the selected inverter module
SW Rev	Software version of the selected inverter module

<b>STS Status Menu</b>	<b>Description</b>
Address	STS module location
Serial No	Serial number of installed STS module
OPV	Output voltage of STS module
OPI	Output current of STS module
OPF	Output frequency of STS module
OPP	Output power of STS module
Mains AC Volt	Voltage of Mains AC connected to STS module
Main AC Freq	Frequency of Mains AC connected to STS module
INV AC Volt	Voltage of Inverter AC connected to STS module
INV AC Freq	Frequency of Inverter AC connected to STS module
MBS Position	Current MBS position (IBP /ISS/Normal/MSS/MBP)
Running Mode	STS running mode (Inverter/mains/standby/power on)
Default Volt	STS default output voltage (V)
Default Freq	STS default output frequency (Hz)
Power Used	Load level (%)
Temperature	STS internal temperature (°C)
Run Time	STS total running time in (hours)
Priority	STS output priority (On-line/Off-line)
HW Rev	Hardware version of STS module
SW Rev	Software version of STS module

<b>Controller Menu</b>	<b>Description</b>
Hardware Version	Hardware version of controller module
Firmware Version	Software version of controller module
Input vol	DC input voltage of controller module (V)
Temperature	Controller temperature (°C)



### Alarm Log Display

Main menu > Alarm > Active Alarm

Item	Specification	Remark
Inverter	Serial Number , Alarm name, time happened	For example: 1. Inv xxxxxxxxx Fan Fault yyyy-mm-dd hh:mm:ss
STS		
SMR		

### Alarm Status Inquiry

Main menu > Alarm > Alarm History

Inquire:


Item	Specification	Remark
Inverter	Serial Number , Alarm name, time happened	For example: 1. Inv xxxxxxxxx Fan Fault yyyy-mm-dd hh:mm:ss
STS		
SMR		

## Parameter Setting

The inverter system allows some parameters to be set from the controller module.

- 1 Press  $\nabla$  then  $\leftarrow$  to select SETTING.
- 2 A 4-digit numeric password is requested.



 Press  $\Delta$  or  $\nabla$  to increase or decrease the number. Then press  $\leftarrow$ . The default password is 1234. No setting modification can be executed if a wrong password is entered.

The SETTING section is divided into two categories:

- SYSTEM - system related setups.
- MODULE - parameters related to individual modules

## Password Setting

A new password can be set in SYSTEM option under SETTING.

- 1 Press **←** to enter SETTING PASSWORD menu to change the password.
- 2 Use **△** and **▽** to select new password. Press **←** to validate each digit of password once the desired number is selected.
- 3 After a new 4-digit password is input, re-enter the new password as confirmation. Repeat Step 2 to key in the new password again.

The screen will display DONE, when the password is successfully changed.

## Inverter System Parameter Settings

Parameter	Specification
BaudRate: Baud rate of COM port	Selectable at 1) 2400bps, 2) 4800bps and 3) 9600bps
RS422 Addr: RS422 address	RS422 communication protocol
Keypad tones: activation or de-activation of audio alarm	Selectable at 1) Enable or 2) Disable
Time&Date: Time and Date displayed on LCD	Time: hh:mm:ss Date: yyyy-mm-dd
Language	English/ Simplified Chinese/ Traditional Chinese
Password	Setting system password
Brightness: LCD brightness	From 00~63 for adjusting LCD display contrast
Default: Reset Default value	Select system type (230V-50Hz or 120V-60Hz). Press <b>←</b> to reset the default value or <b>Esc</b> to cancel. Please refer to Default Values on page <a href="#">71</a> .
Dryconnet: Dry contact setting	Refer to Alarm Settings on page <a href="#">38</a> .
Bat Calib: battery voltage calibration	xx.xxV For regulating the battery voltage value of LCD display of controller after operating for long period of time.  The adjustable range is from 20.01V to 69.99V

## Parameter Programming

### Inverter Parameter Settings

Parameter	Setting Option
Output volt	Inverter output voltage For 230Vac output: 1) 208 Vac; 2) 220 Vac; 3) 230 Vac; 4) 240 Vac For 110Vac output: 1) 110Vac; 2) 115Vac; 3)120Vac
Output Freq	Inverter output frequency: 50Hz or 60Hz
OPV HL: High loss of inverter output voltage	For Output volt = 208V, adjustable between 220V and 240V For Output volt = 220V, adjustable between 233V and 252V For Output volt = 230V, adjustable between 244V and 264V For Output volt = 240V, adjustable between 254V and 276V For Output volt = 110V, adjustable between 117V and 127V For Output volt = 115V, adjustable between 122V and 132V For Output volt = 120V, adjustable between 127V and 138V
OPV LL: Low loss of inverter output voltage	For Output volt = 208V, adjustable between 176V and 198V For Output volt = 220V, adjustable between 176V and 209V For Output volt = 230V, adjustable between 185V and 218V For Output volt = 240V, adjustable between 193V and 228V For Output volt = 110V, adjustable between 89V and 105V For Output volt = 115V, adjustable between 93V and 110V For Output volt = 120V, adjustable between 100V and 114V
IPV LVSD	The maximum input voltage for inverter normal operation: Adjustable between 39V and 44V
IPV HVSD	The minimum input voltage for inverter normal operation: Adjustable between 59V to 61V
Power Limited	Inverter output power capacity: Adjustable between 50% and 100%
Fan Speed	Fan speed level of inverter module: Selectable at 1) Normal and 2) Full
Inverter On/off	1. All > On/Off 2. Single > select Inverter number > select On/Off.

## STS Parameter Settings
















Parameter	Setting Option
AC HL: High loss of alternative AC input	xxxV
AC LL: Low loss of alternative AC input	xxxV
Inv HL: High loss of inverter AC input	xxxV
Inv LL: Low loss of inverter AC input	xxxV
Priority	Selectable at 1) On line or 2) Off line
Fan speed	Normal speed / Full speed

## Alarm Settings

In "clear" menu, push  to clear the alarm history.

## Connection to Dry contact Relays

Use # 30~16 AWG to connect to the dry relay contacts.

Dry Contact 1 CN7			Dry Contact 2 CN8			Dry Contact 3 CN9			Dry Contact 4 CN10			Dry Contact 5 CN11		
NC	COM	NO	NC	COM	NO	NC	COM	NO	NC	COM	NO	NC	COM	NO
														

## Dry Contact Relay Setting

To use the dry relay contacts as alarms, set the alarm mode of each dry contact as follows:



### Step 1 - Select which dry contact you want use



In the "Setting" menu, select "system", select "Dry contact", Select Dry contact # using  $\Delta$  and  $\nabla$ .

### Step 2 - Select the module for each the dry contact

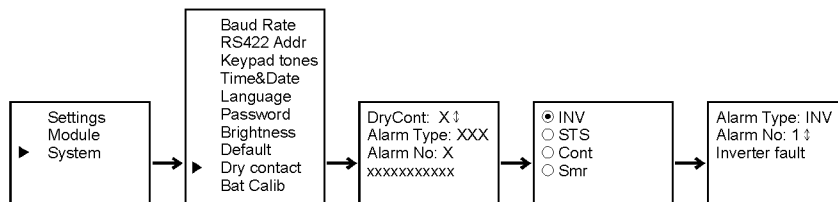


At "Alarm Type" press , select the module alarm for this Dry contact, then press .

**Step 3 - Select the alarm or fault mode of the module selected**



1 Press **←** to select the "Alarm No" to decide the alarm mode of the module by pressing **△** and **▽**.



- 2 Program the alarm mode as follows:
- Select the alarm mode.
  - Press **←** to confirm the selected alarm mode.
  - The new setting will be effective in 5 seconds.

**Procedure complete**

**Dry Contact Alarm Tables**

**Inverter**

01	Inverter fault
02	Inverter over load
03	Inv fan fault
04	Inv power limit
05	DC input Abnormal
06	Inv low volt off

**Static Transfer Switch**

01	Inv unavailable
02	Main unavailable
03	Output overload
04	OP short circuit
05	K1 relay open
06	STS SCR1 short
07	STS SCR2 short
08	INV Bypass Mode
09	Over temperature
10	MBS position abnormal
11	STS fan lock
12	STS Fault Mode
13	STS EEPROM fault
14	SPS Power Fail

**Controller**

01	DC input low
02	Cont temp high
03	Cont eeprom fail
04	DC input Over
05	CAN Bus Off

**SMR (not used)**

01	Output Volt High
02	SMR temp high
03	Fuse broken
04	SMR fault
05	Fan failure
06	SMR eeprom fail
07	AC derating
08	Temp derating
09	Output Shut Down
10	AC Volt Loss
11	AC Frequency Loss

## Overview



- The Matrix contains hazardous voltages and hazardous energy levels. Before undertaking any maintenance task refer to the Warnings on page [7](#).
- If a maintenance task must be performed on a "live" system then take all necessary precautions to avoid short-circuits or disconnection of the load equipment, and follow any "live-working" instructions applicable to the site.
- Only perform the maintenance tasks described in the Maintenance chapter. All other tasks are classified as Servicing. Servicing must only be performed according to specific instructions and only by personnel authorized by Eaton. This includes disassembly and/or servicing of any modules.
- For further information on Servicing contact your local Eaton dc product supplier, or refer to the contact details on page [77](#).

Topic	Page
Preventative Maintenance	<a href="#">41</a>
Troubleshooting	<a href="#">41</a>
Alarm Code Tables	<a href="#">48</a>

## Preventative Maintenance

The following preventive maintenance routines should be considered as a minimum requirement. Your installation and site may require additional preventive maintenance to assure optimal performance from your installed inverter and associated equipment.

These routines should be performed twice a year (or more often if required).

We strongly recommend a contract with Eaton Customer Support Services for preventive and remedial maintenance. See Worldwide Support on page [77](#) to contact Eaton for more information.

The technician or electrician performing preventive maintenance on the equipment must read and thoroughly understand this manual and be familiar with the indicators, controls, and operation of the equipment.

## Troubleshooting

If the Matrix fails to operate properly after installation and setup, use the following tables to determine the probable cause(s) and solution(s) to resolve the error conditions.

For unlisted error conditions, please contact your local dealer for technical assistance. See Worldwide Support on page [77](#).

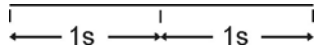
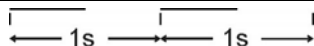

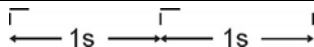
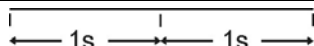
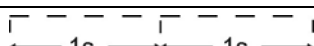
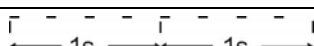
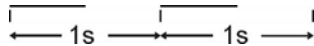
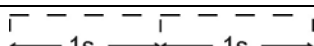
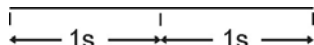
## Inverter Troubleshooting

Error Condition	Possible Cause	Recommendation
Inverter module cannot be properly inserted	STS module instead of inverter.	The inverter shelf only holds inverter modules.
	Wrong model of inverter module.	All inverters must be the same model. The model type that can be installed is set by the nylon spacers. See details on page <a href="#">12</a> .
No AC output and all LEDs are off.	Lack of input power	1. Check if input cables are all firmly connected to power source. 2. Check if power source is switched on, or is low in power.
	Mis-match of inverter modules	Check inserted inverter modules are all the same model.
No AC output. Both green and yellow LEDs flash.	Inverter self-diagnosis	Inverter self-diagnosis takes a few seconds. LED then turns to a solid green.
No AC output. Both yellow and red LEDs are on.	Load exceeds 125%	Reduce the load to below 100% of the total power rating.
No AC output, Red LED is on.	1. Input wiring is reverse polarity.	Check input cable polarity (positive to positive, negative to negative).
	2. Output voltage is out of operating range.	Make needed voltage adjustment to ensure that the voltage of connected device is within the inverter output voltage range.
	3. Inverter output is shorted	Turn off the input power source to remove all short circuits.
	4. Negative Power Protection	1. For multi-shelf system, any jumper insertion on JP2 connector would obstruct parallel connections. Remove jumper from JP2 connector. 2. For single-shelf system, jumper on JP2 connector pools two inverter modules. Ensure a jumper on JP2 connector.
Red LED flashing fast	1. Inverter fails to soft start	Reboot the inverter system by switching the input power source on and off.
	2. Inverter temperature is above the temperature limit.	Leave inverter idle to cool down for few minutes.



Error Condition	Possible Cause	Recommendation
AC output exists with yellow LED flashing.	Input voltage is out of operating range.	Ensure input voltage is between 45V and 58V. Check if the battery or dc source is connected.
AC output exists with yellow LED on	Load is over 100% but below 125%.	Reduce the load to below 100% of the total power rating.
Inverter continuously delivers power, with red LED flashing slowly.	Failure of EEPROM	Reboot the inverter system by switching the input power source on and off.
	Fan failure.	If the fan is blocked, remove the cause. If the fan fails to operate, return the inverter for service.

### Inverter Module LED display status (Low to High Priority)

LED	LED Signal	Status
Green	Continuous	 Normal operation.
	Slow Flash (1Hz)	 Inverter is communicating.
	Short Slow Flash (1Hz)	 Either: 1) Power On. Refer to note. 2) Shut down remotely.
Yellow	Short Slow Flash (1Hz)	 Power On. Details refer to note.
	Continuous	 Over Load (Load > 100%)
	Fast Flash (4Hz)	 DC input abnormal (Vin<=45V or Vin>=58 V)
	Short Fast Flash (4Hz)	 Inverter shut down due to low/high input (Vin<=VLVSD or Vin>=VHVSD)
Red	Slow Flash (1Hz)	 Either: 1) EEPROM Fault. The inverter can not operate in parallel mode system, however, it can work in single mode system 2) Inverter Fan Fault. Fan fails to operate.
	Fast Flash (4Hz)	 Either: 1) Internal DC Bus Over/Under/Unbalance/soft start fail. The inverter will shutdown. It cannot restart automatically. 2) Temperature High. The inverter will shut down. It cannot restart automatically.
	Continuous	 Either:

LED	LED Signal	Status
		1) The DC input voltage polarity is reverse. 2) Inverter output Short circuit. When short circuit happens, inverter will shut down. Manual restart is required. 3) Abnormal output voltage. The inverter will shut down when output voltage is out of operating voltage range. It cannot restart automatically. 4) Negative Power Protection. The inverter will shut down. It cannot restart automatically. 5) Overload fault. When the time of overload protection exceeds the defined time, the inverter will shut down. Then inverter should be manually restarted.

Note :

Power On: When inverter is in "Power On" mode, the green LED and the yellow LED are flickering synchronously without any alarm which needs the yellow LED to indicate.

Overload and overload fault:

When overload fault alarm occurred, the yellow LED and red LED turn on at the same time while overload alarm occurred, only the yellow LED turns on.

Priority:

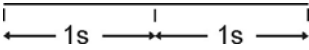
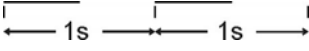
If more than one warning exists at the same time, then the LED will display the highest priority.

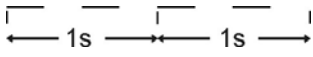
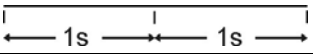
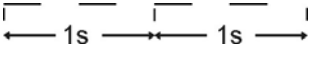
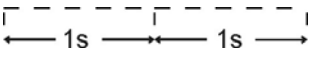
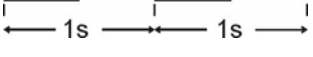
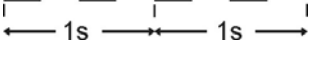
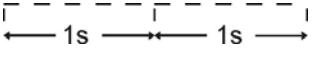
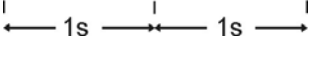
## STS Troubleshooting

Error Condition	Possible Cause	Recommendation
No AC output and all LED off.	Lack of input power	1. Check if input cables and bus bars are all firmly connected to power source. 2. Check if inverter output or Mains AC are not yet switched on, or is low in power
Priority is On line, STS AC output is normal but with yellow LED on.	STS AC input source is from inverter. The inverter is in normal status, but the utility line is in abnormal status.	Check AC Mains connection and status.
Priority is On line, STS AC output is normal but with green LED flash at 1Hz.	STS AC input source is from utility, the inverter is in normal status; Maybe the current load is out of the capability of inverter, or the inverter is just from abnormal status back to normal.	Please refer to inverter trouble shooting guide
Priority is On line, STS AC output is normal but with green LED flash at 1Hz, and yellow LED on.	STS AC input source is from utility, and inverter is in abnormal status	Please refer to inverter trouble shooting guide
No AC output, yellow LED is on.	Both inverter and utility AC source are in abnormal status	Check AC mains and inverter output.
Priority is off line, AC is normal from Mains, but yellow LED is on.	STS AC input source is from utility, and inverter is in abnormal status	Please refer to inverter trouble shooting guide
Priority is off line, AC is normal, but green LED flash at 1Hz.	STS AC input source is from inverter, utility is just from abnormal status back to normal	Check AC Mains connection and status.
No AC output, yellow LED flash at 2Hz.	The relay of utility power side is broken and can not form close circuit	Turn MBS to mains or inverter bypass mode, maintain the STS module
AC output is normal, green LED is on or flashes at 1Hz, yellow LED flashes at 2Hz.	The relay of utility power side is broken and can not form close circuit	Turn MBS to mains or inverter bypass mode, maintain the STS module
AC output is normal, green LED is on, red LED flashes at 1Hz.	Fan fails	Turn MBS to mains or inverter bypass mode, maintain the STS Fan

<b>Error Condition</b>	<b>Possible Cause</b>	<b>Recommendation</b>
AC output is normal, green LED is on, red LED flashes at 1Hz.	EEPROM FAULT. EEPROM can not write or read data correctly	This will not influence the STS AC output. The alert will be off automatically after 10s later.
AC output is normal, green LED is on, red LED flashes at 1Hz.	CAN communication error	Check the connection of CAN signal cables
AC output is normal, green LED is on, red LED flashes at 2Hz.	SCR short fault	Turn MBS to mains or inverter bypass mode, maintain the STS
AC output is normal, green LED is on, red LED flashes at 2Hz.	Auxiliary Power Supply fault	Turn MBS to mains or inverter bypass mode, maintain the STS
AC output is normal, green LED is on, red LED flashes at 5Hz.	MBS provides 3 signals to STS for detecting MBS position. When the connection is off or not at valid position, this alert appears.	Check if the MBS and STS signal cable is well-connected
AC output is off, red LED on, other LED off.	STS fault mode	Turn MBS to mains or inverter bypass mode, maintain the STS
AC output is off, red LED on, other LED off.	Over temperature	Turn MBS to mains or inverter bypass mode, maintain the STS, check if the environmental temperature is higher, if there's anything blocking the vent?
AC output is off, red LED on, other LED off.	Over load	Decrease or remove the loads, then shut down or remove the STS module. Then connect it back and restart up.
AC output is off, red LED on, other LED off.	Output short	Decrease or remove the loads, then shut down or remove the STS module. Then connect it back and restart up.
AC output is normal, green and yellow LED flashes at 2Hz.	Inverter bypass mode	STS internal temperature is too high. Check if anything blocking the vent or working overload for long time.

**STS Module Alarm LED display status (Low to High Priority)**

<b>LED</b>	<b>LED Signal</b>		<b>Status</b>
Green	Solid		STS is operating normally
	Slow Flash (1Hz)		Running mode does not agree with the setting priority. For example, STS is in off-line mode, but the priority is on-line.

	Fast Flash (2Hz)		STS is in Inverter Bypass mode (this refers to the internal mode of STS, not the position of the MBS).
Yellow	Solid		Mains or inverter abnormal
	Fast Flash (2Hz)		If the status of green and yellow LED is the same, then STS is in Inverter Bypass mode, otherwise the Back-feed relay is open.
	Fastest Flash (5Hz)		STS Output is abnormal
Red	Slow Flash (1Hz)		Fan lock, CAN communication fail, or EEPROM fault
	Fast Flash (2Hz)		SCR short or auxiliary power supply fault
	Fastest Flash (5Hz)		MBS position abnormal.
	Solid		STS Fault mode, may be overload, over temperature, or output short.

Note: If more than one warning exists at the same time, then the LED will display the highest priority.

## Alarm Code Tables

### Inverter Alarm Codes

Alarm Name	Level	Remark
Inverter fault	Major	Inverter fault
Inv over load	Observe	Inverter Over-loading
Inv fan fault	Major	Inverter Fan fault
Inv power limit	Major	Inverter power limit
DC input Abnormal	Major	Inverter input abnormal
Inv low volt off	Major	Inverter shut down due to low input volt
Inv Bus High	Critical	Bus volt over the maximal level
Inv Bus Low	Critical	Bus volt under the minimal level
Inv BusSoft fail	Critical	Bus Soft Start Fail
Inv Output short	Critical	Inverter Output Short
Inv OPV Low	Critical	Inverter output volt low
Inv OPV High	Critical	Inverter output volt high
Inv Temp High	Critical	Inverter Temperature High
NegPow Protect	Critical	Inverter negative power protection
SynPulse fault	Critical	Sync Pulse Fault
Inv EPO	Critical	EPO
SoftStart fail	Critical	Inverter soft start fail
Eeprom fail	Major	Inverter EEPROM fault
Inv Temp High	Critical	Inverter temperature high

### Controller Alarm Codes

Alarm Name	Level	Remark
Inv lost	Critical	Inverter lost
STS lost	Critical	STS lost
DC input low	Critical	Bat Volt Low
Cont temp high	Critical	Controller temperature High
Cont eeprom fail	Major	Controller EEPROM fault
DC input Over	Critical	Bat voltage high
CAN Bus Off	Critical	Controller CAN bus off

## STS Alarm Codes

Alarm Name	Level	Remark
Inv unavailable	Major	Inverter unavailable
Main unavailable	Major	Mains unavailable
Output overload	Major	Output over load
OP Short circuit	Critical	Output short circuit
K1 Relay open	Major	Back-feed relay open
STS SCR1 short	Critical	SCR1 short circuit
STS SCR2 short	Critical	SCR2 short circuit
INV Bypass Mode	Critical	Inverter bypass mode
Over temperature	Major	STS temperature high
MBS Abnormal	Critical	MBS in abnormal position
STS Fan Lock	Major	STS fan fault
STS fault mode	Critical	STS running in fault mode
STS Eeprom Fault	Major	EEPROM fault
SPS Power Fail	Critical	Control power fail
OutPut Abnormal	Critical	STS output abnormal





## DC Input

Nominal voltage	48Vdc
Operating range	40.5Vdc ~ 58Vdc
Under voltage warning threshold	45Vdc
Under voltage threshold	40Vdc
Over voltage warning threshold	58Vdc
Over voltage threshold	60Vdc
Isolation AC-DC	Reinforced isolation (Pri-Sec) 4242Vdc/1min
Inrush current	$<2 \cdot I_{rated}$
Isolation DC-enclosure	707Vdc (Varistors and filter capacitor removed)/1min
Input protection	Reverse Polarity Protection
Psophometric noise voltage	$\leq 1.0\text{mV}$ ITU-T O.41 (16.66 ~ 6000Hz)
Reflected Psophometric noise current	According to YD / T 777-2006 less than 1%
Reflected relative band wide current noise	According to YD/T 777~2006 less than 10%(0-2Mhz)
Wide Band Noise	$<1.0\text{mVpsof}$ (25Hz~5kHz) $<20\text{mVrms}$ (25Hz~20kHz)
Peak to peak noise	150mV up to 100MHz

## Protection

Over load	When load exceeds 125% or 150% or 200% of power capacity, inverter will shut down 20s or 10s or 5s later, and diagnose as overload fault with red LED lit. When load is 100~125%, inverter continuously delivers output power with a yellow LED lit for warning.
Output Voltage Fault Detection	When the output RMS (root mean square) voltage is out of operating voltage range, the inverter unit will diagnose as output voltage high or low fault.
Inverter output short circuit	When output is short, the system will shut down and the red LED will be on.
Input Voltage Detection	When the DC input voltage is out of operating voltage range, the inverter system will shut down and release visual and audio alarms.
Over Temperature	When inverter internal temperature rises over 100°C (212°F), the system will diagnose as over temperature fault with red LED flicker.

**AC Output**

Power Capacity	1000VA/800W or 1500VA/1200W
Waveform	Pure sine wave
Power factor	0.8
Nominal output voltage	110/115/120Vac or 208/220/230/240Vac
Voltage regulation	Nominal $\pm 2\%$
Output frequency	50/60Hz
Frequency variation	Nominal $\pm 0.5\%$
Frequency setting	Manually, field selectable
Crest factor	3:1
THD	<3% for linear load <5% for non-linear load
Capacitive/inductive load	-0.8 to +0.8 without exceeding permissible distortion for resistive load
Efficiency	Min 89% at rated load for 48Vdc System
Current limitation	Electronic current limitation at overloads and short circuits.
Isolation AC-enclosure	Basic isolation (Pri-Gnd) 2121Vdc/1min
Surge protection	EN61000-4-5. Telcordia GR-1089 Core ANSI C62.41-IEEE, STD 587-1980
Dynamic response	< $\pm 10\%$ , according to IEC 62040-3 class 1
Over load protection	2*I <sub>nom</sub> , 5s max 1.5*I <sub>nom</sub> , 10s max 1.25*I <sub>nom</sub> temperature controlled I <sub>nom</sub> = 1000VA (1500VA) / output voltage
Load sharing	< 5 %

**Parallel Connection**




Maximum number of inverter modules for parallel connection:

	Without STS	With STS-050	With STS-100
INV-4810	12	6	12
INV-4810E	12	12	12
INV-4815	12	4	8
INV-4815E	12	8	12

**Controller Module**

DC nominal voltage	48Vdc
DC voltage range	30 Vdc -72Vdc
Over current protection	2A Fuse

### User Interface

LCD display	3-inch backlit LCD screen 4 lines by 16 characters
LED Indicators	Green: Normal Yellow: Warning Red: Fault
Function Keys	
 (Enter):	Select comment, validation
<b>Esc</b> (Escape):	Cancel
 (Up):	Move cursor up
 (Down):	Move cursor down
Buzzer	Audio alarm when inverter, STS, controller module operate abnormally

### System Parameters

BaudRate	Set controller serial port baud rate
Keypad tones	Disable or enable keypad tones
Time & Date	Set current time and date
Setting Password	Set system password
Brightness	Set LCD brightness
Default	Change current system parameters to default values
Bat Calib	Calibrate battery voltage

### Environmental

Operating temperature	-20°C to 70°C (-4°F to 158°F) -5°C to 50 °C (23°F to 122°F) <i>full performance</i>
Storage temperature	-40°C to 85°C (-40°F to 185°F)
Operating humidity	90% Relative Humidity (non condensing)
Heat dissipation	Forced air cooling for inverter/STS module
Operating Attitude	1500m
Audible noise	55dB ETS 300 753, class 3.1

### Safety Standards

Inverter Module	EN 60950-1 / UL-60950-1
STS Module	EN 60950-1,UL-1778
Controller Module	EN 60950-1

**Mechanical**

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Inverter Module

Dimension (D, W, H): 270mm, 215mm, 43.8mm (10.6", 8.5", 1.7")  
Weight: 2.5kg (5.5 lb)

---

STS-050 Module

Dimension (D, W, H): 270mm, 215mm, 43.8mm (10.6", 8.5", 1.7")  
Weight: 2.1kg (4.6 lb)

---

STS-100 Module

Dimension (D, W, H): 270mm, 218mm, 88mm (10.6", 8.6", 3.5")  
Weight: 3.5kg (7.7 lb)

---

Controller Module

Dimension (D, W, H): 277mm, 87.9mm, 43.5mm (10.8", 3.4", 1.7")  
Weight: 0.5kg (1.1 lb)

---

Interface Module

Dimension (D, W, H): 79.7mm, 129.5mm, 43.5mm (3.1", 5.1", 1.7")  
Weight: 0.25kg (0.55 lb)

---

Inverter Chassis

Dimension (D, W, H): 330mm, 483mm, 43.8mm (13", 19", 1.7")  
Weight: 2.7kg (6 lb)

---

Controller/Interface/STS-050 Chassis

Dimension (D, W, H): 330mm, 483mm, 43.8mm (13", 19", 1.7")  
Weight: 2.7kg (6 lb)

---

Controller/Interface/STS-100 Chassis

Dimension (D, W, H): 330mm, 483mm, 88.1mm (13", 19", 3.5")  
Weight: 3.5kg (7.7 lb)

---

MBS-050 / PD Chassis, MBS-100 / PD Chassis

Dimension (D, W, H): 330mm, 483mm, 88mm (13", 19", 3.5")  
Weight: 7.0kg (15.4 lb)

## STS AC Input

AC voltage range	
110/115/120 Vac:	89 to 138 Vac. See Note.
208/220/230/240 Vac:	176 to 276 Vac
Over voltage threshold	Adjustable by controller module: 220 to 240 Vac for 208 Vac systems 233 to 252 Vac for 220 Vac systems 244 to 264 Vac for 230 Vac systems 254 to 276 Vac for 240 Vac systems 117 to 127 Vac for 110 Vac systems 122 to 132 Vac for 115 Vac systems 127 to 138 Vac for 120 Vac systems
Under voltage threshold	Adjustable by controller module: 176 to 198 Vac for 208 Vac systems 176 to 209 Vac for 220 Vac systems 185 to 218 Vac for 230 Vac systems 193 to 228 Vac for 240 Vac systems 89 to 105 Vac for 110 Vac systems 93 to 110 Vac for 115 Vac systems 100 to 114 Vac for 120 Vac systems
Redundant power supply design	Startup power-on by priority source or alternative

### Note:

The over/under voltage for each rate must be set by the controller. If the controller module does not exist in the system, the STS module will adopt the widest range to set over/under voltage in order to guarantee its performance.

The ranges are:

110/115/120 Vac system:	89Vac (under voltage point) to 138Vac (over voltage point)
208/220/230/240 Vac system:	176Vac (under voltage point) to 276Vac (over voltage point).

However, once the STS module is set by the controller, it will memorize the setting permanently no matter if the controller module exists or not, unless the STS is set by controller again or the AC source changes from 120V (110/115/120) to 240V (208/220/230/240) or from 240V (208/220/230/240) to 120V (110/115/120).

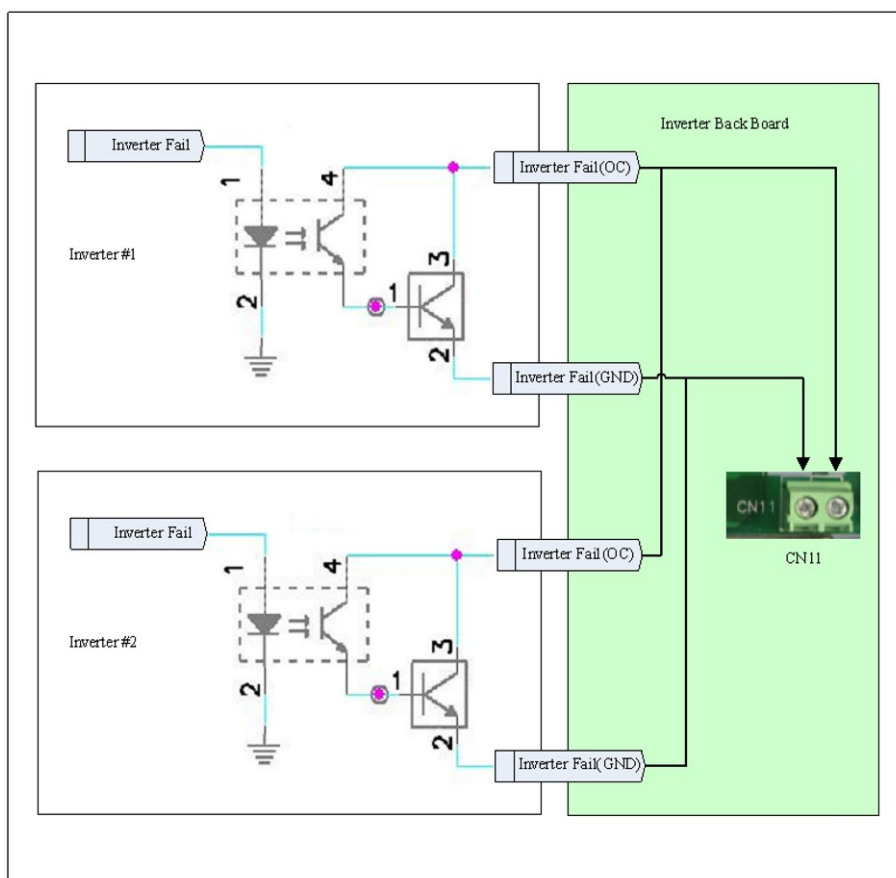
**STS Output**

Nominal Output Voltage	Same as utility voltage or inverter output
Permissible Frequency Area	Max. +/-2.5% (inverter synchronization)
Transfer Time	Typical 1/4 cycle
Rated Power	STS-050: 50A STS-100: 100A
Operation Methods	Inverter priority / Mains priority
Over load protection	20s 120% $I_{nom}$ 5s 160% $I_{nom}$ STS-050 : $I_{nom}$ = 50A, STS-100 : $I_{nom}$ = 100A, Note: When Mains has the priority, and STS is in off-line mode, if change the priority to Inverter, then STS will estimate the load capability of Inverter to decide whether transfer to on-line mode. If the current load exceeds the load capability of Inverter, STS will not transfer to on-line mode; otherwise it will transfer to on-line mode 5s later.
Over temperature operation	
On-line mode:	When the temperature of heat sink in STS is over 85°C, the static switch will power the load through the internal bypass relay, and the SCR2 on the side of the inverter will be open. If the temperature reaches 90°C, the bypass relay will be open, and the load will have no power unless STS is restarted. The system will re-establish the power through the inverter with SCR2 close and relay open, when the temperature is within 65°C, STS returns to normal mode.
Off-line mode:	When the temperature of heat sink in STS is over 85°C, the static switch will transfer to on-line mode if Inverter is normal, then the over temperature protection is the same as on-line mode.

## Inverter Alarm Interface

CN11 on the inverter shelf backplane is the inverter alarm. It will send out alarm signal if either inverter in the shelf fails.

This alarm is typically used if the inverters are stand-alone (no controller). It can be connected to a suitable digital input of an external alarm monitoring system.



Inverter 1	Inverter 2	Status between Pin 1& Pin 2
Normal	Normal	High impedance
Fault	Normal	Low impedance
Normal	Fault	Low impedance
Fault	Fault	Low impedance

## Standard Torque Settings

Use the following torque settings unless specific values are stated on the fastener or elsewhere. For battery terminals use the torque values specified by the battery manufacturer.

Thread Size ISO Coarse	Minimum - Maximum Torque
M2.5	0.3 - 0.4Nm (2.7 - 3.5 inch-pounds)
M3	0.5 - 0.6Nm (4.5 - 5.3 inch-pounds)
M4	1.1 - 1.3Nm (9.8 - 11.5 inch-pounds)
M5	2.3 - 2.7Nm (20.5 - 23.9 inch-pounds)
M6	3.9 - 4.5Nm (35 - 39 inch-pounds)
M8	9.5 - 11.1Nm (85 - 98 inch-pounds)
M10	18.7 - 21.9Nm (166 - 194 inch-pounds)
M12	32.8 - 38.4Nm (292 - 340 inch-pounds)
M16	81.5 - 95.1Nm (724 - 844 inch-pounds)

**Notes:**

- 1 Torque settings are for mild steel, brass and stainless steel.
- 2 Torque is based on 60% of yield stress of the material. Yield for the purposes of this chart is 240MPa.
- 3 Tolerance range is 60 - 70 % of yield.
- 4 When a bolt and nut is torqued use a spanner to prevent rotation.

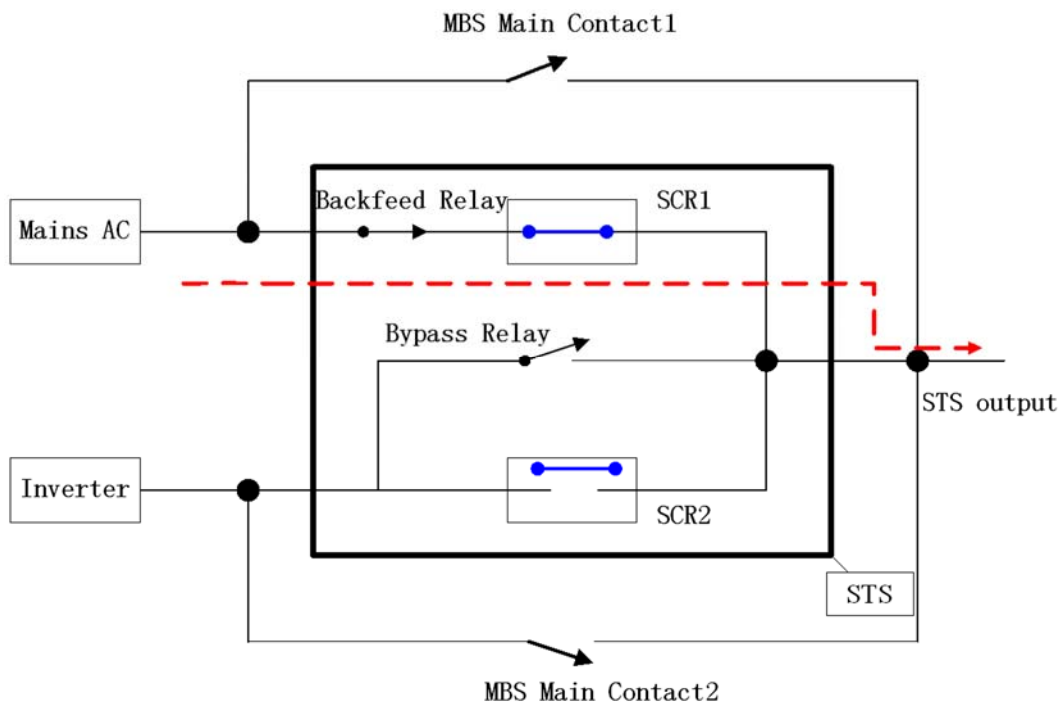


## Introduction

The optional Static Transfer Switch (STS) module increases system reliability by providing automatic switching between the inverter output and the AC mains source. This provides protection against load interruptions caused by severe overload or inverter system failure. The optional Maintenance Bypass Switch (MBS) consists of a mechanical switch providing voltage free system maintenance for the safe removal of inverters or the static transfer switch without load power interruptions.

The MBS has two main contacts. In the *Inverter Bypass* or *Mains AC Bypass* positions, the MBS main contact2 or the MBS main contact1 will be closed. The inverter or mains AC will then power the load via directly, so that the STS can be removed without interruption to the load.

- ☐ For STS specifications refer to STS AC input specifications on page [55](#) and STS Output Specifications on page [56](#).



## MBS Switch Positions

The MBS has five positions:

- Mains bypass, MBP
- Mains static switch, MSS
- Normal operation, NORM
- Inverter static switch, ISS
- Inverter bypass, IBP

The MBP and IBP positions are used to insert or remove the STS module without load power interruption.

The MSS and ISS positions are for Inverter maintenance and Mains AC maintenance, respectively.

The NORM position is the primary operation position for the system. In this position the output power will never be interrupted except if both Mains AC and the inverters are unavailable.

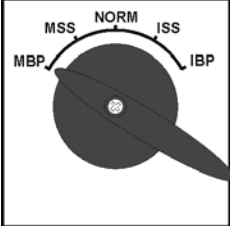
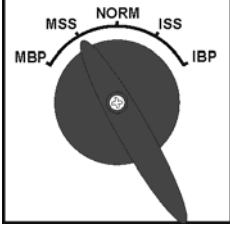
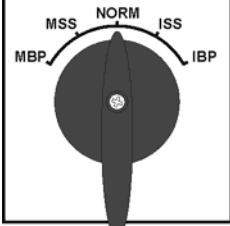
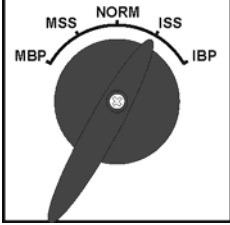
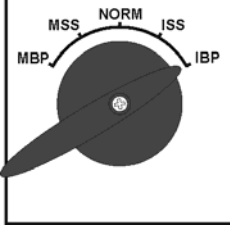
To maintain an inverter module, or inverter input or output connections, you can switch from NORM to the MSS position, this guarantees the continuity of output power. Alternatively, switch from NORM to the ISS position, to maintain the Mains AC input without load power interruption.

For maximum reliability of the supply make sure the MBS is in NORM position when maintenance is required.

The following table shows detail of the MBS switch positions.

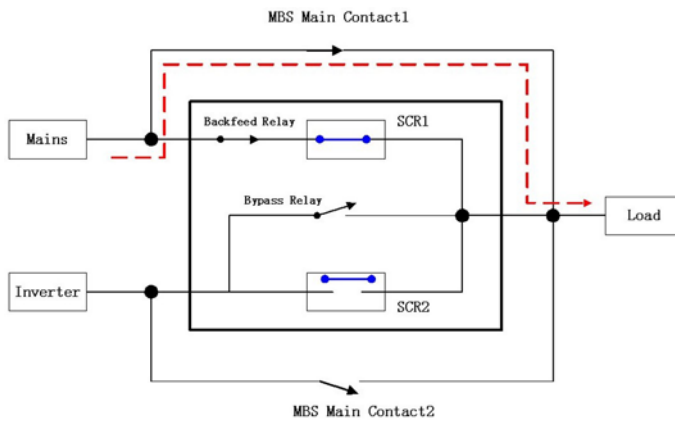
**Note:**

- 1** Do not change MBS position immediately after the STS is inserted into the system. Wait at least 5 seconds before any change.
- 2** Make any changes slowly. Leave the MBS in one position for at least 1 second so that the STS has enough time to detect the MBS position via the MBS auxiliary contacts.

MBS Position		Function	Power Source
Mains Bypass (MBP)		Load is powered through the MBS by the Mains AC. STS can now be removed from the system.	Mains AC power the load via MBS contact 1.
Mains Static Switch (MSS)		Mains AC powers the load. The inverters are ON, but do not provide any load power. Inverter tests can be made.	Mains AC power the load.
Normal Operation (NORM)		Usually, the system operates with MBS in this position. Only in this position does the transfer action between Mains AC and inverter take place.	The system output power is from either Mains AC or Inverter according to the programmable priority.
Inverter Static Switch (ISS)		Mains AC is disconnected from the system. This is achieved by opening the Backfeed contactor.	Inverter powers the load.
Inverter Bypass (IBP)		Load is powered through the MBS by the inverters. STS can now be removed from the system.	Inverter powers the load via MBS contact 2.

## Operation of STS at each MBS position

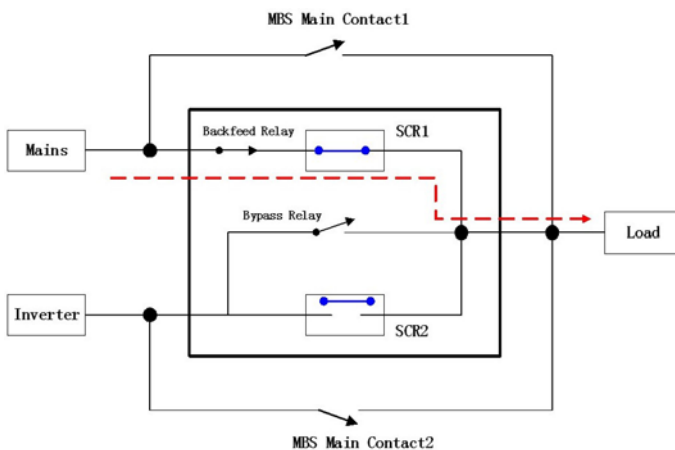
### Mains Bypass (MBP)



#### Mains Bypass:

- Load is powered through the MBS by the Mains AC
- STS can be removed from the system
- MBS can only be switched to Mains Static Switch position
- SCR2 open, SCR1 and Back-feed Relay closed
- If SCR2 is short, the STS will stay in off-line mode

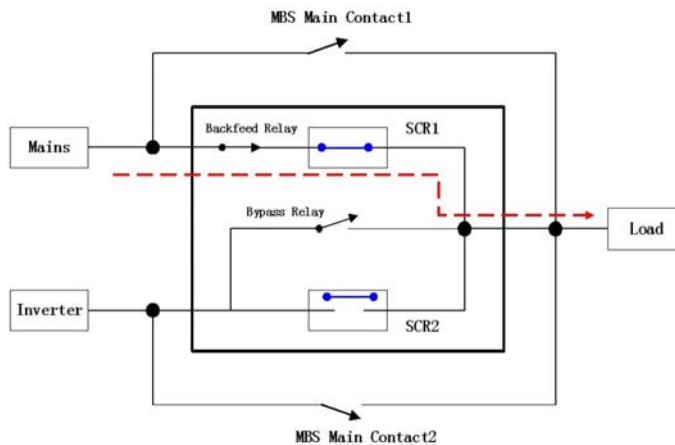
### Mains Static Switch (MSS)



#### Inverter Maintenance (MSS):

- Mains AC powers the load through the static switch
- Inverters are on, but do not provide load any power
- Inverters can be removed from the system, but the static switch cannot
- MBS can be switched from to Mains Bypass or Normal Operation position
- SCR2 open, SCR1 and Back-feed Relay closed
- If SCR2 is short, the STS will stay in off-line mode

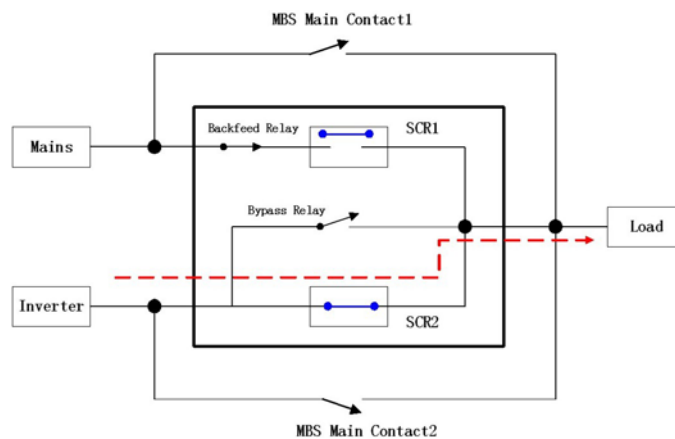
Normal Operation (mains priority)



Normal Operation (NORM)  
Mains priority:

- Mains AC powers the load through the static switch
- MBS can be switched to Mains Static Switch or Inverter Static Switch position
- SCR2 open, SCR1 and Back-feed Relay closed
- If the mains voltage or frequency is abnormal, but the inverter is normal, the STS will transfer to on-line mode
- If SCR2 is short, the STS will keep the off-line mode

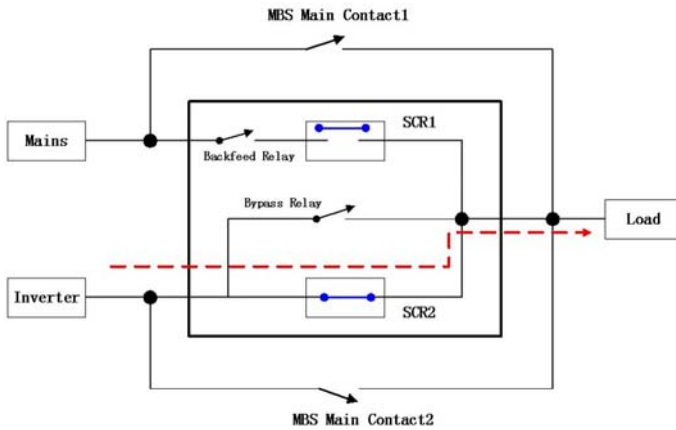
Normal Operation (NORM) (inverter priority)



Normal Operation (NORM)  
Inverter priority:

- Inverters power the load through the STS
- MBS can be switched to Mains Static Switch or Inverter Static Switch position
- SCR1 open, SCR2 and Back-feed Relay closed
- If the Inverter's voltage or frequency is abnormal, but the mains is normal, the STS will transfer to off-line mode
- If SCR1 is short, the STS will keep the on-line mode, and the Back-feed relay will open

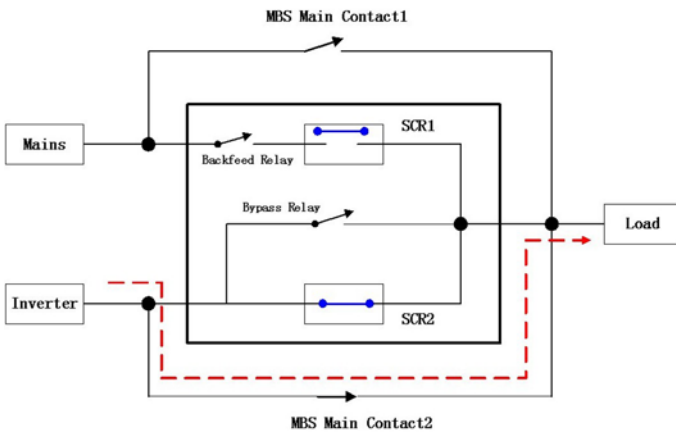
### Inverter Static Switch (ISS)



ISS (Inverter Static Switch):

- Inverters power the load through the STS
- AC mains is disconnected from the system, and the STS cannot be removed from the system
- MBS can be switched to Normal Operation and Inverter Bypass position
- Back-feed Relay and SCR1 open, SCR2 closed

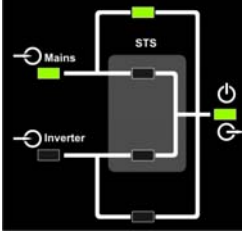
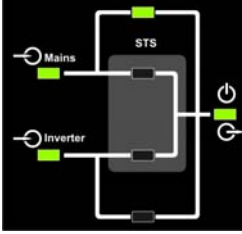
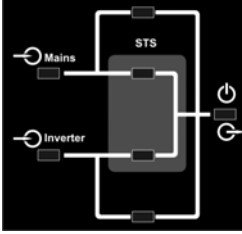
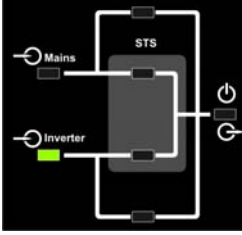
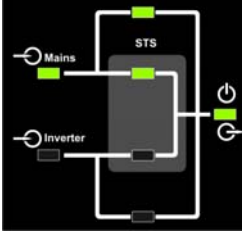
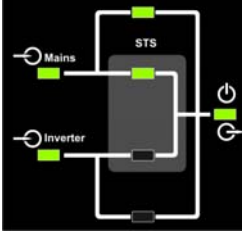
### Inverter Bypass (IBP)

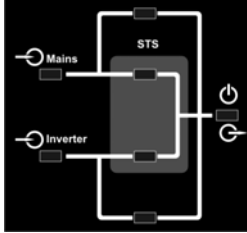
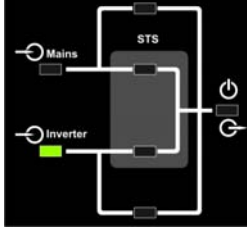
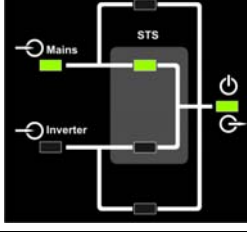
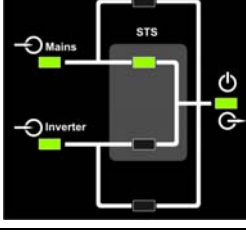


Inverter Bypass (IBP):

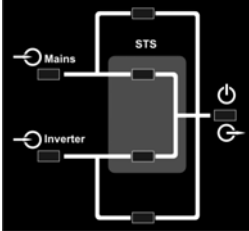
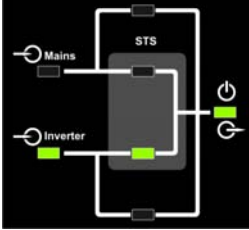
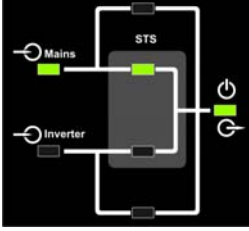
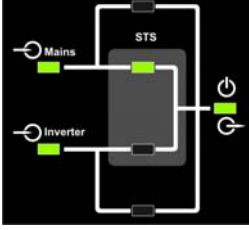
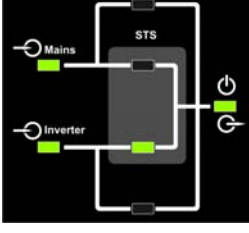
- Load is powered through the MBS by the inverters.
- STS can be removed from the system
- MBS can only be switched to Inverter Static Switch position
- Back-feed Relay and SCR1 open, SCR2 closed

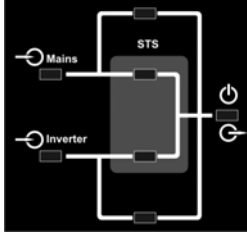
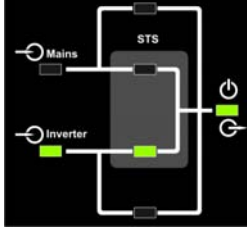
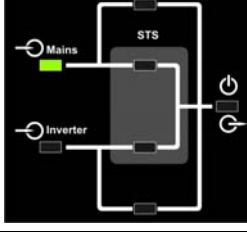
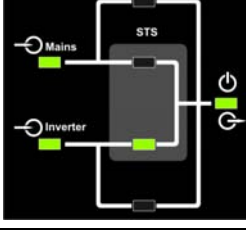
**STS-100 LED Status Display**

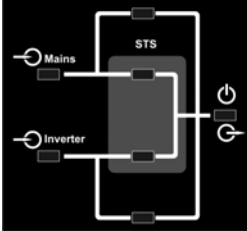
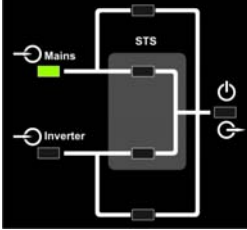
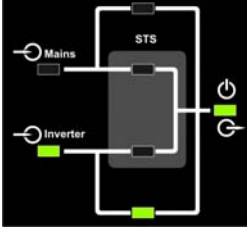
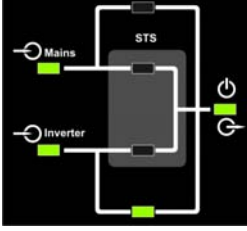
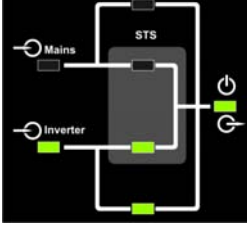
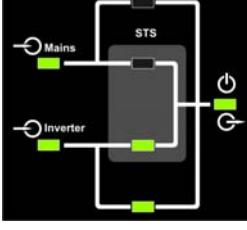
MBS Position	LED Display	Status
Mains Bypass (MBP)		<p>AC Mains is on but unacceptable.                      Inverter output is off or unacceptable.                      Mains power to the load via bypass switch.</p>
		<p>AC Mains is on but unacceptable.                      Inverter output is acceptable.                      Mains power to the load via bypass switch.</p>
		<p>AC Mains is off.                      Inverter output is off.</p>
		<p>AC Mains is off.                      Inverter output is on.                      No mains power to load (mains bypass is on).</p>
		<p>AC Mains is acceptable.                      Inverter output is off.                      Mains power to the load via bypass switch.</p>
		<p>AC Mains is acceptable.                      Inverter output is on.                      Mains power to the load via bypass switch.</p>

MBS Position	LED Display	Status
<b>Inverter Maintenance (MSS)</b>		AC Mains is off or unacceptable. Inverter output is off or unacceptable.
		AC Mains is off or unacceptable. Inverter output is acceptable.
		AC Mains is acceptable. Inverter output is off or unacceptable. Mains power to load via STS.
		AC Mains is acceptable. Inverter output is acceptable. Mains power to load via STS.



MBS Position	LED Display	Status
Normal Operation (NORM)		AC Mains is off or unacceptable. Inverter output is off or unacceptable.
		AC Mains is unacceptable. Inverter output is acceptable. Inverter power to load via STS.
		AC Mains is acceptable. Inverter output is off or unacceptable. Mains power to load via STS.
		<b>Priority: Off-line</b> AC Mains is acceptable. Inverter output is acceptable. Mains power to load via STS.
		<b>Priority: On-line</b> AC Mains is acceptable. Inverter output is acceptable. Inverter power to load via STS.

MBS Position	LED Display	Status
Mains Maintenance (ISS)		<p>AC Mains is off or unacceptable. Inverter output is off or unacceptable.</p>
		<p>AC Mains is off or unacceptable. Inverter output is acceptable. Inverter power to load via STS.</p>
		<p>AC Mains is acceptable. Inverter output is unacceptable.</p>
		<p>AC Mains is acceptable. Inverter output is acceptable. Inverter power to load via STS.</p>

MBS Position	LED Display	Status
Inverter Bypass (IBP)		<p>AC Mains is off or unacceptable. Inverter output is off or unacceptable.</p>
		<p>AC Mains is acceptable. Inverter output is off or unacceptable.</p>
		<p>AC Mains is off or unacceptable. Inverter output is on but unacceptable. Inverter output to load via bypass switch.</p>
		<p>AC Mains is acceptable. Inverter output is on but unacceptable. Inverter output to load via bypass switch.</p>
		<p>AC Mains is off or unacceptable. Inverter output is acceptable. Inverter output to load via bypass switch.</p>
		<p>AC Mains is acceptable. Inverter output is acceptable. Inverter output to load via bypass switch.</p>



**Controller Default Values**

STS priority	on-line
--------------	---------

**230Vac System Default Values (INV-4810E or INV-4815E inverters)**

The following default values apply to systems with INV-4810E or INV-4815E inverter modules.

Mains high loss volt:	264V
Mains low loss volt	185V
Inverter input highloss volt for STS	264V
Inverter input lowloss volt for STS	185V
Inverter output highloss volt	264V
Inverter output lowloss volt	185V
Inverter shut down due to low input volt	40V
Inverter shut down due to high input volt	60V
Inverter output volt	230V
Inverter output volt frequency	50Hz
Inverter output power limit	100%

**120Vac System Default Values (INV-4810 or INV-4815 inverters)**

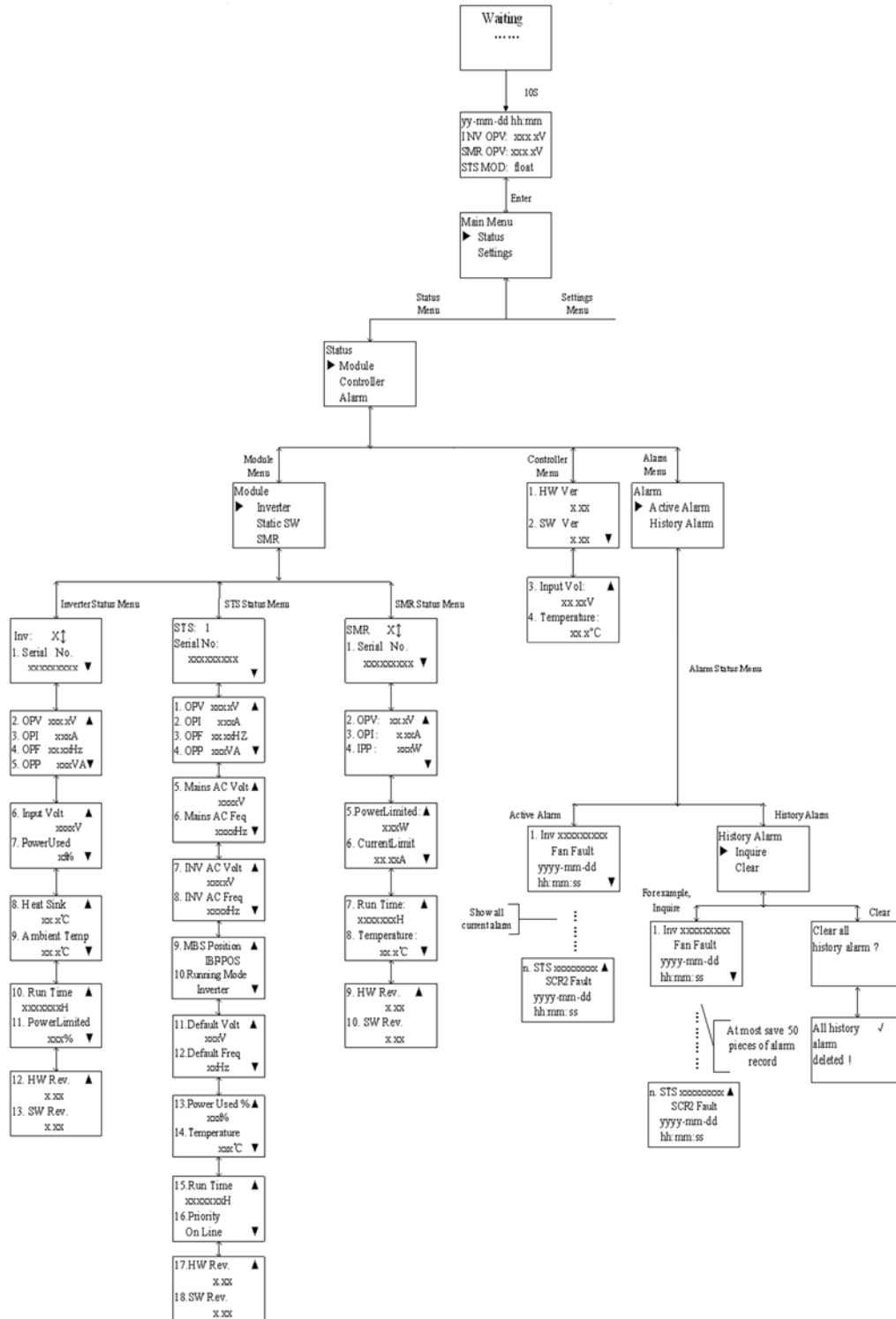
The following default values apply to systems with INV-4810 or INV-4815 inverter modules.

Mains high loss volt	138V
Mains low loss volt	100V
Inverter input highloss volt for STS	138V
Inverter input lowloss volt for STS	100V
Inverter output highloss volt	138V
Inverter output lowloss volt	100V
Inverter shut down due to low input volt	40V
Inverter shut down due to high input volt	60V
Inverter output volt	120V
Inverter output volt frequency	60Hz
Inverter output power limit	100%

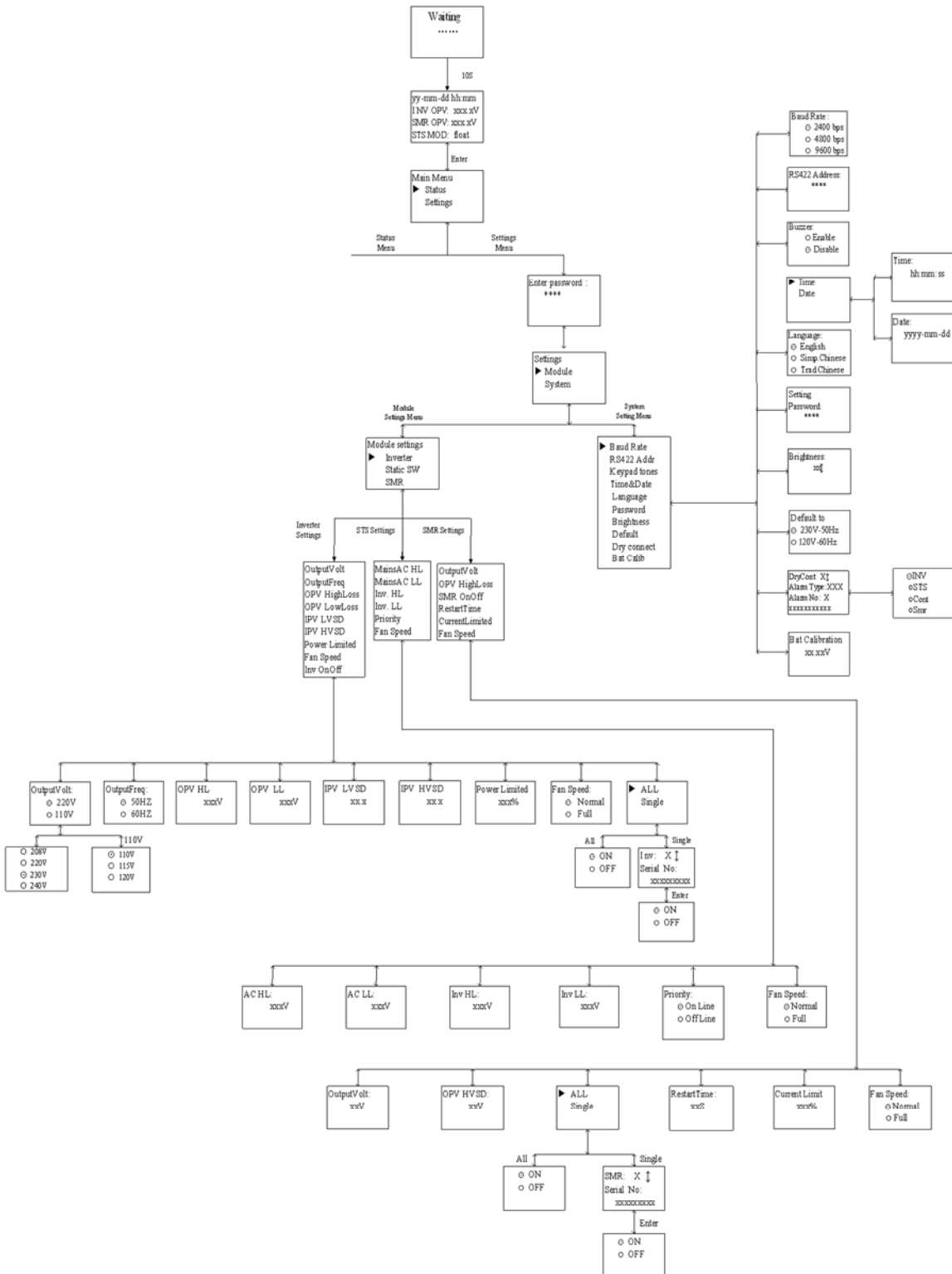
## System Parameter Default Values

RS232 communication baudrate	2400bps
Button tone (audio alarm)	On
LCD brightness value	45
Language	English
Password	1234
Drycon0 Alarmcode	Inverter over load
Drycon1 Alarm code	Inverter unavailable
Drycon2 Alarmcode	Inverter fan fault
Drycon3 Alarmcode	STS fan fault
Drycon4 Alarmcode	Inverter power limit

## Status Menu



# Settings Menu





## EQUIPMENT INCIDENT REPORT

Please enter as much information as you can. Send the completed form, together with the item for repair to your nearest authorized service agent. NOTE: Only one fault to be recorded per form.

For further information contact your local Eaton dc product supplier or Eaton (see contact details on page 77). Or email: CustomerServiceNZ@eaton.com

Date: \_\_\_\_\_

### Customer Information

Company: \_\_\_\_\_

Postal Address: \_\_\_\_\_

Return Address:  
(Not PO Box) \_\_\_\_\_

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_ Email: \_\_\_\_\_

Contact Name: \_\_\_\_\_

### Location of Failure

Product code: \_\_\_\_\_ Serial number: \_\_\_\_\_ Document number: \_\_\_\_\_

System type installed in: \_\_\_\_\_ Serial number: \_\_\_\_\_

Site name or location: \_\_\_\_\_

**Fault discovered**

<input type="checkbox"/> Delivery	<input type="checkbox"/> Unpacking	<input type="checkbox"/> Installation
<input type="checkbox"/> Initial test	<input type="checkbox"/> Operation after ____ years	<input type="checkbox"/> Other _____

**Failure source**

<input type="checkbox"/> Design	<input type="checkbox"/> Manufacturing	<input type="checkbox"/> Documentation
<input type="checkbox"/> Transportation	<input type="checkbox"/> Installation	<input type="checkbox"/> Handling
<input type="checkbox"/> _____		

**Effect on system operation**     None     Minor     Major     \_\_\_\_\_

### INFORMATION (fault details, circumstances, consequences, actions)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

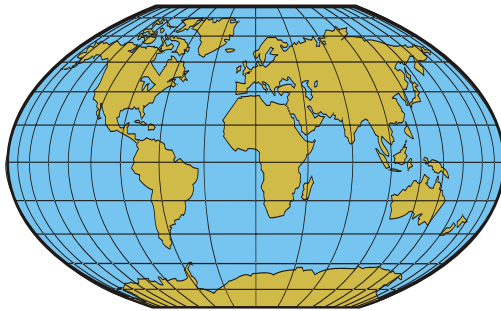
Internal use only.

Reference No: \_\_\_\_\_ RMA: \_\_\_\_\_ NCR: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_



For product information and a complete listing of worldwide sales offices, visit Eaton's website at: [www.eaton.com/telecompower](http://www.eaton.com/telecompower) or email: [DCinfo@eaton.com](mailto:DCinfo@eaton.com)

For technical support contact either your local Eaton dc product representative, the closest office from the following list, telephone (+64) 3 343-7448, or email [CustomerServiceNZ@eaton.com](mailto:CustomerServiceNZ@eaton.com)



<b>Australia</b>	1300 877 359
<b>Canada</b>	1-800-461-9166
<b>Central America</b>	+52 55 9000 5252
<b>China</b>	+86-571-8848-0166
<b>Europe / Middle East / Africa</b>	+44-1243-810-500
<b>Hong Kong / Korea / Japan</b>	+852-2745-6682
<b>India</b>	+91-11-4223-2325
<b>New Zealand</b>	0800 DC Power (327-693)
<b>Singapore / South East Asia</b>	+65 6825 1668
<b>South America</b>	+54-11-4124-4000
<b>South Pacific</b>	+64-3-343-7448
<b>Taiwan</b>	+886-2-6600-6688 or free call 0800-038-168
<b>United States of America (Toll Free)</b>	1-800-843-9433



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